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T. L. MACKEY

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HYDRAULIC TILTING BLADE CONTROLS FOR BULLDOZERS

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2 Sheets-Sheet 1

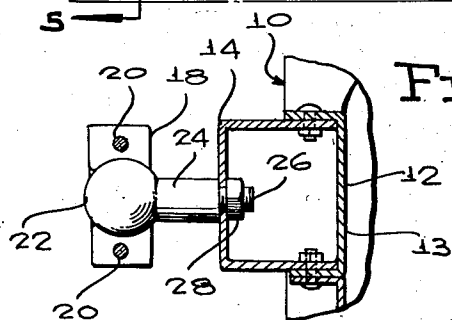
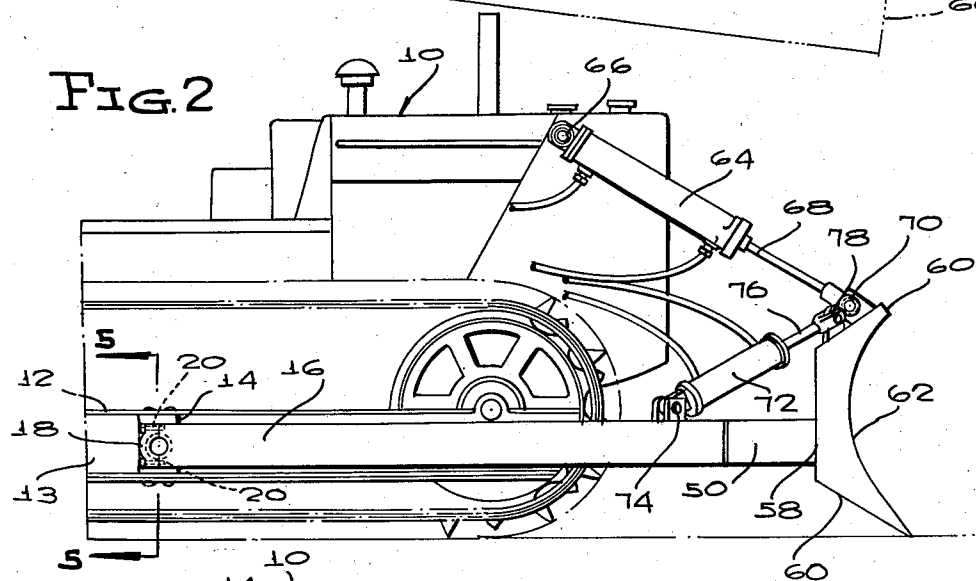
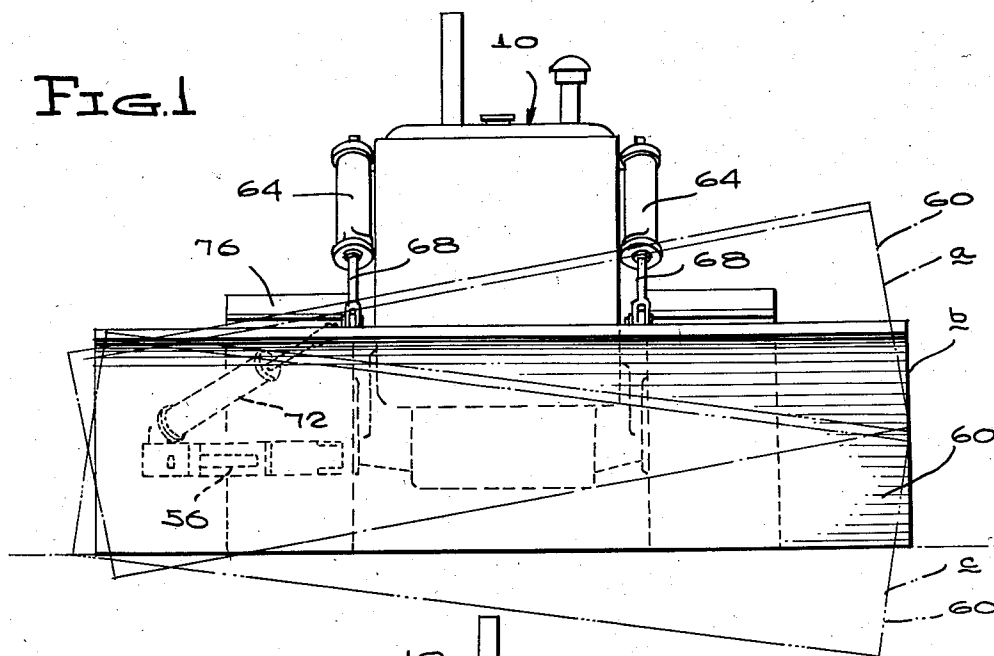


