

[54] **TRACTOR MOUNTED UTILITY GRADER BLADE**

3,515,221 6/1970 Fowler..... 172/447
3,677,567 7/1972 Slosiarek..... 280/499

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[57] **ABSTRACT**

[21] Appl. No.: **354,905**

A utility grader blade combined with a mounting for controllably supporting the blade from the rear of a tractor for use in grading, scraping, ditching and the like. Remotely controlled adjustment means is provided for accomplishing previously unattainable adjustment dimensions while at the same time attaining the required strength characteristics necessary for this type of equipment. The grader blade is supported for adjustment in five different attitudes with four major adjustments being remotely controlled from the tractor seat.

[52] U.S. Cl..... 172/447, 172/667, 172/742, 280/468

[51] Int. Cl..... **A01b 59/043**

[58] Field of Search 172/447, 446, 324, 325, 172/679, 667, 742; 280/463, 468, 499, 461 A

[56] **References Cited**
UNITED STATES PATENTS

3,487,448 12/1969 Stemmerman et al..... 280/499 X
3,498,637 3/1970 Lemmon..... 280/468

14 Claims, 9 Drawing Figures

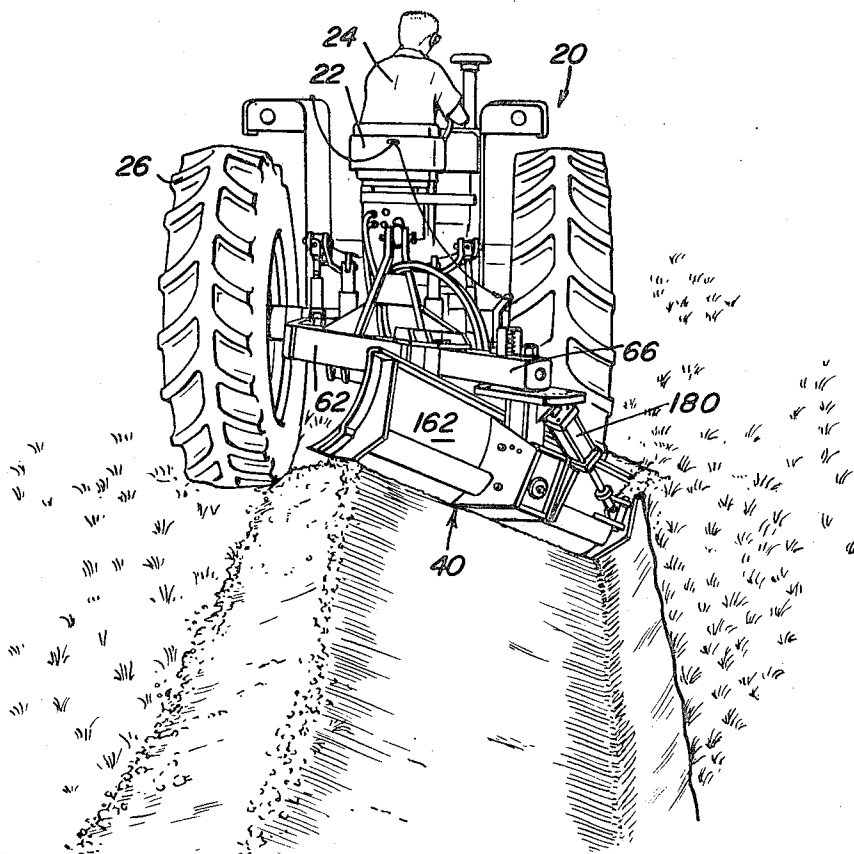


Fig. 1

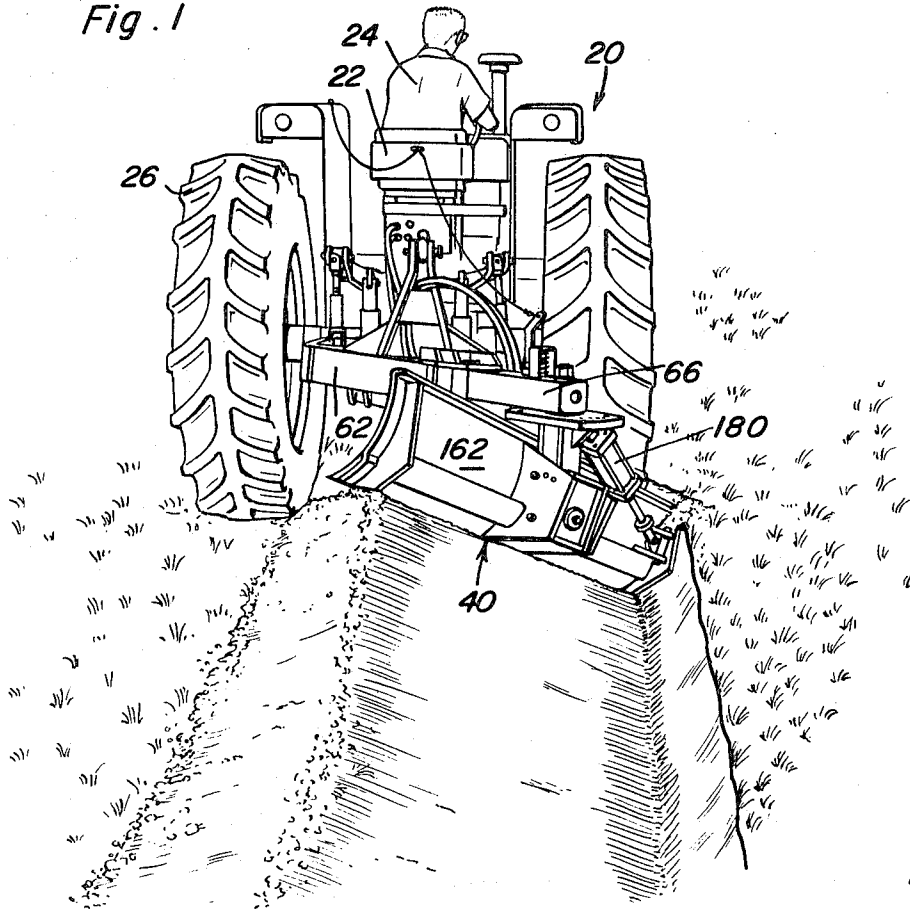
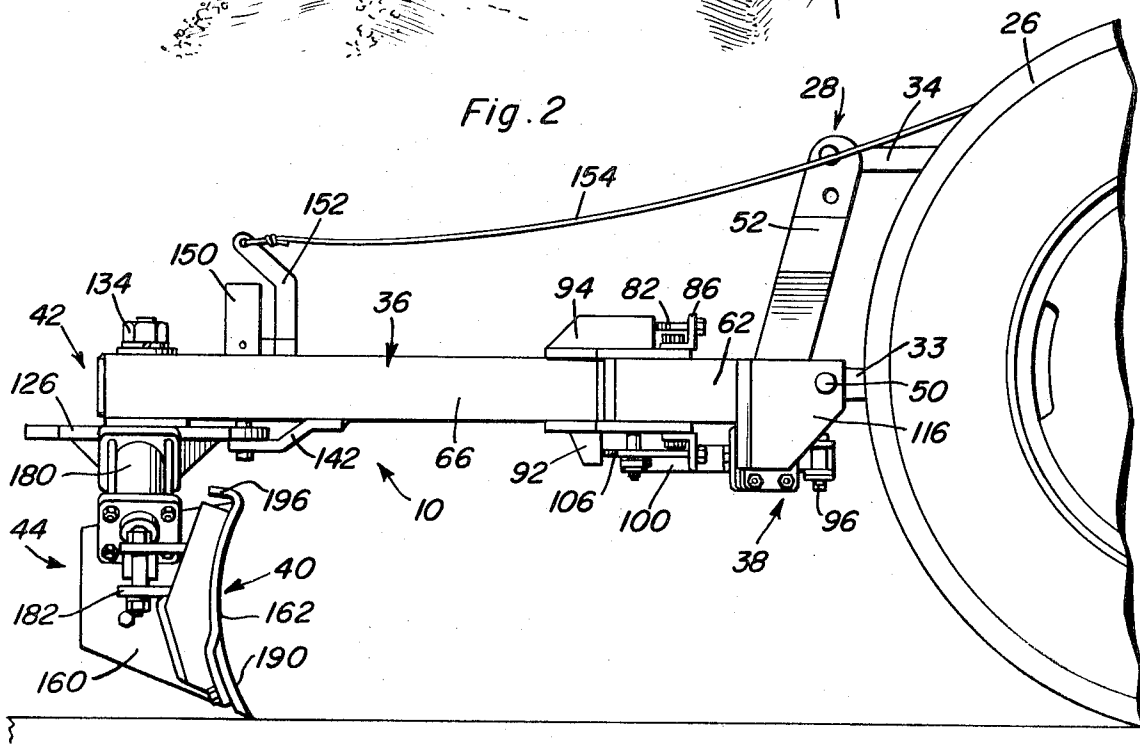


