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2,938,285

BULLDOZER

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3 Sheets-Sheet 2

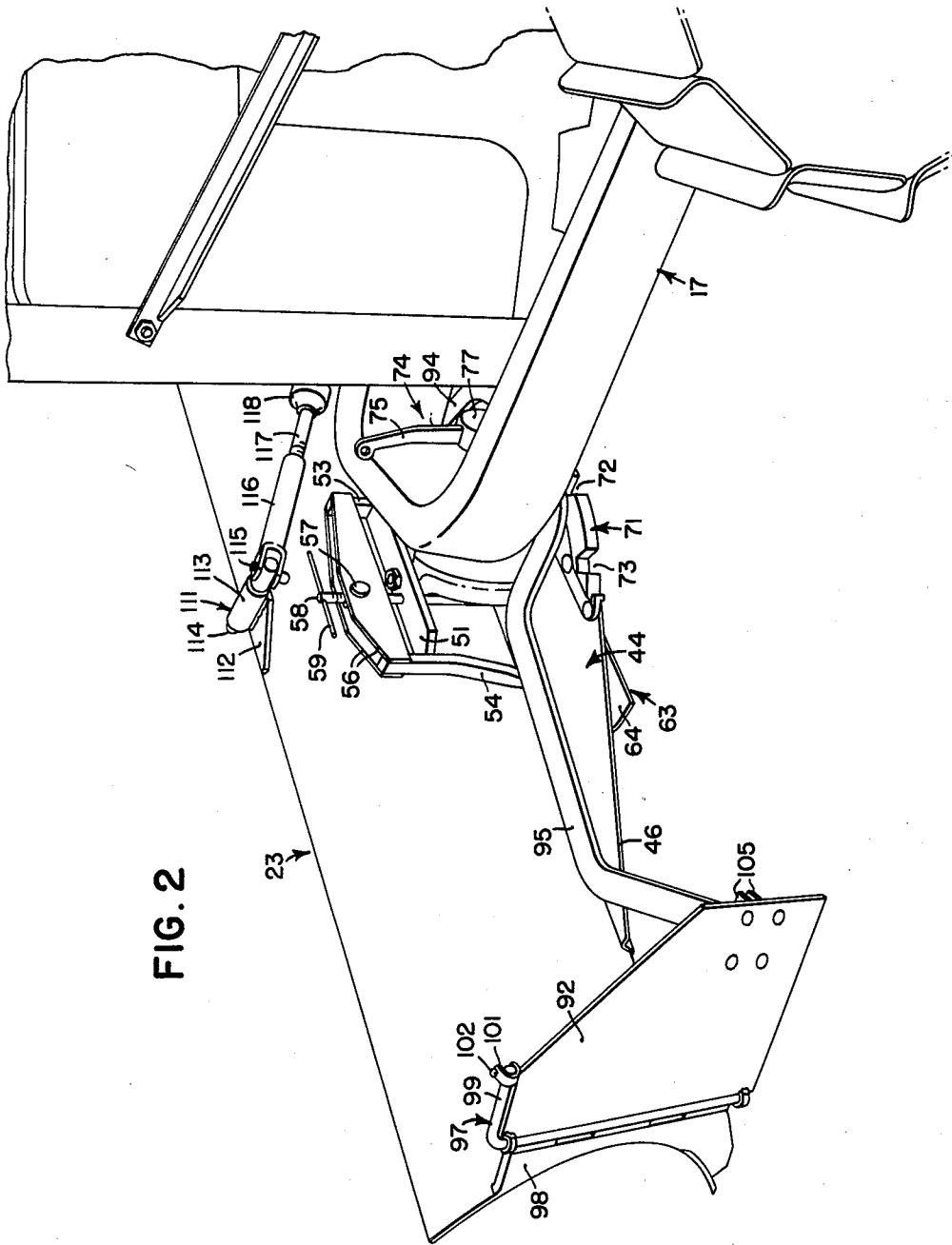


FIG. 2

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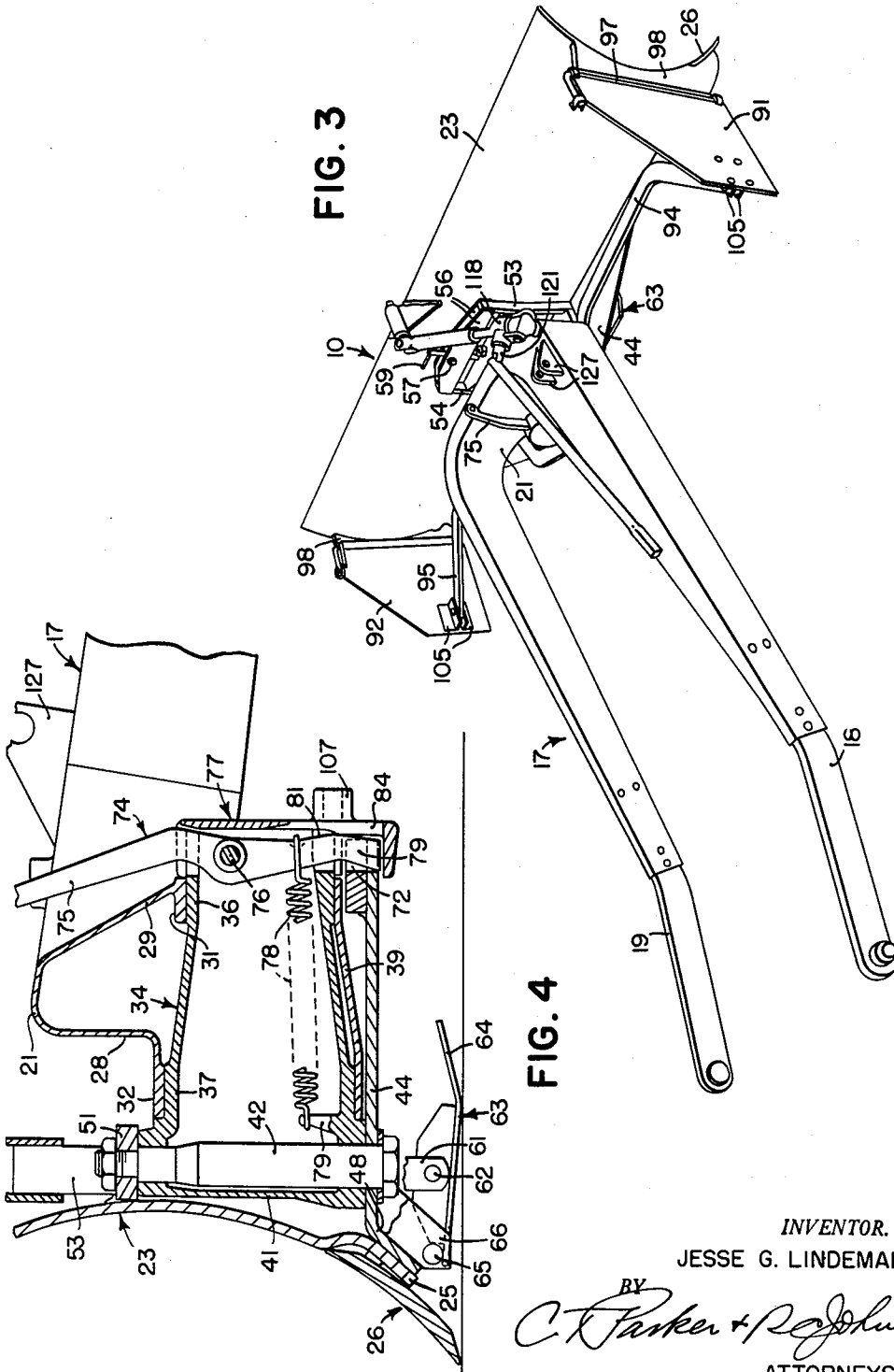
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BULLDOZER

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10 Claims. (Cl. 37-144)

The present invention relates generally to agricultural and like implements and more particularly to earth moving implements having an earth scraping blade and means mounting the blade on a tractor.

The object and general nature of the present invention is the provision of a bulldozer or like implement having a blade that is carried by a push frame and swingable relative to the latter about a generally vertical axis, with associated pivoted landside plates pivoted to opposite ends of the blade and arranged to take the side pressure when the blade is operated in an angled position. More specifically, it is a feature of this invention to provide means acting automatically in response to movement of the blade into and out of angled position for shifting the pivoted landside plates into the proper position for the selected blade angle.

It is a further feature of this invention to provide new and improved means mounting the blade on the forward end of the associated push frame to facilitate connection of the blade therewith and the pivoting of the blade into, and the locking of the blade in, various angled positions. An additional feature of this invention is the provision of new and improved trunnion means connecting the blade with the push frame for movement about a generally fore-and-aft extending or longitudinal axis, with means whereby movement of the blade about the aforesaid longitudinal axis does not interfere with the automatic action of the landside plates.

