May 12, 1942. L. T. ARGO 2,282,389

BULLDOZER

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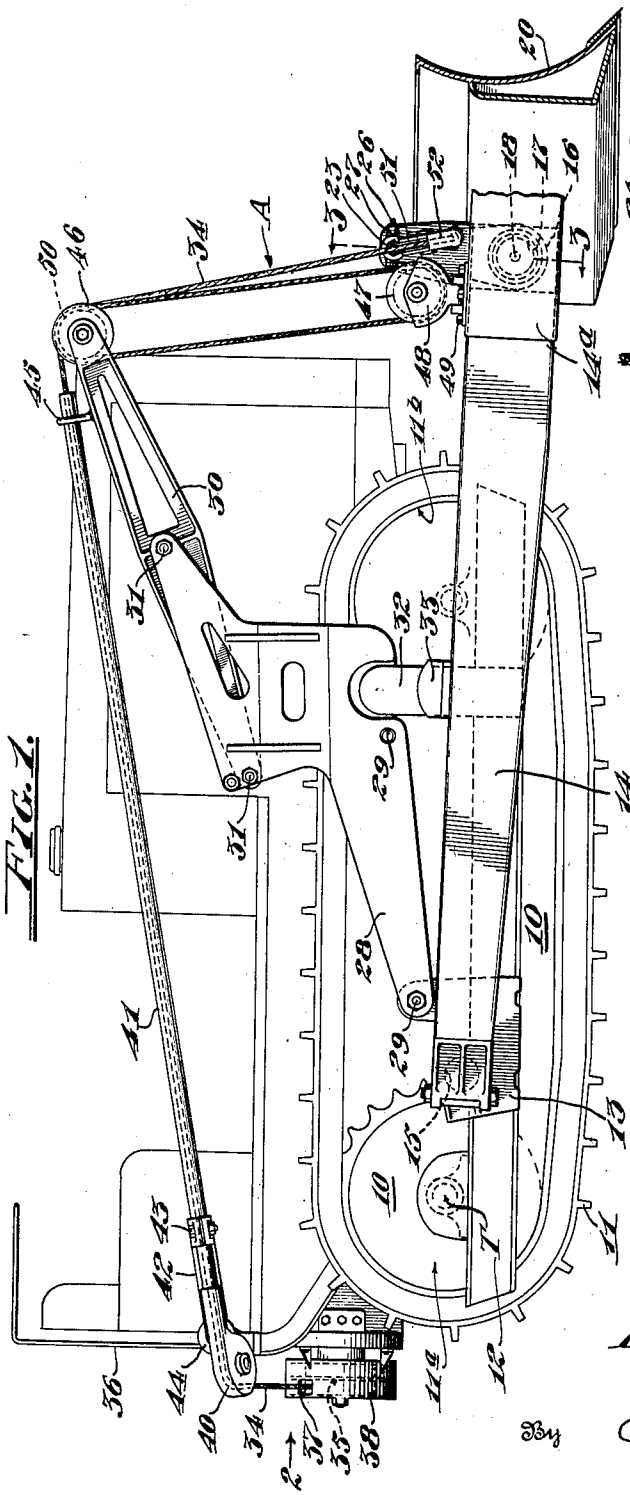


FIG. 1.

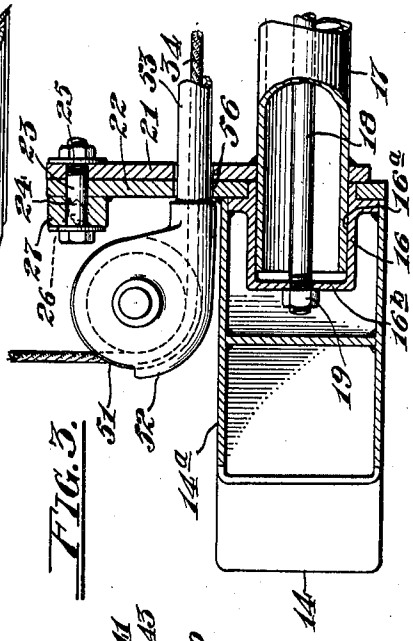


FIG. 3.