Fig. 2



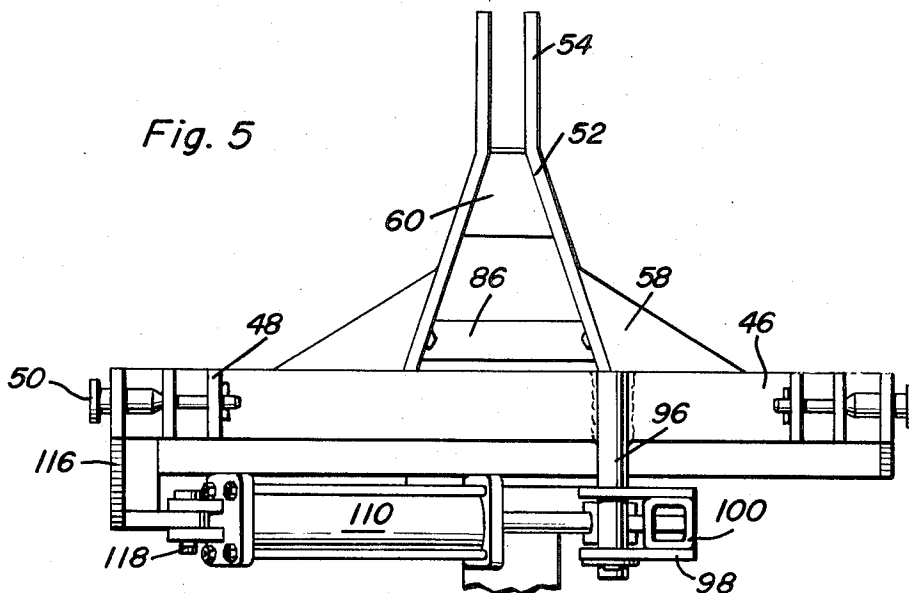
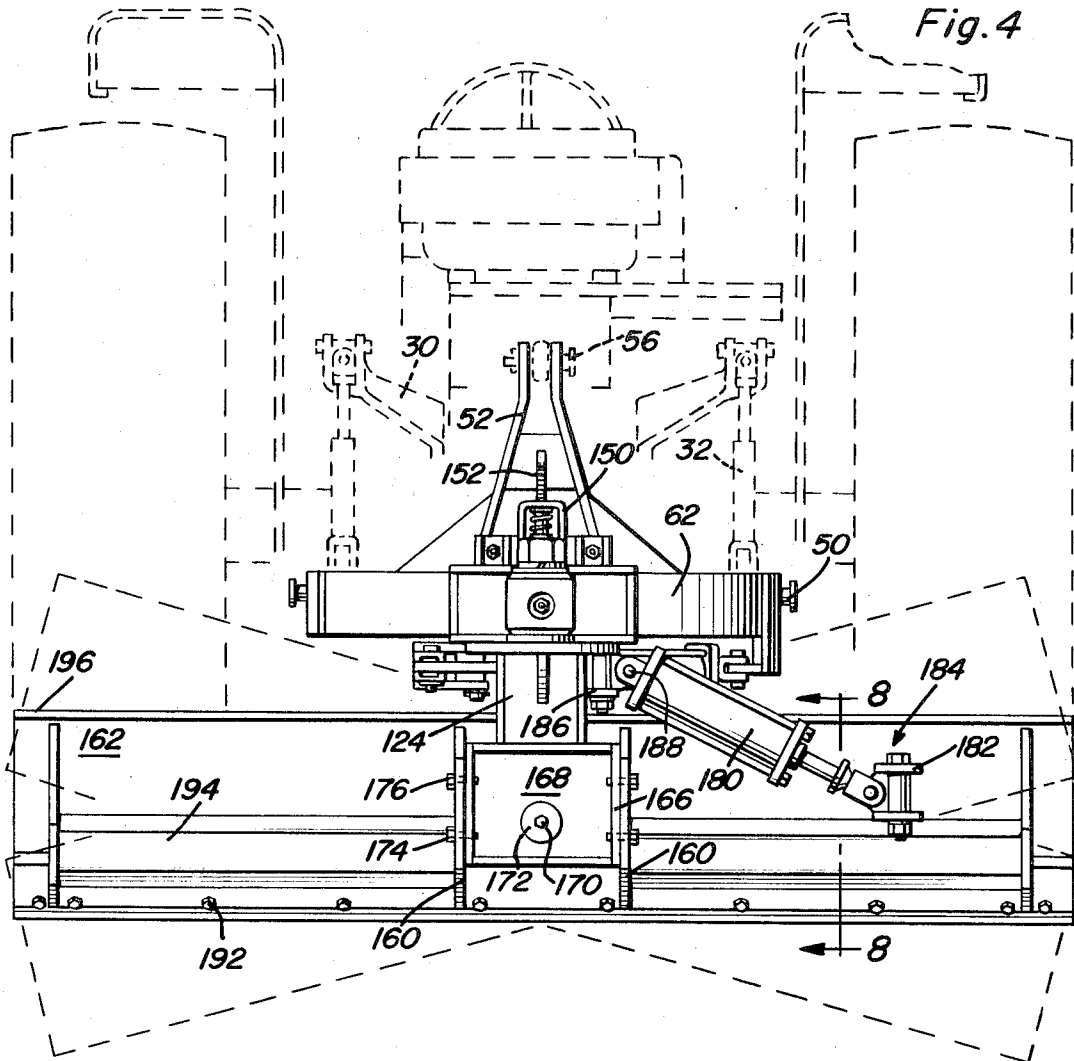


