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Coontz

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[54] **BULLDOZER MEANS WITH A PIVOTABLE BLADE**

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[51] **Int. Cl.** **E02f 3/76**

[58] **Field of Search** 172/213, 297, 803–807, 172/809; 37/42

[56] **References Cited**

UNITED STATES PATENTS

3,439,752	4/1969	Coontz	172/805
2,950,550	8/1960	French	172/804
3,581,829	6/1971	Frisbee et al.	172/804
2,216,572	10/1940	Nichols	172/803 X
2,943,407	7/1960	Long	172/804
2,749,630	6/1956	Nave	172/804
2,973,592	3/1961	Abel	172/804

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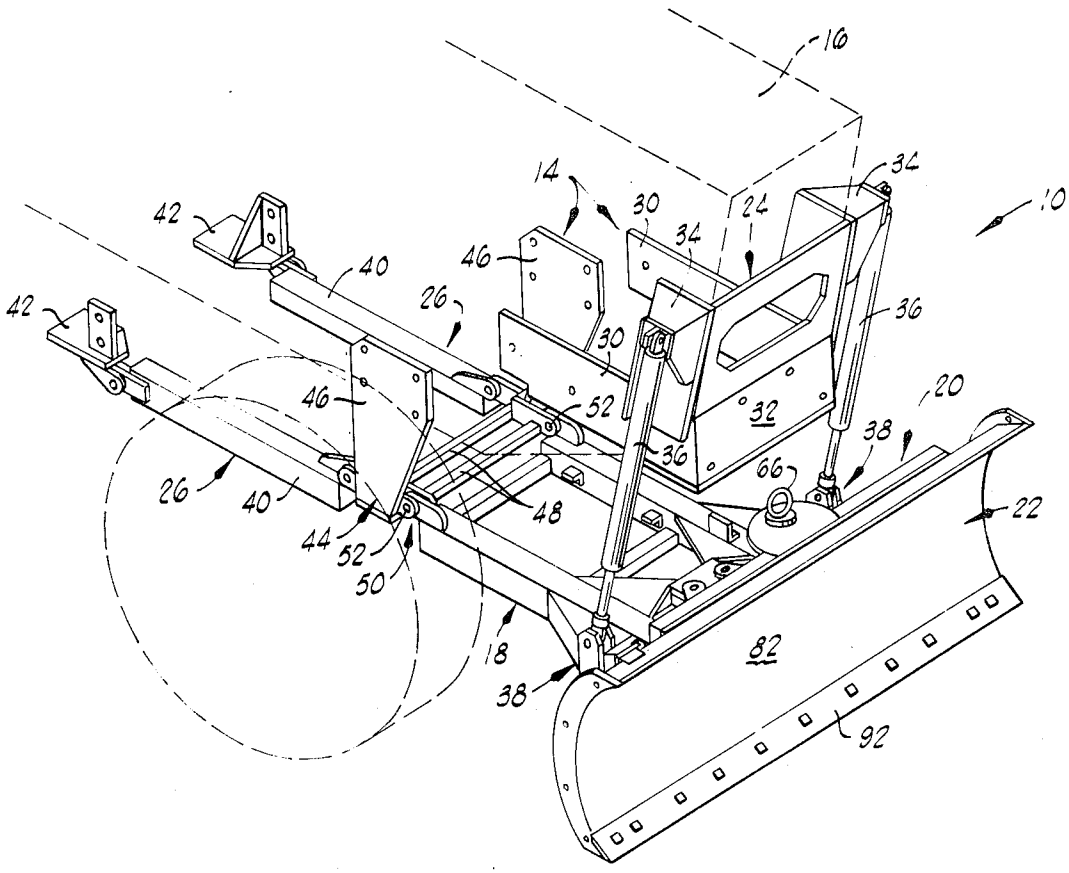
[57] **ABSTRACT**

A bulldozer assembly has a blade support pivotally mountable with a tractor to be pivoted generally vertically. A blade mount is transversely pivotally mounted on the outer end of the blade support. A blade is pivotally mounted on the blade mount to tilt the blade in an upright plane.