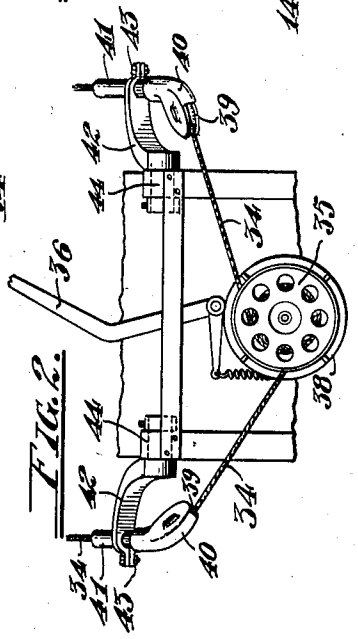


FIG. 2.

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FIG. 4.

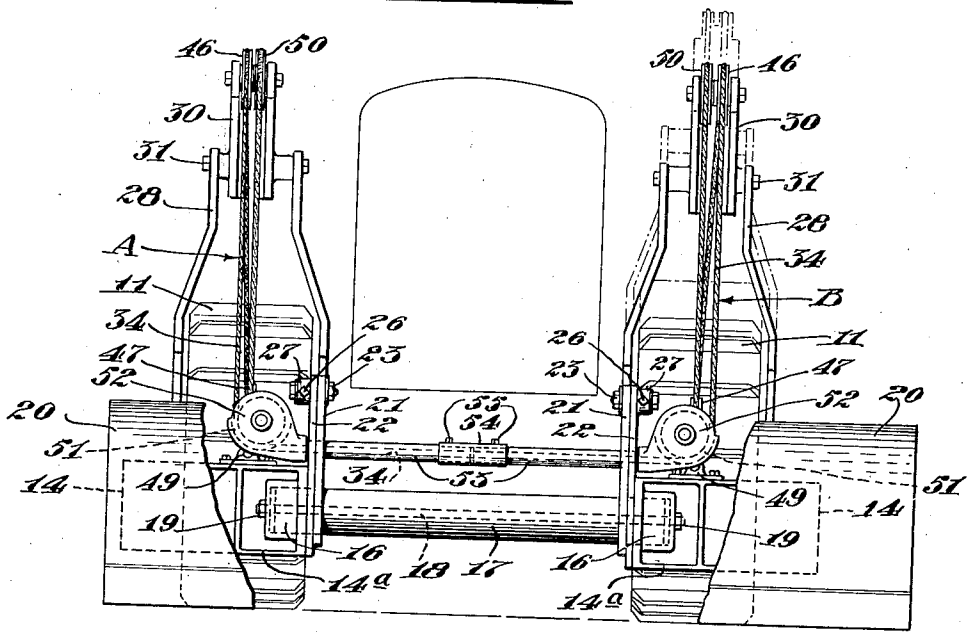


FIG. 5.

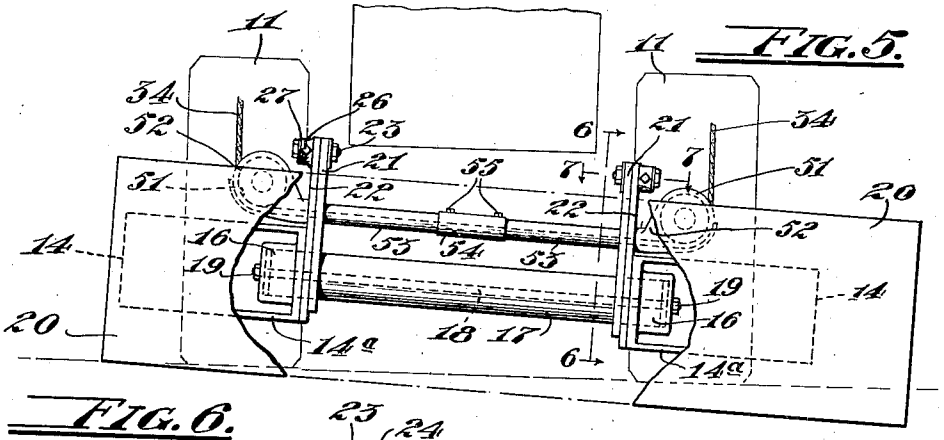


FIG. 6.