Fig. 9

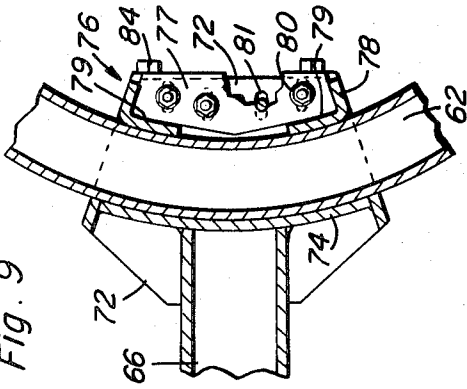
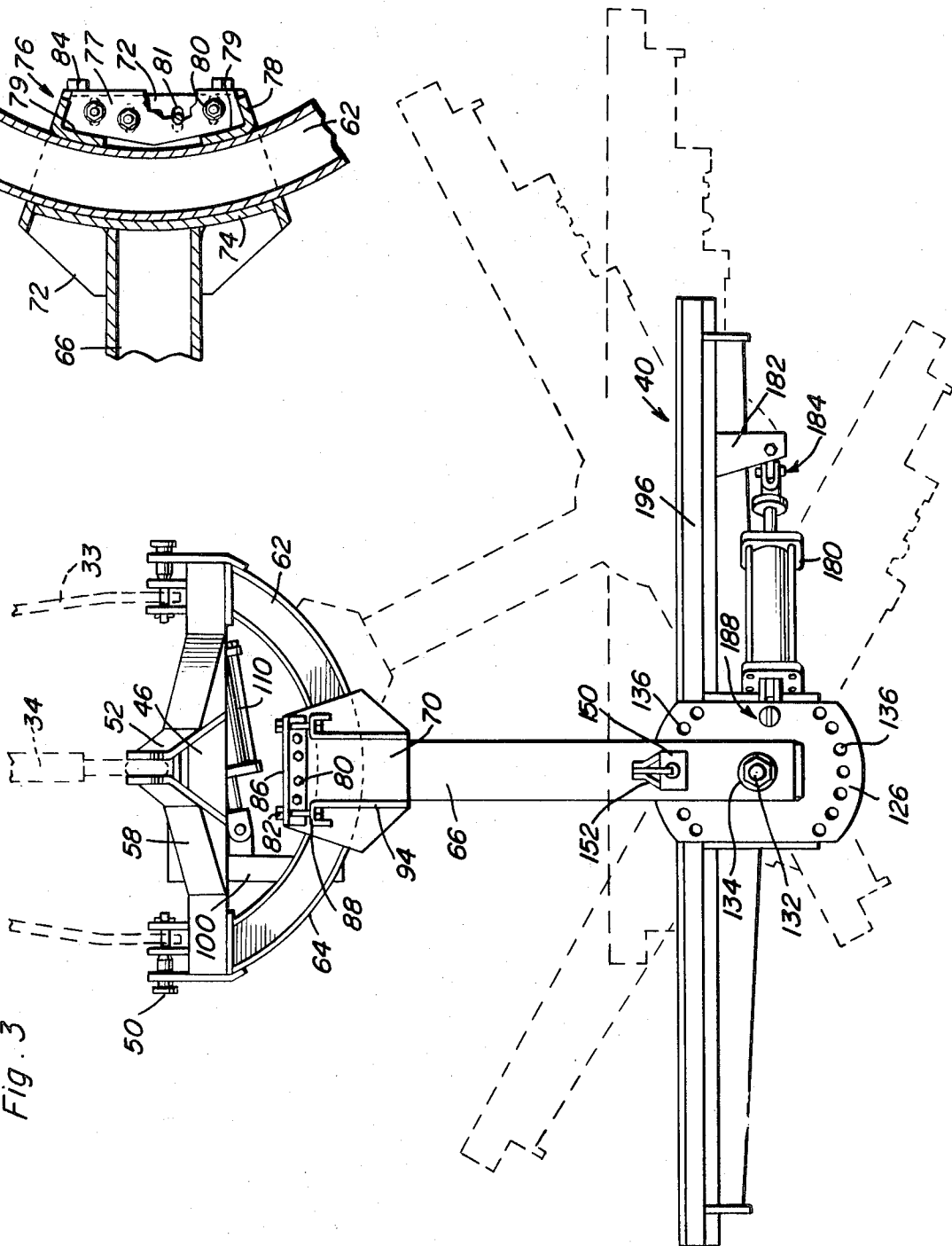