FIG. 5

INVENTOR.
THEODORE L. MACKEY
BY

McMorrow, Berman + Davidson
ATTORNEYS

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FIG. 3

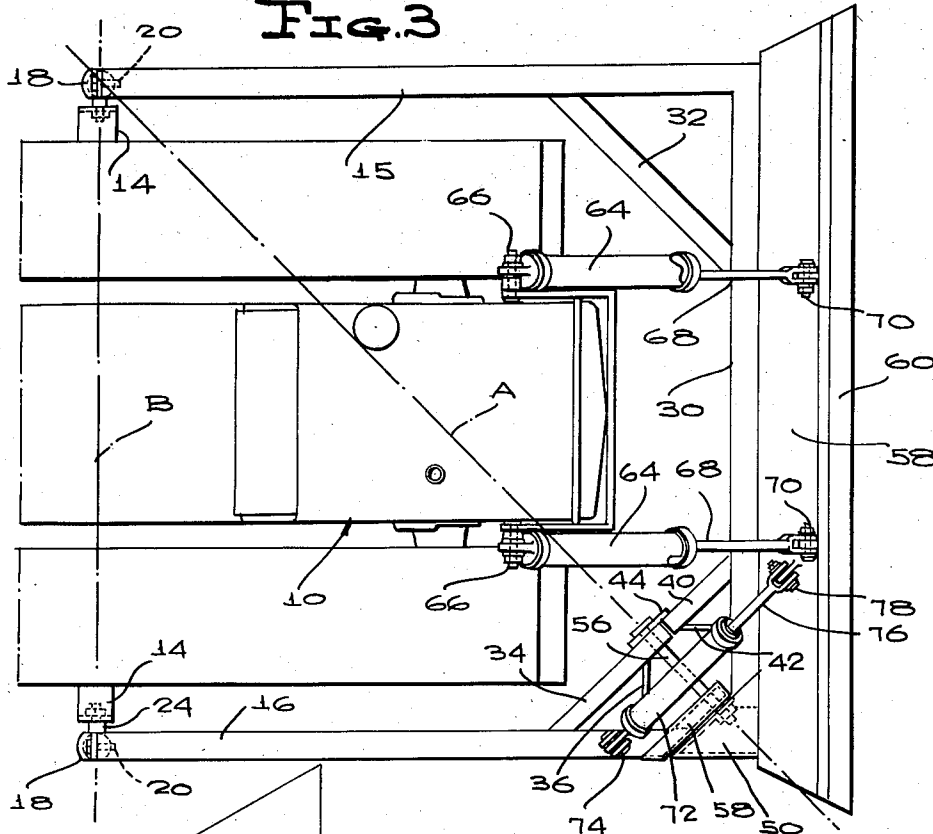
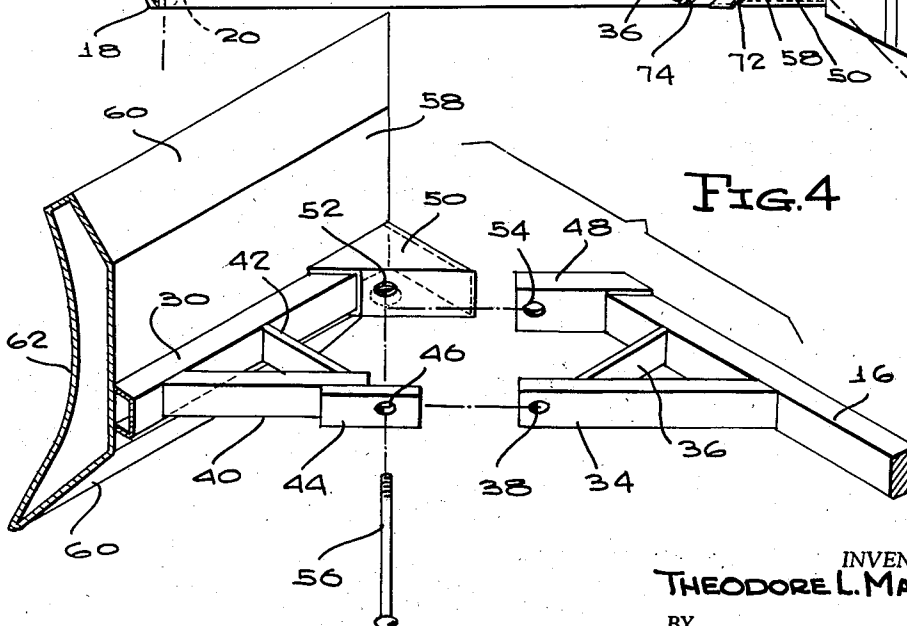


FIG. 4



INVENTOR.
THEODORE L. MACKEY
BY

McMorrow, Berman & Davidson
ATTORNEYS

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HYDRAULIC TILTING BLADE CONTROLS FOR BULLDOZERS

Theodore L. Mackey, Colorado Springs, Colo.

