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TILTING DEVICE FOR BULLDOZER BLADE

Filed Feb. 2, 1954

2 Sheets-Sheet 1

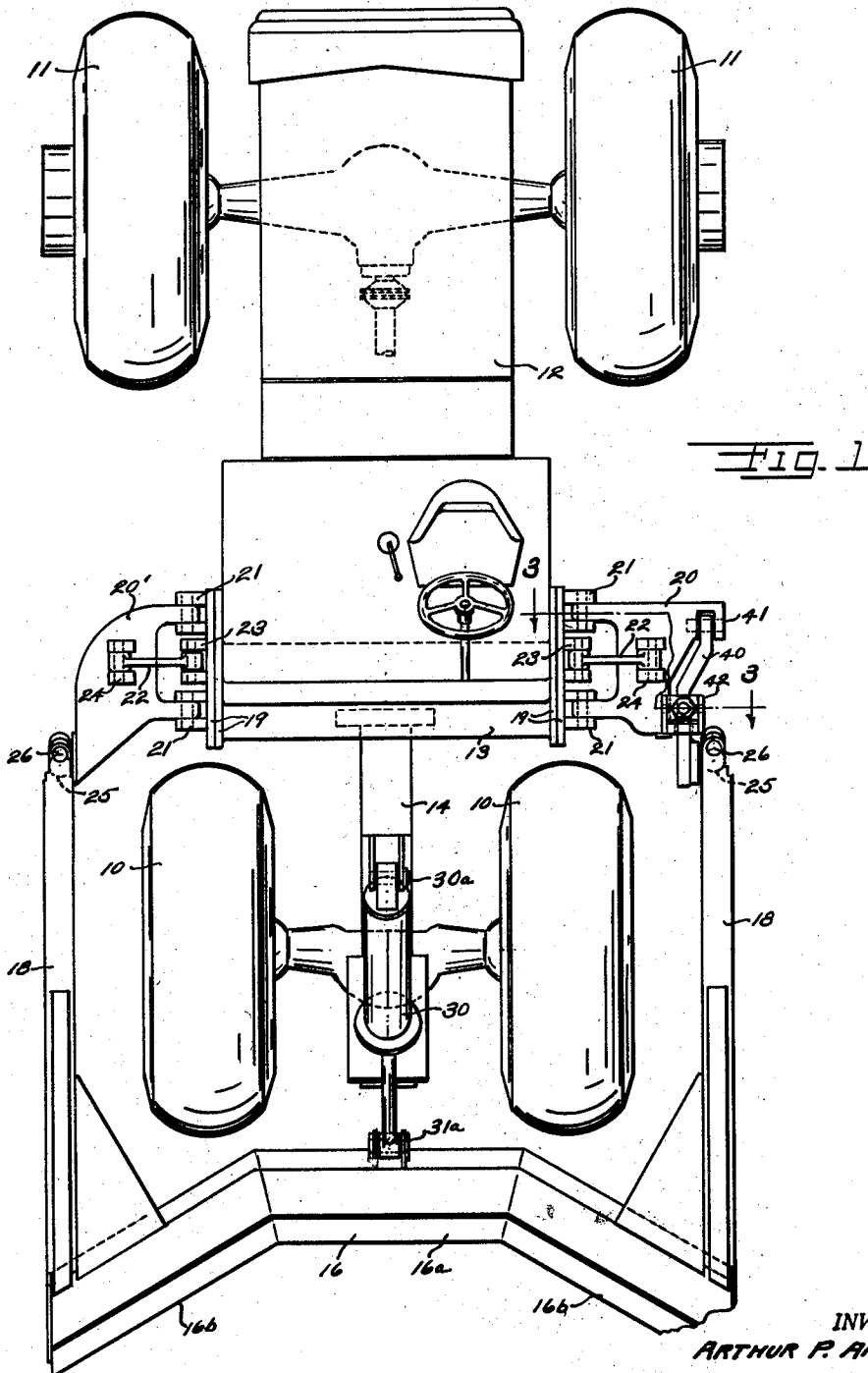


Fig. 1

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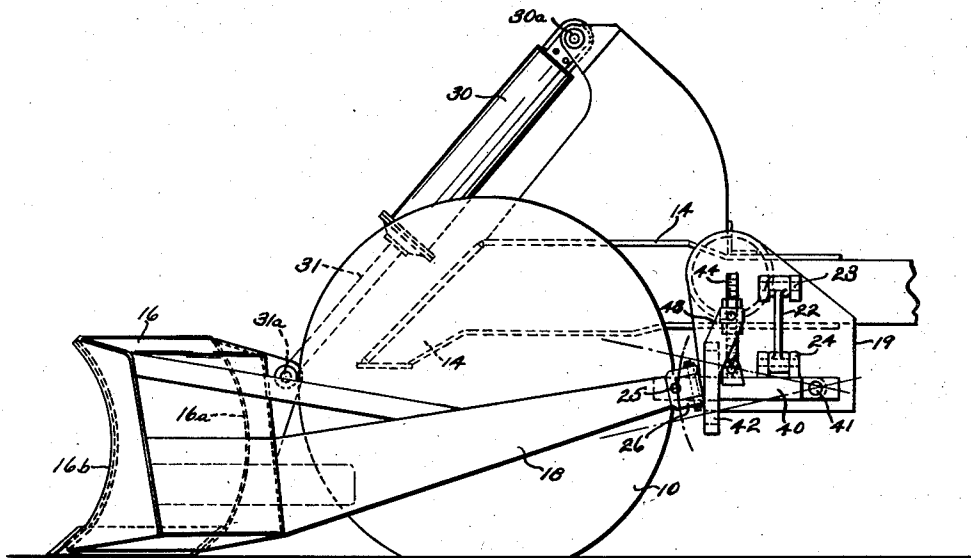


FIG. 2

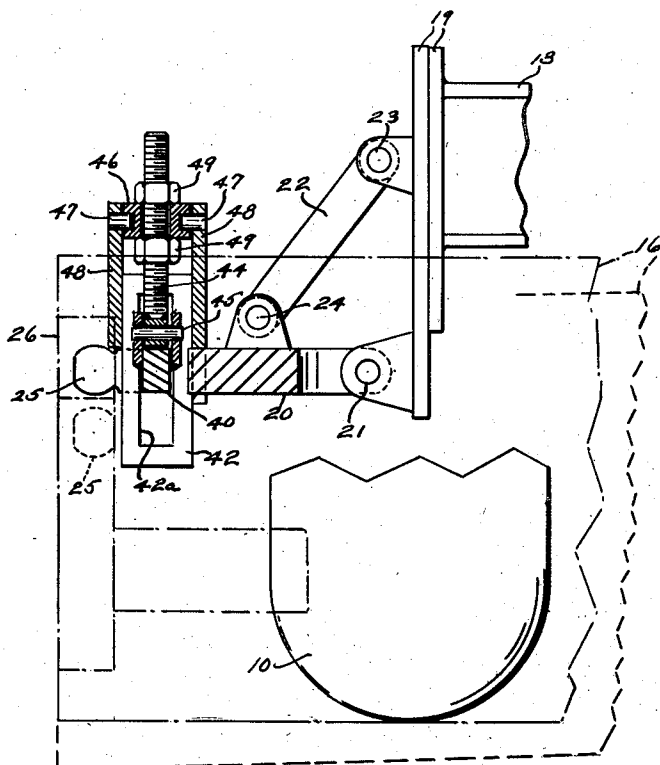


FIG. 3

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TILTING DEVICE FOR BULLDOZER BLADE

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2 Claims. (Cl. 37—144)

This invention relates to improvements in a material moving blade and more particularly to a tilting device for a bulldozing blade.

One of the objects of the present invention is to provide a blade for a power-driven vehicle with said blade mounted so that it can be selectively tilted relative to said vehicle about a generally longitudinally extending axis.

Another object of the present invention is to provide a blade, as set forth in the previous paragraph, wherein said blade is mounted on beams straddling said vehicle with said beams pivotally connected to said vehicle and with means for raising or lowering one of said pivots.