2 Claims, 8 Drawing Figures



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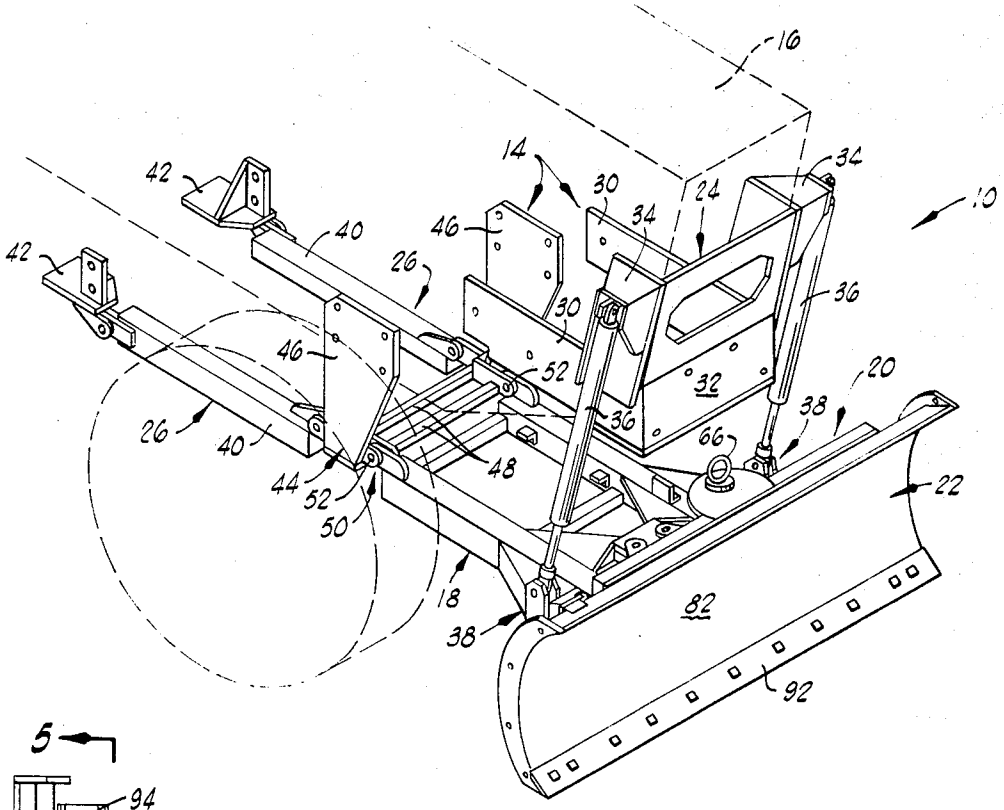