Fig. 3



TRACTOR MOUNTED UTILITY GRADER BLADE BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a rear tractor mounted utility grader blade having five major adjustments, four of which are remotely controlled from the tractor seat to provide maximum performance for various functions of the grader blade.

2. Description of the Prior Art

Grader blades have been attached to tractors at both the front and rear thereof and the mountings for the grader blades usually employ adjustment means by which the position of the grader blade may be varied. Examples of such rear mounted grader blades are found in U.S. Pat. Nos. 2,815,591; 3,515,221; 3,576,215 and 3,613,800. U.S. Pat. No. 2,815,591 provides adjustment of the blade with offset of the blade being accomplished by sliding the blade laterally of the hitch or frame structure so that the unsupported distance along the moldboard is increased thereby increasing the lever arm by which forces act on the moldboard thus requiring a stronger moldboard to withstand the same loads as a center blade mount. U.S. Pat. No. 3,515,221 discloses an arrangement by which offset of the blade is accomplished by an arm and pivot arrangement in which the pivot is inclined so that the angle of movement or swing of the blade employing a standard stroke hydraulic system is quite limited. Also, in this patent, the cylinder is subjected to direct loads from the moldboard and also side loads due to the fact that the cylinder ends do not operate in a plane. U.S. Pat. No. 3,576,215 employs a cylinder to swing the blade but in order to obtain the desired movement of the blade, the cylinder must be mounted at two different locations thus reducing the capability of remote control to both sides of a center position. U.S. Pat. No. 3,613,800 employs a parallel linkage arrangement which limits the capability of shifting of the blade and also, this structure introduces loads to the cylinder.

SUMMARY OF THE INVENTION

An object of the invention is to provide a utility grader blade mounted from the three point hitch at the rear of a tractor with the grader blade being capable of adjustment of the pitch, tilt, angle, offset and depth with all of the adjustments except for pitch being controlled from the tractor seat by the operator. The remotely controlled adjustments are accomplished by utilizing standard and readily available hydraulic piston and cylinder assemblies such as those normally used on various farm equipment and provided with an 8 inch stroke.

Another object of the invention is to provide a grader blade mounting incorporating a main frame connected with the tractor through a hitch assembly at the forward end and connected with the grader blade by a vertical pivot post mount at the rear.

A further object of the invention is to provide a grader blade mount in accordance with the preceding objects in which the hitch assembly includes a curved beam whereby both shifting and swinging of the main frame are accomplished with a single cylinder with maximum offset being accomplished with the curved beam or member with a given stroke cylinder with remote control to both the left and right of center position being controlled by a single cylinder. The main

frame shifts and swings in two directions along the curved member.

Still another object of the invention is to provide a grader blade mounting as set forth in the preceding objects in which the hitch assembly includes a clevis arrangement that allows the main frame to slide along the curved member and includes an adjustable shoe which compensates for wear with the adjustable shoe being associated with a slide shoe with the two shoes being on opposite sides of the curved member so that a locking action occurs between the slide shoes and the front and rear sides of the curved member when forces on the grader blade are encountered by resistance from the soil thereby preventing transmission of operating forces to the control cylinder and linkage thereby enabling the use of economical linkage and enabling a standard hydraulic cylinder to be employed inasmuch as the cylinder does not have to encounter or withstand forces exerted by the grader blade.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear perspective view of the utility grader blade of the present invention mounted from the rear of a tractor.

FIG. 2 is a side elevational view of the grader blade and mounting therefor.

FIG. 3 is a top plan view of the grader blade and mounting illustrating the orientation of the components and certain of the adjustments in broken line.

FIG. 4 is a rear elevational view of the grader blade and mounting illustrating further structural details thereof and additional adjustment capabilities in broken line.

FIG. 5 is a front elevational view of the hitch assembly for the grader blade mounting.

FIG. 6 is a longitudinal, vertical sectional view of the grader blade and mounting.