Another object of the present invention is to provide a blade, as set forth in the previous paragraph, wherein the vertically movable pivot is supported by a member pivotally secured to the vehicle for movement about a transverse axis.

Another object of the present invention is to provide a blade, as set forth in any one of the preceding paragraphs, wherein said blade is generally U-shape in plan view.

Another object of the present invention is to provide a material moving blade, as set forth in any one of the previous paragraphs, wherein the parts are arranged to give maximum rigidity in absorbing the forces exerted by the material on said blade.

Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and description and the essential features will be set forth in the appended claims.

In the drawings,

Fig. 1 is a top plan view of a generally U-shaped blade mounted as a bulldozer blade located in front of a tractor;

Fig. 2 is a side elevational view of the forward portion of said tractor including said blade, push beams and mounting means shown in Fig. 1; while

Fig. 3 is an enlarged vertical transverse sectional view through one of the mounting means taken along the line 3—3 of Fig. 1.

Those familiar with this art will recognize that this invention may take many forms. Although the material moving implement of the present invention is adapted to be mounted on any type of power-driven vehicle and propelled by the same, it is specifically disclosed herein as a bulldozer blade mounted on a tractor of the type shown in my copending U. S. patent application, Serial No. 350,446, filed April 22, 1953, and entitled "Four-Wheel Drive Tractor Grader." The tractor includes front wheels 10, 10, and rear wheels 11, 11 in Fig. 1 driven by a driving motor 12 with all these parts connected together with a common tractor frame. The frame includes a transversely extending torque tube 13 immediately below and in front of the driver's seat and a forwardly extending frame arm 14 secured at its rear to

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the torque tube 13 and at its front to the axle housing of front wheels 10, 10, as shown in more detail in said aforementioned copending application.

The material moving implement may take any of a variety of forms including various types of blade. However, the specific one here shown is a bulldozer blade 16 in Figs. 1 and 2 having a transversely extending center section 16a with forwardly and outwardly extending side wings 16b, 16b in Fig. 1 each secured to opposite ends of the center section 16a. This blade is generally U-shape in plan view with the open portion of the U-shape opening forwardly and extending in the direction of forward travel of the tractor.

The blade 16 has rigidly secured thereto generally parallel push beams 18, 18 straddling the front wheels 10 and the sides of the tractor as they extend rearwardly from the bulldozer blade 16.

A separate mounting means is provided for securing the rear end of each push beam to the tractor frame in suitable manner so that the bulldozer blade 16 can be manipulated to get the proper digging, cutting, or material moving action. Many parts of these mounting means are identical for both push beams 18, 18 so that only the mounting means on the right (when the drawing sheet is held in an upright position with the bulldozer blade lowermost) in Fig. 1 will be described. One or more vertically extending plates 19 are welded or otherwise rigidly secured to the outer end of the torque tube 13. An outwardly extending arm 20 is pivotally secured, best seen in Fig. 1, at its inner end by two longitudinally spaced pivot pin and clevis type connections 21, 21 to the lower end of the plate 19 while a connecting link 22, best seen in Fig. 3, supports this arm 20 in a rigid manner by having pivot pin and clevis type joints 23 and 24 at opposite ends respectively with plate 19 and the arm 20. The arm on the left in Fig. 1 is of simpler construction so that it has been assigned a different reference numeral, designated as arm 20', to distinguish it from the corresponding arm 20 on the right.

Although clevis and pin joints 23 and 24 are used, these plates 19, arms 20 and 20', and links 22 could just as well be formed of solid construction since they do not have to pivot or move relative to each other. The pin and clevis type connections, however, have been found more satisfactory under actual conditions and is the preferred construction.

Each of the arms 20 or 20' carries a ball 25 connected within a socket 26 formed on the rearward end of its associated push beam 18. This construction provides a pivotal and universal connection at the rear end of each push beam so that the bulldozer blade 16 can be raised and lowered by pivoting about the ball and socket connections 25, 26.