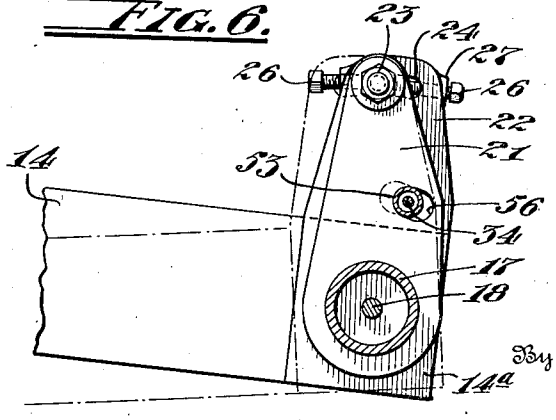
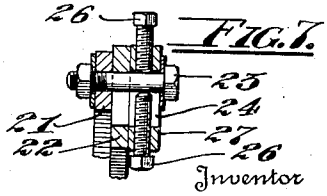


FIG. 7.



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FIG. 8.

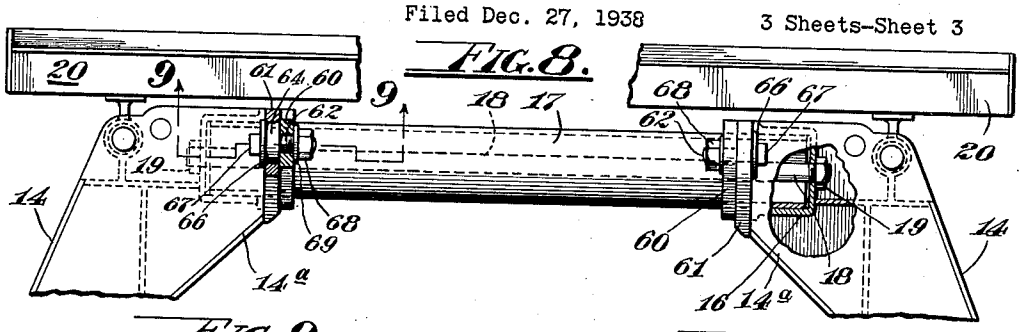


FIG. 9.

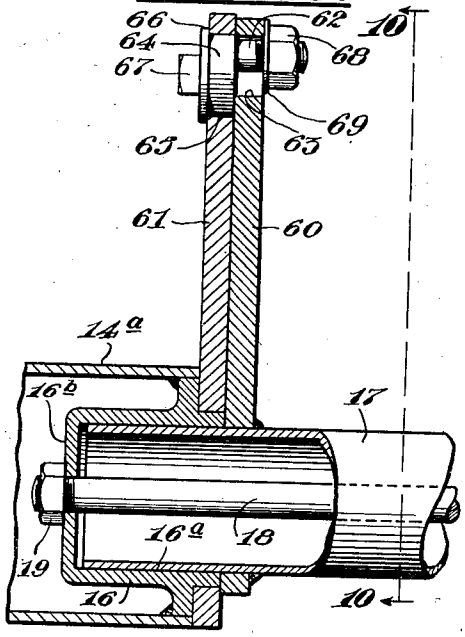


FIG. 10.

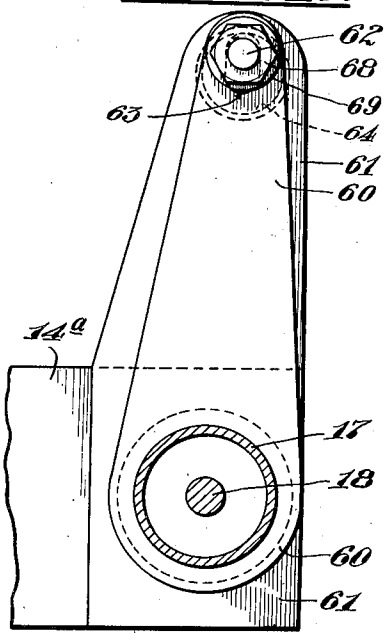


FIG. 12.