FIG. 1

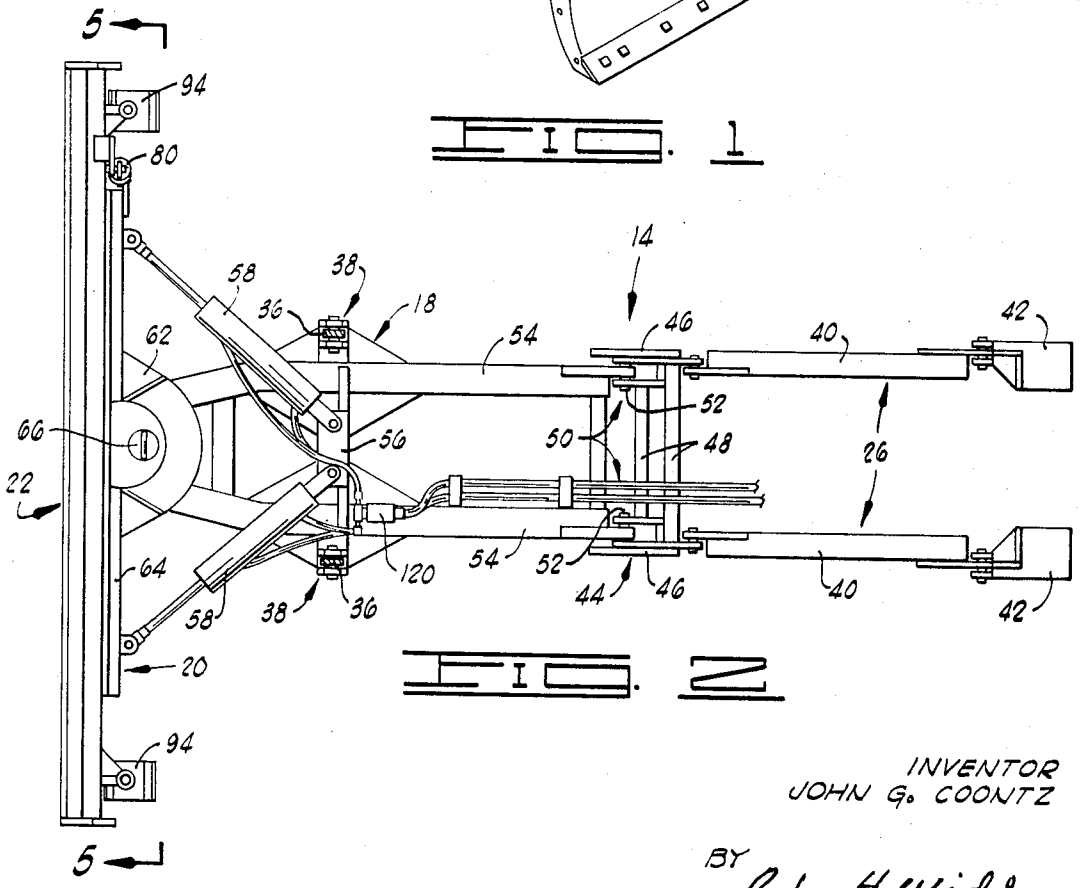

FIG. 2

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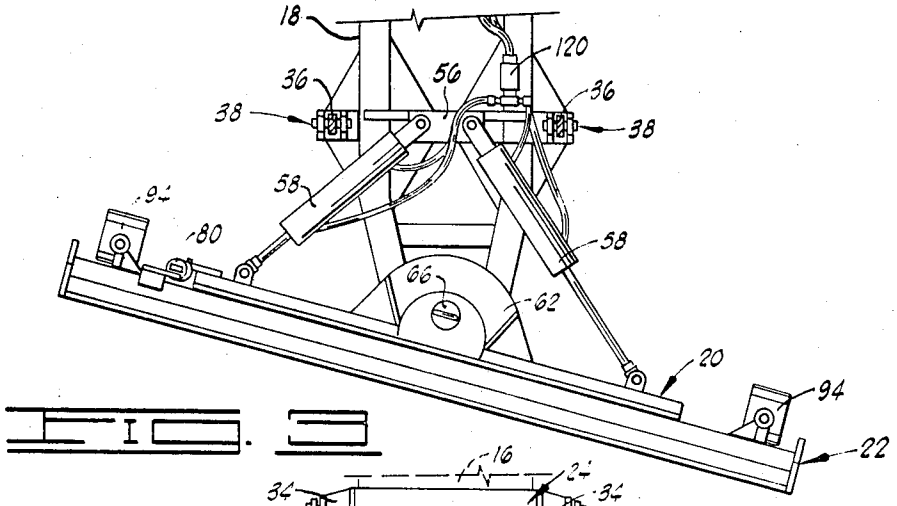