FIG. 7 is a plan, sectional view taken substantially upon a plane passing along section line 7—7 of FIG. 6 illustrating structural details of the linkage and connection between the hydraulic cylinder and main frame for shifting and swinging the main frame in relation to the curved hitch member.

FIG. 8 is a vertical sectional view taken substantially upon a plane along section line 8—8 of FIG. 4 illustrating further structural details of the grader blade and the structure to enable adjustment of the pitch of the blade with such adjustment being shown in broken line.

FIG. 9 is a sectional view taken along section line 9—9 on FIG. 6 showing additional structural details.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now specifically to the drawings, the utility grader blade of the present invention is generally designated by numeral 10 and is attached to a conventional tractor 20 of the type having a hydraulic system incorporated therein with control valve assemblies associated with an operator's seat 22 so that the operator 24 of the tractor may actuate the control valve or control valves while also controlling the tractor 20. Also, the

tractor is provided with the usual rear drive wheels 26 and a standard three point hitch assembly 28 including two lift arms 30 connected to the two lower points of attachment through adjustable lift links 32 and an upper arm 34 connected to the upper point of attachment on the utility grader blade 10. The structure and operation of the tractor 20 is conventional and forms no particular part of the present invention except in its association with the grader blade and mounting assembly therefor.

The grader blade assembly 10 includes an elongated main frame 36 extending rearwardly from a hitch assembly 38 and which includes a grader blade generally designated by numeral 40 at the rear terminus thereof which is connected thereto through a vertical pivot post assembly 42 and a tilt box assembly 44.

The hitch assembly 38 includes a transversely extending beam or member 46 having hitch points 48 at each end thereof for connection with the lift links 32 by conventional pins 50. Attached to the transverse member 46 is an upstanding A frame 52 having the upper hitch point 54 thereon for connecting with the upper arm 34 by a pin 56 all of which is a conventional manner of connecting an implement to the three point hitch. The upstanding members of the A frame are rigidified by gussets 58 externally thereof and a reinforcing plate 60 internally thereof.

The hitch assembly 38 also includes an arcuate or curved beam 62 rigid with and disposed rearwardly of the transverse member or beam 46 with both the transverse member 46 and the arcuate member 62 being hollow with the arcuate member 62 having the front and rear walls thereof extending slightly above and below the top and bottom walls respectively to provide curved flanges 64. Thus, the transverse member 46, arcuate member 62 and A frame 52 are all rigidly interconnected and define a hitch assembly connected to the three point hitch of the tractor 20 which includes upper arm 34, lift arms 30, lift links 32 and lower arms 33 in a conventional manner so that the operator 24 may raise and lower the hitch assembly by operating the three point hitch in a conventional and well known manner.

The main frame 36 includes a single longitudinally elongated hollow member or beam 66 attached to the curved member 62 by a connecting assembly 68 in the form of a clevis arrangement which permits the main frame 36 to slide along the curved member 62 thus allowing the main frame 36 and the grader blade 40 to shift and swing in two directions from a center position in order to advantageously provide remote blade offset.

The connecting assembly 68 includes two horizontally disposed plates 70 and 72 which are spaced apart by a stationary shoe 74 at the rear all of which are rigid with beam 66. An adjustable shoe 76 at the front of member 62 compensates for wear and is removable for assembly purposes. The adjustable shoe 76 includes top and bottom flanges 77 rigidly interconnected by vertical edge flanges 78 which have inturned rear edge flanges 79 which form wear shoes engaged with the front surface of curved member 62. The top and bottom plates 70 and 72 are provided with slots 81 for adjustable connection with the top and bottom flanges 77 by vertically oriented bolts 80 as illustrated in FIG. 9. Movement of the adjustable shoe 76 is attained by horizontally disposed bolts including two upper bolts 82 and two lower bolts 84. The bolts 82 extend between

upwardly extending flanges 86 attached under the upper bolts 80 and an upwardly extending flange 88 on the upper plate 70 as illustrated in FIG. 6. The lower bolts 84 extend through flanges 90 on the lower bolts 80 and flanges 92 on the lower plate 72 so that the shoe 76 may be moved or adjusted toward the curved member 62 by loosening the bolts 80 and then manipulating the bolts 82 and 84 to move the shoe 76 toward the arcuate member 62 thereby compensating for wear. The flanges 88 and 92 on the plates 70 and 72 respectively may be reinforced by gussets 94 to provide a rigid structure.

Rigidly fixed to the forward surface of the transverse member 46 as by welding or the like is a depending rod or pin 96 which extends downwardly below the transverse member 46 and is connected with lugs 98 on a hollow linkage member 100 with the lugs 98 being disposed at one end of the linkage member 100. The linkage member 100 extends rearwardly under the transverse member 46 and under the curved member 62 and is connected at its other end to a swing linkage member 102 by a pin 104. The linkage member 102 is connected with a depending pin or rod 106 rigid with the lower plate 72 as illustrated in FIG. 6. Intermediate the ends of the linkage member 100, lugs 108 are provided to which is connected one end of the hydraulic piston and cylinder assembly 110. Specifically, the piston rod 112 is connected to the lugs 108 by a pin 114. The cylinder end of the piston and cylinder assembly 110 is pivotally connected to a depending bracket 116 on the end of the transverse member 46 by a pin and lug assembly 118 as illustrated in FIG. 5. The piston and cylinder assembly 110 is a standard 8 inch stroke hydraulic cylinder which is commercially available and used on various farm implements.