Means is provided for raising and lowering the bulldozer blade 16. This takes the form in the present disclosure of a fluid pressure actuated hoist having a cylinder 30 and a piston and piston rod 31 with this hoist having pivotal connections 31a and 30a at opposite ends to the blade 16 and tractor frame member 14 respectively. This fluid pressure actuated hoist may be powered by any suitable pressure fluid, such as air, oil, etc. and may be of either single acting or double acting construction. This provides a substantially rigid connection means between the blade and the vehicle with this connecting means adjustable in length to provide the raising and lowering function.

At least one of these push beam mounting means includes means for selectively raising or lowering its ball and socket joint 25, 26 relative to the tractor so as to tilt the bottom of the bulldozer blade out of the horizontal to dig one end deeper than the other. Although both mounting means could have this adjustment, only one

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is necessary since it will provide the tilt and the hoist 30, 31 can be used to change the elevation of the blade.

Although this vertical adjustment of one of the ball and socket joints 25, 26 may take any of a variety of forms, only one specific form has been shown herein and this is more specifically disclosed in Fig. 1 on the right and in Figs. 2 and 3. The portion of the mounting means on the right in Fig. 1 having the ball 25 takes the form of a lever-type member 40 in the present disclosure having as a first pivot the ball and socket type pivotal connection 25, 26 with its associated push beam 18, and having as a second pivot a pivot pin 41 on the outer end of arm 20. The second pivot is fixed relative to the tractor since the arm 20 does not move. It should also be noted that this second pivot is spaced from the first pivot and has a pivotal axis extending generally transverse to the tractor so that swinging the member 40 about the transverse axis of the second pivot 41 will raise or lower the first pivot 25, 26 and its associated push beam 18 to tilt the bulldozer blade 16 to dig one end deeper than the other. This lever 40, and especially the portion thereof at ball 25, moves in a generally vertically and longitudinally extending plane relative to the tractor during its swinging movements. It also should be noted in Fig. 2 that lever type member 40 and push beam 18 extend generally in a straight line in Fig. 2 and as close as possible to a straight line in Fig. 1. Hence, the force exerted by the blade on push beam 18 acts generally through the two pivots 25, 26 and 41 to provide a more rigid construction.

The lever type member 40 is restricted against lateral movements by travelling in a closed, vertically elongated slot 42a, seen in Fig. 3, formed in a projecting lug 42 rigidly secured to the outer end of arm 20. This slot 42a is only slightly wider than the width of the lever type member 40 and this closed slot completely surrounds the member 40 to restrict it to move only in a vertically and longitudinally extending plane. This slot serves as a generally vertically extending guide track between the adjustable, vertically moving lever-type member 40 and the remainder of the mounting means fixed relative to the tractor frame.

The mounting means also includes an adjustable means connecting the lever-type member 40 adjustably to the remainder of the mounting means and to the tractor. This adjustable means in the present disclosure takes the form of a screw 44, best seen in Fig. 3, pivotally secured by a clevis and pin type connection 45 to the lever-type member 40 at its lower end and extending upwardly through a vertically extending hole in a swivel member 46 pivotally connected by aligned pins 47 in Fig. 3 to the top of generally parallel legs 48 rigidly secured at their lower ends by welding or any other suitable connection to lug 42 and arm 20. Threaded nuts 49, 49 in Fig. 3 are screwed onto the screw 44 and straddle the swivel member 46 so that turning both these nuts in the same direction will raise or lower the ball and socket connection 25, 26 at the left in Fig. 3 to provide the desired movement of the bulldozer blade 16.

This adjustable means, taking the form of a link adjustable in length, is capable of moving the lever-type member 40 to any desired position along the length of the slot 42a. Although the adjustable link in the present disclosure takes the form of screw 44 and nuts 49, 49, other suitable links of adjustable length could be used. For example, a fluid or pressure operated hoist similar to but smaller than hoist 30, 31 could be used. Also, the screw 44 could be rotatably mounted in the clevis connection 45 while the nuts 49 were rigidly secured to the swivel member 46 so that rotation of the screw 44 would provide the proper elevating or lowering action; the screw could be power driven, if desired. However, the illustrated construction is preferred because of its simplicity and ruggedness.