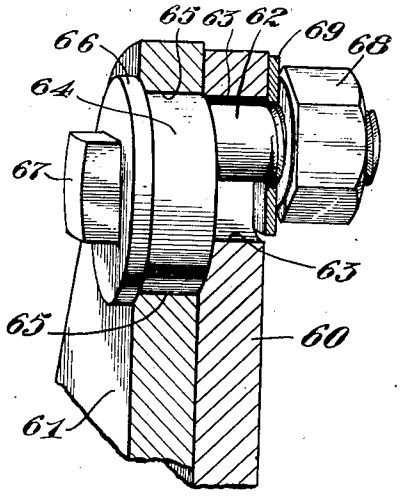
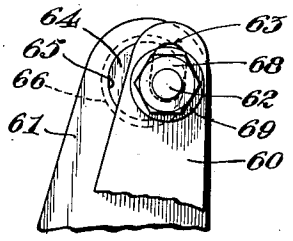


FIG. 11.



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Patented May 12, 1942

2,282,389

UNITED STATES PATENT OFFICE

2,282,389

BULLDOZER

Lisle T. Argo, Los Angeles, Calif., assignor to Kay-Brunner Steel Products Inc., a corporation of Delaware

Application December 27, 1938, Serial No. 247,804

7 Claims. (Cl. 37—144)

My invention relates to road working machines of the character known as trail builders or bulldozers, wherein excavating implements are carried and advanced by a tractor to move earth forwardly or to either side thereof in the building of a roadway. In such machines, mechanisms are provided for obtaining vertical adjustments of the implements with respect to the ground so that they can perform predetermined earth moving operations. However, the implements do not maintain their positions with respect to the ground upon the encountering by the forward portions of the machine tracks of irregularities in the road surface, which irregularities produce relative vertical movement between the forward portions of the track frames, causing an inclination of the machine out of its normal plane of operation.

It is a purpose of my invention to provide an elevating and compensating or equalizing mechanism for the implement of a road working machine, by means of which the implement is maintained in fixed angular relationship with respect to the axis of oscillation of the track frames irrespective of relative vertical movement of the forward portions of the track frames, tending to disturb such relationship, and thereby causing the implement to maintain its position of adjustment with respect to the ground.

It is also a purpose of my invention to provide an implement mounting for road working machines capable of ready adjustment to predetermine its normal position of operation with respect to the ground, which position can be either parallel to the ground or inclined or tilted with respect thereto.

I will describe only one form of road working machine, including one form of elevating and compensating or equalizing mechanism, and two forms of mountings for the implement, and will then point out the novel features there in claims.

In the accompanying drawings:

Fig. 1 is a side elevation of one form of road working machine embodying my invention.

Fig. 2 is a rear elevation in the direction of arrow 2 of Fig. 1.

Fig. 3 is an enlarged fragmentary sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a front elevation of the machine shown in Fig. 1 parts being broken away to disclose the supporting and elevating mechanisms for the implement.

Fig. 5 is a view similar to Fig. 4, showing the implement in another position of adjustment with respect to the tractor and ground.

Fig. 6 is an enlarged sectional view taken on the line 6—6 of Fig. 5 and showing one form of implement mounting.

Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 5.

Fig. 8 is a fragmentary plan view of the part of the machine shown in Fig. 1 illustrating another form of implement mounting embodying my invention.

Fig. 9 is an enlarged vertical sectional view taken on the line 9—9 of Fig. 8.

Fig. 10 is a vertical sectional view taken on the line 10—10 of Fig. 9, and showing one adjustment of the mounting.

Fig. 11 is a fragmentary view similar to Fig. 10 showing another adjustment of the mounting.

Fig. 12 is an enlarged sectional perspective view of the mounting of Fig. 8.