The vertical pivot post assembly 42 is located at the rear of the hollow longitudinal frame member 66 and includes a vertically disposed pivot shaft 120 received in a vertical tubular member 122 rigidly fixed through the longitudinal hollow beam 66 as illustrated in FIG. 6. The pivot shaft 120 is rigidly fixed to a vertical tube 124 which projects from its lower end and which includes a horizontal plate 126 rigid with its upper end with the plate 126 underlying the bottom of the hollow beam 66 and reinforced with the vertical tube 124 by gussets 128 or the like. A bearing 130 is provided between the plate 126 and the hollow beam 66 to facilitate rotational movement of the vertical tube 124 and shaft 120 in relation to the hollow beam 66 and the pivot tube 122 extending therethrough. The shaft 120 is retained in assembled relation with the hollow beam 66 by the threaded upper end 132 thereof receiving a nut 134 which has a washer thereunder for bearing engagement with the upper end of the pivot tube 122 and the upper surface of the hollow frame member or beam 66. Thus, the plate 126, shaft 120 and tube 124 which are all rigid with each other are all rotatably supported from the main frame 36 for movement about the axis of the shaft 120.

To lock the plate 126 in angularly adjusted position, the plate 126 is provided with a plurality of spaced apertures 136 which are arcuately arranged about the axis of the shaft 120 at both the forward and rearward edge of the plate 126. The apertures 136 are adapted to receive a vertically reciprocal lockpin 138 that is vertically slidably received through aligned apertures in the hollow beam 66 as illustrated in FIG. 6. The lower end

of the lockpin 138 extends through one of the apertures 136 and also through an aperture 140 in a lug 142 rigidly fixed to the bottom of the frame member 66 thus more securely supporting the lockpin 138. By lifting the lockpin 138 upwardly, it can be retracted from the aperture 136 thus enabling the plate 126 and its related structure to be pivoted about the axis of the shaft 120 to a desired angular position after which release of the lockpin 138 will enable the lockpin 138 to pass through an aligned aperture 136 for locking the plate 126 in adjusted position about the axis of the shaft 120.

For biasing the lockpin 138 downwardly, a compression coil spring 144 is provided on the upper end of the lockpin 138 which extends above the hollow beam 66. The lower end of the spring 144 engages a plate or pin 146 rigid with the lockpin 138 and the upper end of the spring 144 engages the top horizontal plate or bight portion 148 of a U-shaped guide bracket 150. The bight portion or plate 148 of the U-shaped guide 150 has an aperture enabling longitudinal reciprocation of the pin 138 and also serves as an additional guide for the lockpin 138 when it is elevated.

A bell crank 152 is provided for lifting the lockpin 138 with the bell crank 152 having an upwardly extending arm having its upper end connected to a flexible operating line 154 that extends forwardly to a point adjacent the operator's seat 22 on the tractor 20 and is anchored in a suitable manner to a portion of the tractor as illustrated in FIG. 1 so that the operator 24 may actuate the bell crank 152. The bell crank 152 includes a lower arm 156 perpendicular to the upwardly extending arm that is pivotally connected to the lockpin 138 below the flange 146 by a pin connection 158 so that as the upper end of the bell crank 152 is pulled forwardly, the lockpin 138 will be moved upwardly against the spring 144 thus compressing the spring thereby enabling the plate 126 to be released and locked from the operator's seat of the tractor. The bell crank 152 has a substantially right angular configuration where it engages the top surface of the beam 66 so that it will rock about a fulcrum area with the orientation of the bell crank being maintained by the pin 158 extending through the pin 138 and the plate 146 rigid with the pin 138 and having end edges closely adjacent the U-shaped guide 150 thereby maintaining the relationship of the bell crank with the beam 66 and lockpin 138.

The lower end of the vertical tubular member 124 is connected with the tilt box assembly 44 and the grader blade 40. The tilt box assembly 44 includes two spaced vertical fore-and-aft plates 160 which have their forward ends rigidly affixed to the rear surface of a vertically arcuate grader blade 162. Extending between the plates 160 is a box-like structure 164 which includes two flat end plates 166 which are disposed closely adjacent the plates 160 and a pair of transversely extending channel-shaped plates 168, one located forwardly and one located rearwardly and interconnecting the edge portions of the flat plates 166 with these plates being rigidly interconnected to form a box-like structure with the plates 168 being spaced fore-and-aft from each other and receiving the vertical tube therebetween. The vertical tube 124 has its lower end portion pivotally connected between the fore-and-aft plates 168 by a bolt 170 and a bearing assembly 172 which defines a fore-and-aft axis to enable the plates 168 and the plates 166 which are rigid therewith to pivot about the fore-and-aft axis defined by the bearing 172 and bolt 170.

Correspondingly, the grader blade 162 may pivot about the same axis by virtue of the plates 160 being attached to the plates 166 adjacent the bottom edges thereof by pivot bolts 174 which define a transverse axis of pivotal movement for the plates 160 in relation to the box 164. The plates 160 are secured in adjusted position about the axis defined by the bolts 174 by bolts 176 disposed above the bolts 174 being received in one of a plurality of apertures 178 in the plates 160 which are arcuately arranged about a center defined by the bolts 174. Thus, by positioning the upper fastening bolts 176 in one of the selected apertures 178, the plates 160 and blade 162 may be angularly adjusted about a transverse axis defined by the bolts 174 thereby varying the angular orientation or pitch of the grader blade 162 about the transverse axis defined by the bolts 174 as illustrated in FIG. 8.

Pivotal movement of the grader blade 162 about the fore-and-aft axis defined by the bolt 170 is accomplished by a piston and cylinder assembly 180 having one end thereof connected to a rearwardly extending bracket or lugs 182 by a double pin and bracket assembly 184 which provides universal movement and is located generally centrally of the vertical height of the grader blade and laterally between one end thereof and the pivot post assembly 42 as illustrated in FIG. 4. The other end of the piston and cylinder assembly 180 is connected to a bracket or lugs 186 on the plate 126 by a double pin and bracket assembly which provides universal movement and enables the angle of the grader blade to be varied in the manner illustrated by the broken lines in FIGS. 3, 4 and 8. The piston and cylinder assembly is a conventional 8 inch stroke hydraulic cylinder capable of universal movement at each end thereof and controlled and actuated from the operator's seat area of the tractor.