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2 Claims. (Cl. 37—144)

This invention relates to bulldozers or similar earth moving equipment, and more particularly has reference to a blade mounting and construction so designed as to permit the tilting of the blade about an axis extending transversely of the blade, in a direction disposed transversely of the axis about which the blade swings when being raised or lowered.

Ordinarily, a bulldozer construction is such that when one desires to tilt the bulldozer blade to one side or the other, that is, about an axis extending longitudinally of the tractor or bulldozer, he must leave the tractor seat to make the adjustment. However, in accordance with the present invention hydraulic controls may be operated by the tractor operator without the necessity of leaving the tractor seat, while the machine is moving, for the purpose of so tilting bulldozer blade.

A further object is to provide means of the character described that can be embodied in generally conventional bulldozer construction, with a minimum of modification and redesign of said construction.

Still another object is to so design the tiltable blade construction and mounting as to permit the same to be incorporated in other hydraulic controls, of the type used in raising and lowering the bulldozer blade, again with a minimum of modification of the bulldozer construction.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a front elevational view of a bulldozer equipped with a blade mounting according to the present invention, the blade being shown in full lines in a normal position and in dotted lines in opposite extreme positions to which the same may be tilted;

Figure 2 is a fragmentary side elevational view of the bulldozer, and of the blade mounting;

Figure 3 is a top plan view;

Figure 4 is an enlarged fragmentary, exploded perspective view of the bulldozer blade construction; and

Figure 5 is an enlarged, detail sectional view substantially on line 5—5 of Figure 2.

Referring to the drawing in detail, designated generally by the reference numeral 10 is a conventional bulldozer. This has a track frame 12 that includes side members 13 extending along opposite sides of the bulldozer.

In accordance with the invention, secured within the outwardly opening, channeled side members 13 (see Figures 2 and 5) are support brackets 14.

The push arms 15, 16 of the bulldozer blade extend along opposite sides of the tractor or bulldozer, in laterally outwardly spaced relation to the side frame members 13 of the track frame. The push arms 15, 16 have ball-and-socket type connections to the track frame, this being necessary when the raising and lowering of the blade is effected by the type of lifting means shown in Figure 1.

Thus, extending into the rear end of the push arms are bolts 20, passing through ball socket members 18,

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having hemispherical sockets formed in the rear extremities of the push arms. Ball elements 22 are engaged for universal movement in the sockets provided at the rear ends of the push arms, and are integrally or otherwise rigidly formed with laterally inwardly projecting stubs 24 having reduced, threaded extensions 26 that extend through openings of the bracket 14. Nuts 28 are threaded upon the extensions 26 to fixedly secure the ball elements to the brackets. Integral or otherwise made rigid with the forward end of the push arm 15 is a front cross brace 30 spaced forwardly from the front end of the bulldozer proper. Cross brace 30 is perpendicular to push arm 15 and forms with the same in a rigidly constituted, L-shaped blade support frame.

The push arm 16 does not have a rigid connection to the other end of the cross brace 30. Rather, referring to Figure 4, it will be seen that the push arm 16 has a diagonally extending brace member 34 rigid therewith, said brace member being in turn braced by a brace element 36 fixedly connected between the push arm 16 and brace member 34. Formed in the outer end of the brace member 34 is an opening 38.

A brace member 40 is rigid with the adjacent end portion of the brace 30, and is reinforced by a brace element 42 rigidly connected between member 40 and brace 30. A plate 44 has an opening 46.

Rigidly secured to push arm 16 forwardly of brace member 34 is a diagonal connector 48 disposed adjacent a triangular block 50 rigid with the adjacent end of brace 30. Block 50 has a back wall parallel to members 40, 34 and 48, formed with opening 52 registrable with opening 54 of member 48. Extendable through the several openings 38, 46, 52, 54 is a connecting pin 56 which extends at 45° to the angle of push arm 16 and cross brace 30. In other words, pin 56 bisects the right angle defined between arm 16 and cross brace 30, extending along line A along which pin 56 extends through the center of the ball and socket joint at the rear end of arm 15 (see Figure 3).