Referring to the drawings, a tractor of conventional design includes a track frame 10 and a belt or track 11 trained about a driving sprocket 11*a* and a driven pulley 11*b*. The driving sprocket rotates about an axis T which constitutes the fixed axis about which the track frame oscillates. The frame 10 is provided on opposite sides with a pair of beams 12, to each of which is attached a bracket 13 fulcruming a side implement arm 14 by means of a pivotal connection 15, preferably of a ball and socket or other universal type. The forward ends 14*a* of the arms are curved inwardly toward one another, socket members 16 being welded thereto for slidably receiving a cross member, consisting of a spreader pipe 17 whose ends are receivable within respective sockets 16*a*, and a tie rod 18 extending through the pipe and through the end walls 16*b* of the socket members. Nuts 19 are threaded on to the ends of the tie rod for tensioning the same to maintain the arms 14 and cross member 17, 18 in spaced relationship with respect to one another, so that the arms move together normally as a unit about their respective pivotal connections 15, as described and claimed in Patent No. 2,107,123, Implement mounting for road working machines, granted Feb. 1, 1938. As further described in that patent, an implement 20 in the form of a blade is suitably attached to the arms 14, being set in a bulldozing position, or adjusted to either side for side casting operations.

The implement 20 can be caused to assume selected normal positions with respect to the ground being operated upon. These positions can include substantial parallelism of the implement relative to the ground, or an axial tilt in

either direction. The particular normal position is dependent upon the relative vertical positions presented by the forward portions 14a of the arms, which portions are relatively movable by a mounting now to be described.

The mounting comprises two devices associated with each arm 14 and as these devices are similar a detailed description of only one of them will suffice for an understanding of both. The spreader pipe 17 of the cross member has an upwardly extending plate 21 welded or otherwise suitably secured thereto. The inner curved portion 14a of the arm also has an upstanding plate 22 welded thereto and positioned adjacent the first-mentioned plate. These plates 21, 22 are normally locked together through the agency of a bolt 23 extending through an arcuate slot 24 provided in the arm plate 22 and extending through a hole 25 in the cross member plate 21. Set screws 26 are threaded into the boss 27 extending from the arm plate and engageable with opposite sides of the bolt shank 23.

Whenever it is desired to adjust the degree of end to end tilt of the implement blade 20 relative to the ground, the blade is elevated by a cable and pulley mechanism to be described hereinafter, and preferably a block is placed under that end of the blade to be lifted so that when the blade is lowered one end will rest on the block and the other end on the ground. Before lowering the blade the nuts on the tie rod and locking bolt are loosened as well as the set screws 26. Thus, when the blade is lowered it will be free to tilt to the angle determined by the height of the block. Concurrently with such blade tilting, the arms 14 rotate or twist circumferentially about the pivots 15 to allow the forward portions 14a of the arms to assume those positions necessary to permit the blade to occupy tilted position. As hereinbefore described, the pivots 15 are of the ball and socket type which allows the requisite turning of the arms without setting up any torsional stresses therein.

As illustrated in Fig. 5, the arm portions 14a under a tilting adjustment of the blade 20, although tilted during such adjustment, remain aligned axially with the spreader pipe 17 so that no stresses are set up in the pipe or the sockets 16a. It is during this tilting movement that the arm portions 14a rotate on the spreader pipe through the agency of the sockets 16a. Under such movement the plates 22 move through vertical arcs and in opposite directions, while the plates 21 remain stationary. Thus, it becomes apparent that by tightening the nuts on the tie rod and bolts, and then tightening the screws 26 against the bolts, the spreader pipe is secured against rotation and the plates 21 and 22 against relative movement to maintain the preselected tilting adjustment of the blade after the blade is elevated free of the block.

The present invention also provides a mechanism for maintaining the implement or blade 20 in its normal position of adjustment with respect to the ground. Such mechanism is preferably part of the device used for determining the elevation of the implement.

In the specific embodiment of the drawings, an auxiliary frame 28 is provided on each side of the tractor, being fastened to the bracket 13 and the tractor frame by suitable bolts or studs 29. An extending arm 30 for carrying part of the elevating mechanism is attached to each auxiliary frame by the bolts 31. Each auxiliary frame 28 and its adjacent implement arm 14 are provided with wear plates 32, 33 to prevent rubbing contact between the arms and the framework, in a known manner.