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Little of the force exerted rearwardly by the push beams 18 is transmitted to the adjustment screw 44 because push beam 18 and lever type member 40 are substantially in a straight line so as to transmit the force along their length. Since screw 44 provides the vertical adjustment instead of having link 22 adjustable for this purpose, adjustment is always possible. When the rearward force by push beam 18 is sufficient to bend, twist or apply strain to the arm mountings 21 and link 22 because of the torque couple produced by having this force exerted on the outward end of the bracket, link 22 may change shape so as to make adjustment thereof difficult if not impossible. This force and any subsequent bending action would not harm adjustment screw 44.

Various changes in details and arrangement of parts can be made by one skilled in the art without departure from either the spirit of this invention or the scope of the appended claims.

What I claim is:

1. A material moving implement adapted to be mounted on a power-driven vehicle and propelled by the same, comprising a blade, beams of generally equal length adapted to straddle said vehicle and secured to said blade, a separate mounting means for each beam, each mounting means adapted to be secured to said vehicle and including a universal pivotal connection with its associated beam spaced from said blade, both said universal pivotal connections being generally in lateral alignment, at least one of said mounting means including a member having as a first pivot said universal pivotal connection with its associated beam and having a second pivot fixed relative to said vehicle and spaced on the side of said first pivot opposite the blade and having a pivotal axis extending generally transverse to said vehicle, whereby swinging said member about the axis of said second pivot will raise or lower said first pivot and its associated beam to tilt said blade, said first and second pivots being generally in alignment with the force exerted by said blade on said last-mentioned beam, said mounting means including a generally vertically extending and vertically elongated guide track of closed slot form only slightly wider than and surrounding said member between said first and second pivots and being fixed relative to said vehicle to restrict member movement to within only a generally vertically and longitudinally extending plane relative to said vehicle, said mounting means including an adjustable link comprising interconnected screw and nut elements with one element pivotally connected to said member and means holding the other of said elements in fixed relation to said vehicle adjacent one end of said slot.

2. A material moving implement adapted to be mounted on a power-driven vehicle and propelled by the same, comprising a blade, beams of generally equal length adapted to straddle said vehicle and secured to said blade, a separate mounting means for each beam, each mounting means adapted to be secured to said vehicle and including a universal pivotal connection with its associated beam spaced from said blade, both said universal pivotal connections being generally in lateral alignment, at least one of said mounting means including a member having as a first pivot said universal pivotal connection with its associated beam and having a second pivot fixed relative to said vehicle and spaced on the side of said first pivot opposite the blade and having a pivotal axis extending generally transverse to said vehicle, whereby swinging said member about the axis of said second pivot will raise or lower said first pivot and its associated beam to tilt said blade, said first and second pivots being generally in alignment with the force exerted by said blade on said last-mentioned beam, said mounting means including a generally vertically extending and vertically elongated guide track of closed slot form only slightly wider than and surrounding said member between said first and second pivots and being fixed relative to said

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vehicle to restrict member movement to within only a generally vertically and longitudinally extending plane relative to said vehicle, said mounting means including a screw pivotally connected to said member between said first and second pivots and closely adjacent said guide track, parallel legs straddling said member and fixed relative to said vehicle, the upper portions of said legs lying on opposite sides of said screw, a swivel block having its opposite ends pivotally mounted in the upper ends of said legs, there being an opening in said swivel block through which said screw extends, and nut means threaded on said screw and engaging said swivel block, whereby to hold said member and its connected beam in vertically adjusted relationship to said vehicle.

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References Cited in the file of this patent

UNITED STATES PATENTS

2,126,791	Low	Aug. 16, 1938
2,185,179	Bird et al.	Jan. 2, 1940
2,238,346	Sorensen	Apr. 15, 1941
2,477,994	Love	Aug. 2, 1949
2,485,407	Peterson	Oct. 18, 1949
2,522,583	Remington	Sept. 19, 1950
2,585,085	Brown	Feb. 12, 1952
2,630,638	Le Tourneau	Mar. 10, 1953
2,650,628	Long	Sept. 1, 1953
2,678,508	Reuter et al.	May 18, 1954