The grader blade is provided with a removable cutting edge 190 secured in place by bolts 192 or the like and reinforcements such as a channel-shaped member 194 may be provided on the rear of the grader blade in order to rigidify the blade with the top edge of the grader blade having a rearwardly extending flange 196 to further rigidify the blade.

The grader blade of the present invention has five adjustments. Pitch of the blade 162 is adjusted as illustrated in broken line in FIG. 8 by the tilt box assembly including the series of holes 178 provided in the plates 160 or pitch brackets 160 so that by association of the bolts 176 with the appropriate holes 178, the blade 162 may be "pitched" or rotated about the axis defined by the bolts 174 which are substantially parallel to the blade 162. This adjustment is significant in obtaining ideal cutting, penetration and draft reduction as well as stabilization of the cutting depth of the blade.

The tilt of the blade 162 may also be adjusted with this adjustment being shown in broken line in FIG. 4 and which also is accomplished by the tilt box and the bolt and bearing assembly 170 and 172 which enables the blade 162 to tilt or rotate about a horizontal axis substantially perpendicular to the blade 162. This blade rotation is commonly known as tilt and is controlled by a standard piston and cylinder assembly 180 connected to lugs on the blade 162 and the plate or tubular member 126 and 124 with the pivotal connection between the hydraulic cylinder and the moldboard and vertical tube being constructed to enable pivotal movement about substantially vertical axes to prevent binding

from pitch adjustments. The tilt adjustment enables one end of the blade to be positioned lower than the other and is employed in combination with other adjustments for maximum advantage in grading.

The angle of the grader blade is also adjusted with the angular adjustment being illustrated in broken line in FIG. 3 with this being accomplished by rotation of the blade 162 about a vertical axis at the center of the blade as defined by the pivot shaft 120. The angle adjustment is accomplished by rotating the vertical shaft 120, the tubular member 124 rigid therewith and the plate 126 rigid therewith together with the tilt box and grader blade with the control for the adjustment about the vertical axis being accomplished by the locking pin or index pin 138. Retraction and release of the index pin 138 is accomplished remotely from the tractor seat by the use of the bell crank or lever member 152 and a rope or line 154 so that when the rope or line 154 is pulled, the index pin 138 is retracted and rotation of the blade about a vertical axis is then accomplished by contacting one end or the other of the blade against the ground and moving the tractor forward or backward thereby enabling adjustment of the angle of the blade to be completely remotely controlled.

The grader blade is also adjustable as to the offset of the blade which provides the capability of handling soil or other material on either side of the tractor. The offset adjustment is shown in broken line in FIG. 3 and the specific structure of this invention enables maximum dual offset, that is offset to either side of center, without the operator dismounting from the tractor. This maximum travel is obtained by the shift and swing of the main frame 36 along the curved hitch member 62. The specific structure of the hitch assembly and the main frame provides a locking action for the main frame which occurs between the slide shoes 74 and 76 and the front and rear sides of the curved member 62 when forces on the grader blade 162 are encountered by resistance from the soil. This locking action prevents transmission of operating forces to the shift control cylinder 110 and its corresponding linkage which allows use of economical linkage and fulfills the object of enabling the use of standard eight inch stroke hydraulic cylinders. The linkage system illustrated in FIG. 7 includes two members 100 and 102 pinned to each other in an elbow fashion by pin 104 with one end anchored beneath the hitch member by pin 96 and the other end attached to the main frame clevis by pin 106.

The blade may also be adjusted as to depth which adjustment is controlled by the tractor operator by adjusting the three point hitch of the tractor from the operator's seat with the mounting assembly of the blade being constructed to provide an adequate range of depth control when using standard three point hitches.

The five adjustments of offset, angle, tilt, pitch and depth may be made either independently or in combination with each other with the mounting including a hitch suitable for attachment to a standard ASAE three point tractor hitch with all of the adjustments except for the pitch being remotely controlled by the operator of the tractor from the operator's seat. The structure also provides maximum adjustment ranges by using standard ASAE 8 inch stroke hydraulic cylinders that are common components of many farm implements thereby rendering the device economical to manufacture but yet quite flexible in its use due to its various adjustments with one manner of using the grader blade

being illustrated in FIG. 1 which illustrates the manner in which the grader blade may be offset in relation to the tractor but the grader blade is still center supported to obtain maximum utility of the structural characteristics of the mounting assembly for the grader blade. One of the features which enhances the use of strength characteristics of the structure is the coaction of the shoes with the curved hitch member so that as rearward forces are exerted on the main beam due to resistance of the grader blade, the frictional engagement of the shoes with the curved member provide a locking action which prevents transmission of forces to the piston and cylinder and linkage assembly.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. An implement assembly for connection with a three point hitch on the rear of a tractor comprising a main frame, a hitch assembly at the forward end of the main frame for connection with the three point hitch of the tractor, means interconnecting the main frame and hitch assembly, to shift and swing the main frame laterally in relation to the hitch assembly, an implement, means mounting the implement at the rear of the main frame for adjustable movement about a vertical axis, adjustable movement about a fore-and-aft longitudinal axis and adjustable movement about a transverse axis to enable adjustment of the implement, said hitch assembly including an arcuate transverse member, means on the arcuate member for connection with the three point hitch of the tractor, said main frame including a longitudinal beam extending rearwardly from the arcuate member, said means connecting the main frame and hitch assembly including arcuate shoes connected with the forward end of the beam and engageable with the forward and rearward arcuate surfaces of the arcuate member enabling the beam to be moved laterally of the arcuate member to offset the implement in relation to the tractor.