The implement elevation mechanism is operable by a cable 34 attached to a motor driven winding drum 35 that can be coupled to a source of power or properly braked through the manipulation of a clutch and brake operating lever 36, in a known manner. The cable 34 extends from the winding drum in two directions, passing through openings 37 in the drum housing 38 and to duplicate arrangements of sheaves or pulleys A, B cooperable with the implement arms 14 and the auxiliary framework 28, 30 on each side of the tractor. In view of the duplicate arrangement a description of one set of the sheaves mechanism will suffice for an understanding of the invention.

From the winding drum 35, the cable passes over a sheave 39 rotatable within a shroud 40 fixed to a tubular guard 41 clamped to an outwardly extending bracket 42 by means of a bolt 43, the bracket having a journal mounting 44 on the tractor frame. The tubular guard extends forwardly with its outer end journalled in a bearing bracket 45 fixed to the extending frame arm 30. The journal bearings 44, 45 are provided to prevent relative movement between the forward and rearward parts of the tractor framework from distorting the guard.

The cable 34 passes through the guard 41 and over a pulley 46 rotatably carried by the extending arm 30. From this pulley the cable proceeds over a sheave 47 rotatable in a bracket 48 pivotally mounted on a base 49 bolted to an implement arm 14, and then over a second pulley or sheave 50 carried by the framework arm 30, after which it passes over an equalizing sheave 51 rotatable in a shroud 52 fixed to a pipe 53 extending toward a similar pipe 53 fixed to a shroud 52 adjacent the other implement arm 14. The pipes 53 are coupled together by means of a tube 54 and screws 55 to form a frame sling through which the cable passes between the equalizer sheaves or pulleys 51. These equalizer pipes pass through slots 56 in the plates 21, 22 to prevent the pipes 53 from hindering adjustment of the normal position of the implement 20.

Through suitable control of the winding drum 35, the implement 20 and its associated arms 14 can be raised or lowered through simultaneous passage of the cable 34 over the sheaves A, B on both sides of the tractor. In the event that the tractor is traversing irregular ground so that the forward end of one of the track frames is elevated, the implement 20 will still maintain its normal position with respect to the ground by being caused to maintain a fixed angular relationship to the fixed axis T of the track frame. If it is assumed that the right hand track frame (as seen in Fig. 4) is elevated to the dotted line position, the fixed axis T will not be similarly elevated but will maintain its normal position because the track frame swings about the axis T as a center. Nor will the right hand end of the implement be elevated but the implement in its entirety will remain in its normal ground position and in fixed angular relationship to the fixed axis T. This is true irrespective of the initial adjustment of the implement.

Elevation of the extending arm 30 of the tractor framework will merely raise the sheaves 46, 50 to produce an increase in their distance from the sheave 47 carried by the implement arm. The necessary cable for traversing this increased dis-

tance will be supplied by the feeding of the cable from the other pulley set A on the other side of the tractor through the equalizer sheaves 51 and frame sling 53, 54, 55. The net result might be a slight elevation of the implement blade, but this will be uniform along its entire length to preserve its adjusted position as regard the ground. Upon return of the right track frame to a level position, the sheaves 46, 50 of the set B will lower allowing the cable to feed back through the equalizer sheaves and sling to the other side A of the tractor.

In Figs. 8 to 12, I have shown another form of mounting for predetermining the normal position of operation of the implement 20 with respect to the ground. This mounting likewise comprises two similar devices one for each arm 14. At each end of the pipe 17 is an upwardly extending plate 60 welded thereto. The arm portion 14a also has an upstanding arm 61 welded thereto and positioned adjacent the plate 60.

These plates 60 and 61 are normally locked together through the medium of a bolt having a shank 62 extending through a slot 63 in the plate 60, and a disk-like head 64 rotatably fitted in a round opening 65 of the plate 61. This head 64 is fixed eccentrically to the shank 62, and its outer side is formed with an annular flange 66 abutting the plate 61 to limit movement of the head inwardly through the plate.

Fixed centrally on the outer face of the head 64 is a projection 67 of squared form to produce in effect a nut which is adapted to be gripped by a wrench for turning the head. The bolt shank 62 is screw-threaded for a portion of its length to receive a nut 68 where it projects from the plate 60, with a washer 69 between the nut and plate.