FIG. 3

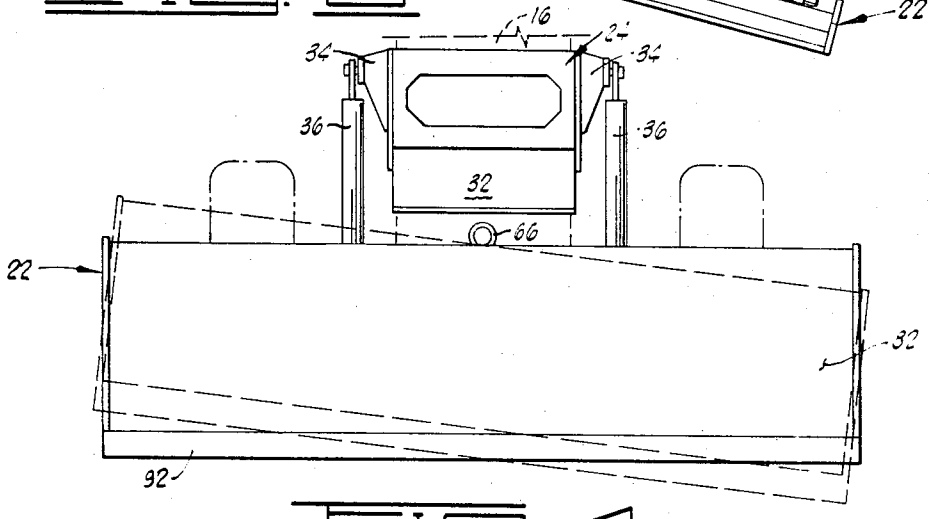

FIG. 4

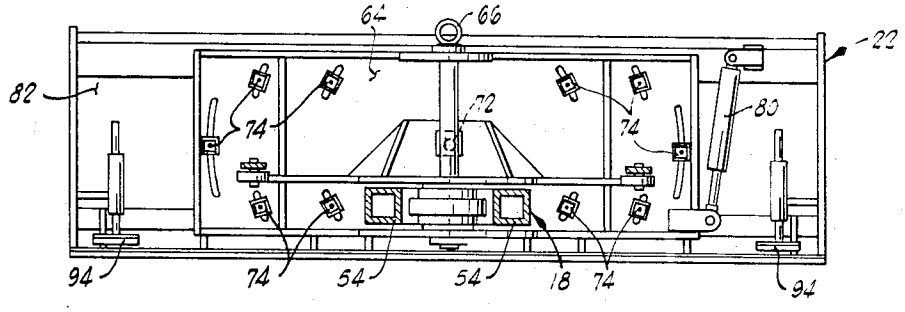

FIG. 5

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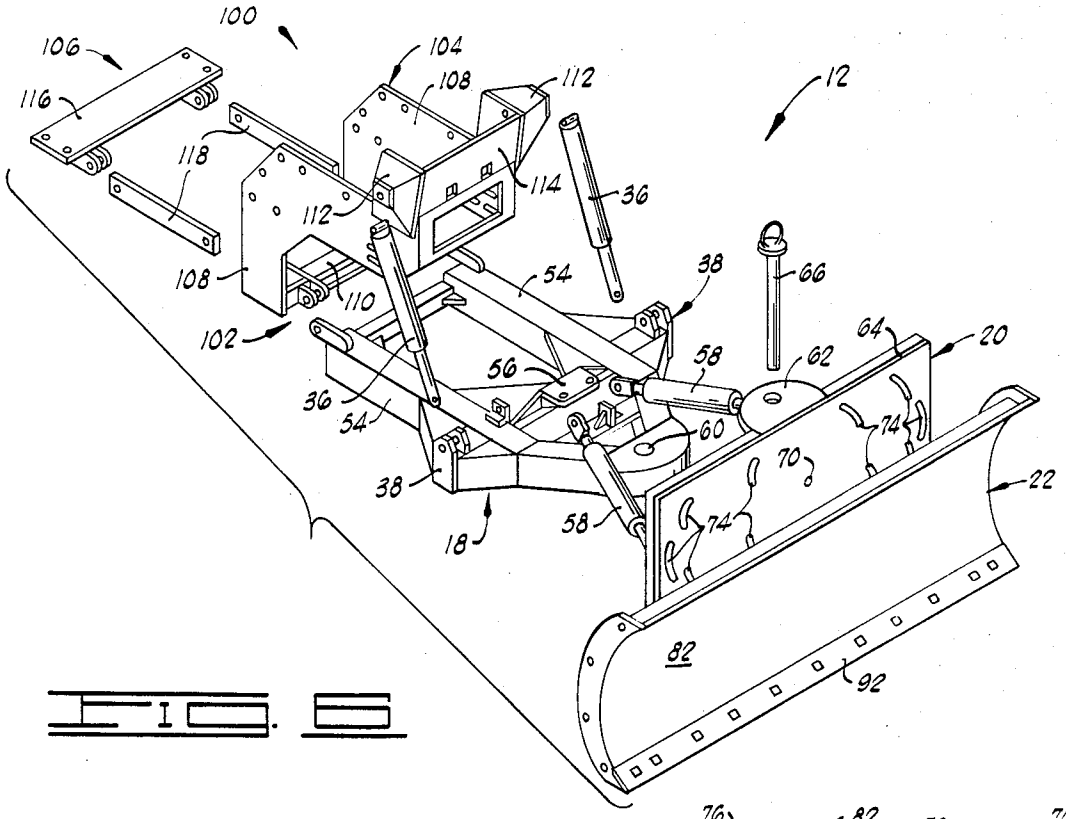