2. The structure as defined in claim 1 wherein said means enabling adjustment about a fore-and-aft longitudinal axis includes a bearing assembly extending substantially perpendicular to the rear of the implement, a supporting post assembly depending from the main frame and engaged with the bearing assembly, and a fluid pressure operated piston and cylinder assembly interconnecting the implement and the vertical post in spaced relation to the bearing assembly to enable remote control of the angular position of the implement in relation to the post about the fore-and-aft axis of the bearing assembly.

3. The structure as defined in claim 1 wherein said means for varying the angle of the implement about a transverse axis including a depending supporting post from the main frame, a bolt and bracket assembly projecting rearwardly from the implement with the bolt extending through the bracket and post, arcuately arranged apertures and bolt assemblies spaced from the pivot bolt to enable variation in the angular position of the implement in order to vary the pitch thereof.

4. The structure as defined in claim 1 wherein said means connecting the implement to the rear end of the main frame for pivotal movement about a vertical axis includes a substantially vertical pivot shaft supported from the rear end of said main frame, said implement being supported from said shaft for pivotal movement about the vertical axis thereof, latch means retaining the implement in angularly adjusted position about the vertical axis of the shaft, said latch means being operated remotely to enable an operator of the tractor to release the latch means to enable angular adjustment of the implement, said latch means being automatically returned to latching position.

5. The structure as defined in claim 4 wherein said pivot shaft is journaled from the main frame and includes a plate having arcuately arranged apertures therein, said latch means being in the form of a reciprocal pin mounted on the main frame for selective engagement with one of the apertures for selectively locking the plate and implement in adjusted position.

6. The structure as defined in claim 1 together with fluid pressure operated piston and cylinder means interconnecting the hitch assembly and main frame to shift and swing the beam around the arcuate member with the beam being substantially perpendicular to a tangent of the arcuate member in all relative positions thereof.

7. The structure as defined in claim 6 wherein the forward shoe on the beam engages the inner surface of the arcuate member, said forward shoe being adjustably mounted on the beam to compensate for wear against the inner surface of the arcuate member, said shoes transmitting the forces exerted by the beam to the arcuate member thereby preventing transmitting such forces to the fluid pressure operated piston and cylinder assembly.

8. The structure as defined in claim 7 wherein said piston and cylinder assembly includes a linkage mechanism connected between the beam and the piston and cylinder assembly to enable a standard 8 inch stroke hydraulic piston and cylinder assembly to be employed to shift and swing the beam from one end to the other of the arcuate member.

9. The structure as defined in claim 8 wherein said means connecting the implement to the rear end of the main frame for pivotal movement about a vertical axis includes a substantially vertical pivot shaft supported from the rear end of said main frame, said implement being supported from said shaft for pivotal movement about the vertical axis thereof, latch means retaining the implement in angularly adjusted position about the vertical axis of the shaft, said latch means being operated remotely to enable an operator of the tractor to release the latch means to enable angular adjustment of the implement, said latch means being automatically returned to latching position.

10. An assembly mounting the main frame of an implement to a vehicle comprising a rigid arcuate transverse member connected with the vehicle, a connecting assembly mounted on said main frame and connected with said transverse member for arcuate movement longitudinally thereof, and means interconnecting said connecting assembly and transverse member to move the connecting assembly arcuately in both directions from a center position on the transverse member thereby enabling the implement to swing and shift in dual offset relation to the vehicle, said connecting as-

sembly including an arcuate front shoe engageable with the front surface of the transverse member and an arcuate rear shoe engageable with the rear surface of the transverse member to oppose forces exerted on the main frame by the implement and to transmit such forces directly to the transverse member in all offset positions of the implement in relation to the vehicle thereby locking the implement in position and preventing such forces from being transmitted to the means for moving the connecting assembly on the transverse member.

11. The structure as defined in claim 10 wherein said means for moving the connecting assembly includes a fluid pressure operated piston and cylinder assembly having a standard stroke output member, and linkage means interconnecting the output member and the connecting assembly, said linkage means including means imparting a mechanical advantage to move the connecting assembly a distance greater than the movement of the output member.

12. The structure as defined in claim 10 wherein said connecting assembly includes means mounting one of said shoes for adjustment relative to the other shoe, and means interconnecting the main frame and adjustable shoe for moving the adjustable shoe toward and away from the other shoe for compensating for wear and to enable locking of the main frame and implement in offset position.

13. The structure as defined in claim 9 wherein said implement is in the form of an elongated grader blade, said pivot shaft being journaled from the main frame and includes a plate having arcuately arranged apertures therein, said latch means being in the form of a reciprocal pin mounted on the main frame for selective engagement with one of the apertures for selectively locking the plate and grader blade in adjusted position, said means enabling adjustment about a fore-and-aft longitudinal axis including a bearing assembly extending substantially perpendicular to the rear of the grader blade, a supporting post assembly depending from the main frame and engaged with the bearing assembly, and a standard, 8 inch stroke hydraulic pressure operated piston and cylinder assembly interconnecting the grader blade and the vertical post in spaced relation to the bearing assembly to enable remote control of the angular position of the grader blade in relation to the post about the fore-and-aft axis of the bearing assembly, said means for varying the angle of the grader blade about a transverse axis including a depending supporting post from the main frame, a bolt and bracket assembly projecting rearwardly from the grader blade with the bolt extending through the bracket and post, arcuately arranged apertures and bolt assemblies spaced from the pivot bolt to enable variation in the angular position of the blade in order to vary the pitch thereof.

14. The assembly as defined in claim 10 wherein the main frame of the implement extends generally radially from the transverse member whereby arcuate movement of the connecting assembly longitudinally along the arcuate transverse member is resisted by frictional engagement between the outer ends of the shoes and the front and rear surfaces of the transverse member when the implement exerts lateral forces on the main frame.

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