As will be understood from the manner in which the blade 20 is adjusted as to degree of tilt through the agency of the first form of implement mounting, in the present case before the blade is lowered on a block the nuts 19 and 68 are loosened to allow movement of the plates 61 through a vertical arc. The bolt shank 62 being eccentric of the head 64, such movement of the plates 61 is permitted without effecting movement of the plates 60 so that the arms 14 are allowed to assume those circumferential positions necessary to permit the blade to occupy the tilted position as determined by the block. Once the desired blade adjustment is obtained, it is maintained by again tightening the nuts 19 and 68 to lock the assembly in set position.

Although I have herein shown and described only two forms of implement mountings, and one form of elevating and equalizing mechanism for the implements of road working machines each embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of my invention, and the spirit and scope of the appended claims.

I claim:

1. A road working machine including a pair of arms adapted to be mounted on a frame for pivotal and axial twisting movements, a cross member connecting said arms for simultaneous movement, an implement carried by said arms, a plate fixed to said cross member, a second plate fixed to one of said arms, one of said plates being provided with a slot, and the other plate having an opening therethrough, and a bolt having a head rotatably fitted in said opening, and a shank fixed eccentrically to the head and extending through said slot, and a nut on the shank coacting with the head when the nut is tightened to secure the plates against relative rotation, and permitting rotation of the head when the nut is loosened to cause relative rotation of the plates.

2. A road working machine including a pair of arms adapted to be mounted on a frame for pivotal and axial twisting movements, a cross member connected with said arms, an implement carried by said arms, and means for varying the normal position of said implement comprising an element fixed to and extending from said cross member, a second element fixed to and extending from one of said arms, and crank means for effecting relative rotation between said elements.

3. A road working machine having a pair of arms adapted to be mounted on a frame for pivotal and axial twisting movements, a cross member having rotatable connections with said arms which are axially of the member and transversely of the arms, an implement fixed to said arms, and means for lengthwise tilting of the implement, comprising an element fixed to and extending radially from said cross member, a second element fixed to and extending from at least one of said arms, and means for effecting relative rotation between said elements.

4. A road working machine having a pair of arms adapted to be mounted on a frame for pivotal and axial twisting movements, a cross member having rotatable connections with said arms which are axially of the member and transversely of the arms, an implement fixed to said arms, and means for lengthwise tilting of the implement, comprising an element fixed to and extending radially from said cross member, a second element fixed to and extending from at least one of said arms, means for effecting relative rotation between said elements; and means for locking said elements against relative rotation.

5. A road working machine, comprising; a frame; a pair of arms at opposite sides of the frame and extending forwardly thereof; an implement fixed on the forward ends of said arms; means for mounting the rear ends of the arms on the frame for independent pivotal and axial twisting movements to allow tilting adjustments of the implement; a cross member having rotatable connections with said arms which are axially of the said member and transversely of the arms so as to allow independent axial adjustments of the arms; and means for locking said connections to maintain axial adjustments of the arms and in consequence to secure the implement in a resultant position of tilt.

6. In a tractor having a body frame, track frames pivoted at opposite sides on the body frame, and auxiliary frames on the track frames; a hoisting drum on the body frame; a pair of arms mounted on the track frames for pivotal and axial twisting movements; a cross member connected with said arms at the forward ends thereof; an implement carried by the forward ends of said arms; a pair of elements fixed to and extending from said cross member; a second pair of elements fixed to and extending from the forward ends of the arms; means for effecting relative rotation between said pairs of elements for varying the normal position of the implement; a pipe extending through said pairs of elements; a cable having both ends secured to the hoisting drum and wrapped in opposite directions about the latter; and pulleys guiding the cable from said drum over the auxiliary frames down to the

forward ends of the arms, back to the auxiliary frames, and then down and through said pipe.

7. A road working machine including a pair of arms adapted to be mounted on a frame for pivotal and axial twisting movements; a cross member connected with said arms; an implement carried by said arms; a pair of elements fixed to and extending from said cross member; a second pair of elements fixed to and extending from said arms; means for effecting relative rotation between said pairs of elements for varying the normal position of the implement; said elements having registering openings therethrough; and a pipe extending through said openings and through which a cable is adapted to be trained.

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