FIG. 6

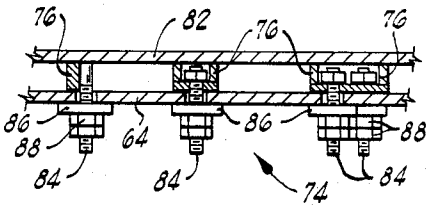

FIG. 7

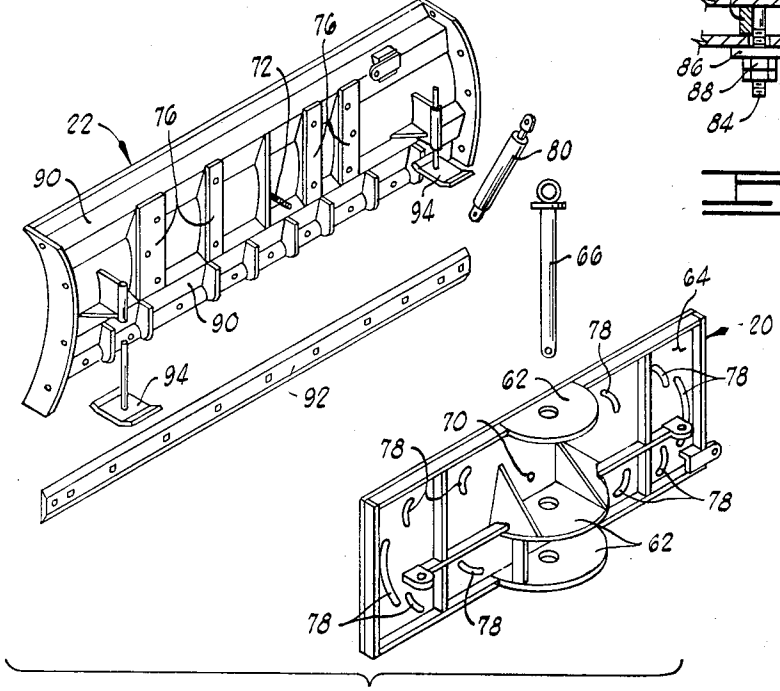

FIG. 8

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BULLDOZER MEANS WITH A PIVOTABLE BLADE

Many types of bulldozer blade assemblies are known in the prior art, however, these prior devices have only limited means to control the position and motion of the blade. These prior art structures generally have either means to lift the blade and change its transverse angular position or they have only means to lift the blade and change its vertical angular orientation. Also, these prior art devices are limited to a substantially permanent installation on a tractor vehicle.

In the herein described preferred specific embodiments of this invention, a bulldozer means with a pivotable blade includes a blade support assembly mountable with a tractor, a transversely pivotable blade mount assembly and a blade pivotable in its generally upright plane generally about the longitudinal axis of the tractor. Each of the pivoting motions of the bulldozer means is remotely controllable by use of hydraulic cylinders. The bulldozer means of this invention is designed to be easily mountable with and removable from a tractor vehicle.

In one preferred specific embodiment of this invention, (1), a bulldozer means with a pivotable blade is provided as described above which is mountable with a conventional tractor vehicle. The blade support assembly has a lower frame member and an upper frame both mountable with a tractor. The lower frame member is connected by a pin-hinge to an elongated frame that extends from the tractor and has the blade support assembly pivotally attached to its outer end. Hydraulic cylinders connect the upper frame and the outer end of the elongated frame; they operate to raise and lower the outer end of the elongated frame and the entire blade assembly. Th blade mount assembly is attached to the outer end of the elongated frame by an upright pin so it can be pivoted transversely by a pair of cooperating hydraulic cylinders connected between it and the elongated frame. The blade mount assembly has a plate member which is mounted on the back side of the blade, it pivotally supports the blade at a central pivot and in conjunction with a plurality of friction pad assemblies spaced about the plate member. A hydraulic cylinder is connected between the back of the blade and the plate member and in operation pivots the blade about the central pivot. The blade can have any conventional bulldozer blade shape on the earth working side at the user's option and still have fixtures on the back side thereof so it can be attached to the plate member.

In a second preferred specific embodiment of this invention, (2), a bulldozer means with a pivotable blade is provided as generally described supra which is mountable with an articulated tractor vehicle. In this second preferred specific embodiment the movable components of the invention are similar to the first described preferred specific embodiment and the stationary portion of the supporting frame is substantially different.

Most articulated tractors are constructed in a box-like fashion with the wheels on the outer ends. The blade support assembly of this preferred specific embodiment has a one-piece main frame assembly mountable with the outer end portion of an articulated tractor. The main frame assembly has a pin hinge on the lower portion to attach the inner end of the elongated frame and a mount on the upper portion thereof to attach hydraulic cylinders that connect the supporting

frame to the outer end of the elongated frame. These hydraulic cylinders provide for overall vertical movement of the bulldozer means.

One object of this invention is to provide a bulldozer means with a pivotable blade overcoming the aforementioned disadvantages of the prior art devices.

Still, one other object of this invention is to provide a bulldozer means with a pivotable blade having the capability to raise and lower the blade vertically, pivot the blade transversely about an upright axis and pivot the blade in an upright plane about the longitudinal axis of the tractor.

Still, another object of this invention is to provide a bulldozer means with a pivotable blade which has its pivoting motions remotely controllable by use of a hydraulic system with hydraulic cylinders.

Yet another object of this invention is to provide a bulldozer means with a pivotable blade which in one preferred specific embodiment is easily mountable with a conventional tractor and which in another preferred specific embodiment is easily mountable with an articulated type tractor and to provide a bulldozer means that can be easily detached and removed from either type of tractor and can be interchanged with the other.