The blade 58 has bevelled top and bottom edge portions 60, 62 and a transversely concave front face 62. Brace 30 is rigid with and extends substantially the full length of blade 58.

Conventional means is employed for moving the blade 60 upwardly and downwardly about a transverse axis B extending horizontally between the centers of the ball and socket joints. Such means can be hydraulic or could be any other type of lift now in common use. For example, there may be hydraulic cylinders 64 pivoted at their rear ends or pins 66 to swing about an axis adjacent the front end of the bulldozer parallel to axis B. Rams or piston rods 68 project forwardly from the cylinders and are pivotally connected at 70 to the rear face of blade 58.

In accordance with the invention, hydraulic means is provided for tilting the blade to any of the positions shown in Figure 1, about the axis A of Figure 3. To this end, arranged transversely of axis A is a hydraulic expansible means including cylinder 72 having a rear end pivoted at 74 on the front end portion of push arm 16. A piston rod 76 works in cylinder 72 and has a pivotal connection 78 to blade 58 adjacent one end of blade 58.

Thus, if piston 76 is retracted into cylinder 72 from its Figure 2 position, a pull is set up on the top edge portion of blade 58 causing the blade, cross brace 30 and push arm 15 to rock as a unit about axis A on the ball provided at the rear end of arm 15 and on the pin 56. The blade thus would tilt to the position *a* shown in Figure 1 from its normal position *b* shown in the same figure.

By extending ram 76 from its Figure 2 position, the

blade is rocked downwardly, again about the axis A, to the dotted line position c shown in Figure 1.

The blade can be tilted in this manner in any position to which it is swung upwardly or downwardly about axis B, as will be readily apparent.

It is believed clear that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. In a bulldozer, a blade and mounting therefor comprising, in combination with a bulldozer frame, a pair of push arms at opposite sides of the frame mounted for up-and-down swinging movement about an axis extending transversely of the frame normally to the length thereof; a blade extending transversely between the forward ends of said arms, said blade having a rigid connection to one arm and a pivotal connection to the other arm; and means for rocking the blade about the axis of its pivotal connection to said other arm, said axis of the pivotal connection of the blade to said other push arm extending obliquely of the first named axis, the angle of the blade being at right angles to said push arms, said second axis bisecting the angle defined between the blade and said other push arm, said second axis including the first axis at the location of the connection of said one push arm to the frame, said means for rocking the blade about the second axis comprising a hydraulic cylinder pivotally connected to said other push arm and a ram extending from said cylinder and having a pivotal connection to the blade, the cylinder and ram overlying the second axis with the ram having its connection to the blade in closely spaced relation to the upper edge of the blade, the connection of the blade to said other arm comprising an elongated pin, diagonal brace members having registering openings receiving said pin, said brace members being rigid with the blade and said other push arm respectively, and correspondingly diagonally

extending connector members spaced from the brace members and rigid with the blade and said other push arm, the connector members having registering openings receiving said pin.

2. In a bulldozer, a blade and mounting therefor comprising, in combination with a bulldozer frame, a pair of push arms at opposite sides of the frame mounted for up-and-down swinging movement about an axis extending transversely of the frame normally to the length thereof; a blade extending transversely between the forward ends of said arms, said blade having a rigid connection to one arm and a pivotal connection to the other arm; and means for rocking the blade about the axis of its pivotal connection to said other arm, said axis of the pivotal connection of the blade to said other push arm extending obliquely of the first named axis, the angle of the blade being at right angles to said push arms, said second axis bisecting the angle defined between the blade and said other push arm, said second axis including the first axis at the location of the connection of said one push arm to the frame, said means for rocking the blade about the second axis comprising a hydraulic cylinder pivotally connected to said other push arm and a ram extending from said cylinder and having a pivotal connection to the blade, the cylinder and ram overlying the second axis with the ram having its connection to the blade in closely spaced relation to the upper edge of the blade, the connection of the blade to said other arm comprising an elongated pin, diagonal brace members having registering openings receiving said pin, said brace members being rigid with the blade and said other push arm respectively, and correspondingly diagonally extending connector members spaced from the brace members and rigid with the blade and said other push arm, the connections of the push arms to the frame comprising ball and socket joints carried by the push arms and frame respectively at locations laterally outwardly spaced from the frame.

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