Various other objects, advantages, and features of the invention will become apparent to those skilled in the art from the following discussion, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view taken from above the end portion of a conventional tractor, shown in dashed lines, and fitted with a preferred specific embodiment of the bulldozer means designed for conventional tractors;

FIG. 2 is a top plan view of the bulldozer means that is shown in FIG. 1;

FIG. 3 is a top plan view of the bulldozer blade, blade mount and outer end portion of the supporting frame with the blade shown in a transversely angled position;

FIG. 4 is a front elevation view of the bulldozer means and a tractor with the blade in the level position and with the blade shown in dotted lines in a tilted position;

FIG. 5 is a rear elevation view of the bulldozer blade and blade mount taken on line 5—5 of FIG. 2;

FIG. 6 is an exploded perspective view taken from above and the front of a second preferred specific embodiment of the bulldozer means adapted to be mounted on articulated type tractors;

FIG. 7 is a cross sectional view of a segment of the blade friction mount; and

FIG. 8 is an exploded perspective view taken from the rear and above of the bulldozer blade and bulldozer blade mount.

The following is a discussion and description of preferred specific embodiments of the bulldozer means with a pivotable blade of this invention, such being made with reference to the drawings whereupon the same reference numerals are used to indicate the same or similar parts and/or structure. It is to be understood that such discussion and description is not to unduly limit the scope of the invention.

Referring to the drawings in detail and in particular to FIGS. 1 and 6, showing the two herein described preferred specific embodiments of this invention. FIG. 1 shows one, (1), preferred specific embodiment of the bulldozer means with a pivotable blade adapted to be mounted with conventional type tractors. FIG. 6 shows

a second preferred specific embodiment, (2), of the bulldozer means with a pivotable blade adapted to be mounted with articulated type tractors. The first preferred specific embodiment, (1), is generally indicated at 10 and the second preferred specific embodiment, (2), is generally indicated at 12.

The first preferred specific embodiment, (1), of the bulldozer means of this invention 10 includes generally a support assembly 14 mounted with the tractor 16, an elongated frame 18 that extends outward from the tractor 16; a blade mount assembly 20 is pivotally attached to the outer end of the elongated frame 18, and a bulldozer blade 22 is pivotally attached to the blade mount assembly 20.

The support assembly 14 has an upper frame member 24 designed to be mounted on the extended end portion of the tractor 16 and a lower frame assembly 26 designed to be mounted on the bottom of the tractor 16. The upper frame member 24 has sides 30 and front 32 which fit around the end of the extended end portion of the tractor 16. On the forward upper end of the sides 30 are hydraulic cylinder mounts 34 that extend out from the sides 30. A pair of hydraulic cylinders 36 is attached to the mounts 34 and are connected to sides of the elongated frame 18, as indicated at 38. The hydraulic cylinders 36 provide vertical movement of the elongated frame 18 pivoting with the lower frame assembly 26. The lower frame assembly 26 has a pair of elongated support members 40 held between a pair of rear support members 42 and it has a forward support member 44. The forward support member 44 has a pair of upright plates 46 mountable with the tractor and connected by a pair of transverse members 48 all which form the hinge mount 50 for the elongated frame 18, as can be seen in FIGS. 1 and 2. The hinge mount 50 has a pair of removable pins 52 which allow the elongated frame 18 to be pivoted vertically and be easily removed and/or mounted.

The elongated frame 18 is a portion of the blade support assembly 14, it is attached to the lower frame 26 at the hinge mount 50 on its inner end and is pivotally attached to the blade mount assembly 20 on its outer end. The elongated frame 18 has a pair of main members 54 which are attached to the hinge mount 50 on the inner end and extend outward a distance parallel and are joined on their outer end. The elongated frame 18 has a transverse member 56 in the center thereof adapted to mount and support the pair of hydraulic cylinders 58 which are used to transversely pivot the blade mount assembly 20. The outer end of the elongated frame 18 has an aperture 60 adapted to mount it with the yoke on the blade mount assembly 20.

The blade mount assembly 20 has a yoke 62 to be mounted with the outer end of the elongated frame 18, and an integral plate member 64 attachable to the back of the blade 22. The yoke 62 is attached to the elongated frame 18 by an upright pin member 66 passing through the yoke 62 and the aperture 60 in frame 18. The blade mount assembly 20 pivots about the pin 66 and is moved by the cooperating pair of hydraulic cylinders 58. The plate member 64 has a central aperture 70 to receive a central pivot pin 72 that extends from the rear center portion of the blade 22; this enables the blade 22 tp pivot about its center point. The blade 22 and blade mount assembly 20 are shown in FIGS. 5 and 8 in detail. A plurality of friction pad assemblies 74 are spaced about the plate member 64 as can be seen in FIG. 5, these guide the blade 22 as it pivots and hold it in a fixed position. The friction pad assemblies 74 are mounted on flanges 76 extending from the rear of the blade and operate through slots 78 in the plate member 64. The blade 22 is pivoted by a hydraulic cylinder 80 mounted between it and the plate member 64, as can be seen in FIG. 5. The hydraulic cylinder 80 operates to overcome the resistance of the friction pad assemblies 74 and rotate the blade 22 about the central pivot pin 72.

The friction pad assemblies 74 are shown in detail in FIG. 7. A number of flanges 76 are attached to the back side of the curved center portion 82 of the blade 22; they are supports for the plate member 64 to rest on and mounts for the alignment bolts 84. The bolts 84 extend through the plate member 64 and have a friction pad 86 and locking nuts 88 on the back side of the plate member. The locking nuts 88 are used to tighten the friction pads 86 into contact with the plate member 64 so the blade 22 will rotate about the center pin 72 with substantial resistance. The friction pad assemblies 74 are tightened sufficiently so they in combination with the hydraulic cylinder 80 will hold the blade 22 in a fixed position; but they are not tightened to such an extent that the hydraulic cylinder 80 cannot rotate the blade 22 on its pivot. The blade is shown in FIG. 4 in the straight or level position and in a tilted position. It is to be noted that the blade 22 can be tilted in either direction about the central pin 72 and held in that position by the friction pad assemblies and the hydraulic cylinder 80.

The bulldozer blade 22 preferably has a curved front member 82 with transverse support members 90 on the upper and lower portions of its back side. The flange members 76 are connected between the transverse members 90 for strength. A removable cutting edge 92 mounts on the lower edge of the blade. Skid shoes 94 are provided on the ends of the blade 22 for protection of the blades cutting edge. It is to be noted that the bulldozer means of this invention is not to be limited to use with the specific bulldozer blade shown herein; it can be used with other types of bulldozer blades, or earthworking implements; only the structure on its back side is necessary for its operation.

In another preferred specific embodiment, (2), of the bulldozer means with a pivotable blade a bulldozer means is provided which is adapted to be mounted with an articulated type tractor vehicle. The second preferred specific embodiment, (2), of the bulldozer means with a pivotable blade 12 is shown in FIG. 6; it utilizes the same elongated frame assembly 18, blade mount 20 and bulldozer blade 22 as the first described preferred specific embodiment, (1); since the herein described preferred specific embodiments of this invention have many similar components, like numerals are used on these components and in the description thereof. The second preferred specific embodiment 12 has a blade support frame assembly 100 mountable with a tractor and has a hinge mount 102 easily connected with the main members 54 of the elongated frame 18.

The frame assembly 100 of the bulldozer means 12 has a single main frame member 104 mountable with the extended end of an articulated tractor which is supported on the lower portion by an additional support assembly 106. The main frame 104 has parallel sides 108 joined on the lower end by a transverse member

110 forming the hinge mount 102. The upper portion of the main frame 104 has hydraulic cylinder mounts 112 extending from the sides 108 adapted to attach the hydraulic cylinders 36. The main frame has an end member 114 connecting the sides 108 and providing additional support for the hydraulic cylinder mounts 112. The lower support assembly 106 has a transverse member 116 that is mounted with the articulated tractor frame and connected by elongated bar members 118 with the transverse hinge mount member 110. The lower support assembly 106 braces the hinge mount 102 for longitudinal forces which are transmitted through the bulldozer blade 22 and supporting structure.

In this preferred specific embodiment, (2), of the bulldozer means 12 the hinge mount 102 is constructed similar to the hinge mount 50 of the first described preferred specific embodiment, (1), and the hydraulic cylinder mounts 112 and 34 respectively are constructed similarly so the blade supporting portions of the structure can be interchangeably used with both preferred specific embodiments. The main members 54 of the elongated frame 18 having mounting lugs 114 that connect it to pivot with the hinge mounts 50 and 102. The mounting lugs are secured by detachable pin members 52 as described above for easy removal and installation.

The hydraulic cylinders used in the hereindescribed preferred specific embodiments (1 and 2) of this invention are operable from the auxiliary hydraulic system of the tractor. The hydraulic system uses three separate control circuits. One hydraulic circuit raises and lowers the blade 22 and supporting structure pivoting it about the hinge mount on its inner end and controls the upright hydraulic cylinders 36. A second hydraulic circuit controls the transverse angular position of the blade 22 pivoting it about the pin 66 of the blade mount assembly 20; it controls the cooperating and horizontally disposed hydraulic cylinders 58. The third hydraulic circuit controls the tilt of the blade 22 or in its rotational position on the center pin 72, it actuates the vertically disposed hydraulic cylinder 80 mounted on the blade 22. The hydraulic system preferably has quick-disconnect type couplings, not shown, to provide for easy and rapid connection with the hydraulic system of the tractor. An important feature of the hydraulic system which is to be noted is the incorporation of a cushion valve 120 into the second described hydraulic circuit. The cushion valve 120 is shown in FIGS. 2 and 3 mounted on the forward end of the elongated frame member 18. The cushion valve 120 is connected in the hydraulic lines which operate the hydraulic cylinders as can be seen in the drawings. The cushion valve 120 lets the hydraulic fluid flow through it as needed to operate the hydraulic cylinders 58. When the hydraulic cylinders 58 are placed under extreme pressure the cushion valve 120 is automatically self-actuated releasing the pressure on the hydraulic cylinders and dumping the hydraulic fluid back into the hydraulic system reservoir. This prevents damage to the hydraulic cylinders 58 or other equipment should they be extended to their limits under pressure and more important should the bulldozer blade 22 strike a solid object while moving. In practice it has been found that a model DLV-50 Gresen hydraulic valve functions satisfactorily as the cushion valve.

In both of the herein described preferred specific embodiments (1 and 2) of this invention, the bulldozer means is normally mounted on the front end of a tractor, however, it is to be understood that it can be mounted on either end of a tractor vehicle. It may be advantageous to have a tractor with the bulldozer means of this invention mounted on one end of a tractor and a backhoe, front end loader or some other earthworking device mounted on the opposite end of the tractor.

In the manufacture of the hereindescribed preferred specific embodiments, (1 and 2), of the bulldozer means with a pivoted blade, it is obvious the structure is constructed of substantial strength to provide a useful end product.

In the use and operation of the herein described preferred specific embodiments (1 and 2), of the bulldozer means with a pivoted blade of this invention, it is obvious that same provides a structure that is easily mounted with a tractor and can be easily disconnected and removed and later reinstalled. The bulldozer blade 22 can be adjusted to desired positions vertically, in a translated angular position and in a tilted angular position by use of hydraulic cylinders and the auxilliary hydraulic system of the tractor.

As will be apparent from the foregoing description of the applicant's bulldozer means with a pivotable blade and the preferred specific embodiments thereof relatively, a simple structure and means to operate same have been provided to mount a bulldozer blade with a tractor and to position it in desired vertical and angular positions, by using a hydraulic system. Also, means have been provided by the cushion valve in the hydraulic system to prevent damage to the blade and the associated hydraulic system should it be subjected to excessive forces.

While the invention has been described in conjunction with two preferred specific embodiments thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims:

I claim:

1. Bulldozer means comprising:

a. support means to mount said bulldozer means with a tractor,

b. frame means pivotally connected to said support means,

c. mounting means transversely pivotally mounted with said frame means, pivotable about an upright axis,

d. earthworking means pivotally mounted with said mounting means pivotable in an upright plane about a point,

e. first means connected to said support means and said frame means to pivot said frame means,

f. second means connected to said frame means and said mount means to pivot said mounting means,

g. third means connected to said earthworking means and said mounting means to pivot said earthworking means,

h. friction means mounted between said earthworking means and said mounting means to restrain pivotal movement of same, said bulldozer means is adapted to be mountable on a tractor means and have said earthworking means transversely pivotable, tiltable and vertically adjustable, and said friction means to restrain pivotal movement of said

earthworking means is a plurality of friction pad assemblies mounted between said mounting means and said earthworking means, said friction pad assemblies each having a bolt member secured to said earthworking means and a friction pad mounted on said bolt member against said mounting means by a nut member, and said third means being a piston and said hydraulic cylinder operably to overcome frictional contact of said frictional pads and aid in holding the said earthworking means in the adjusted rotation position about a horizontal axis.

2. The bulldozer means as described in claim 1, wherein:

a. said first means to pivot said frame means is a hydraulic cylinder means to raise and lower said frame means about a hinge means connected to said frame means,

b. said second means to pivot said mounting means is a hydraulic cylinder connecting said frame means and said mounting means adapted to rotate said mounting means in transverse pivoting motion about said upright axis,

c. said third means to pivot said earthworking means is a hydraulic cylinder connecting said earthworking means and said mounting means adapted to pivot said earthworking means,

d. said hydraulic cylinder of said first, second, and third means has a cushion valve connected thereto adapted to relieve the hydraulic force on said hydraulic cylinder should it be subjected to an excessive pressure, and

e. all of said hydraulic cylinders are connected to a control means and operable by an operator of the tractor.

* * * * *