Still further, an additional feature of this invention is the provision of new and improved depth shoe means for controlling the depth of operation of the blade.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a fragmentary perspective view of a bulldozer implement mounted on a conventional farm tractor of the crawler type, the view being taken just to the right of the operator's station on the tractor and looking generally forwardly.

Fig. 2 is a perspective view showing the left hand forward portion of the tractor and the associated bulldozer with the blade thereof arranged in a position angled oppositely with respect to the angled position of the blade shown in Fig. 1.

Fig. 3 is a perspective view of the bulldozer, showing the blade disposed in its transverse position relative to the push frame, and the latter disconnected from the propelling tractor.

Fig. 4 is an enlarged fragmentary sectional view taken generally along the vertical fore-and-aft extending plate passing through the vertical axis about which the blade is movable relative to the push frame of the bulldozer.

Referring first to Fig. 1, the bulldozer is indicated in its entirety by the reference numeral 10 and is shown in this figure as mounted on a tractor 11 of the type that includes a motor 12, frame means 13, and a pair of

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crawler track units 14, each of which includes a track frame 15 that is fixed in any suitable way to the tractor frame.

As will best be seen from Fig. 3, the bulldozer 10 includes a push frame 17 that includes right and left hand bars 18 and 19 pivotally connected at their rear ends to the right and left hand track frames of the tractor 11. The push frame 17 also includes a forward transverse portion 21 formed as a generally rectangular box section, the right and left hand portions of which are bent rearwardly and are faired into and form a part of the bars 18 and 19.

The bulldozer 10 also includes a transverse blade 23, preferably curved as best shown in Fig. 4 and formed along its lower edge portion 25 with a shouldered section to which the cutting blade 26 is detachably connected in any suitable way. Preferably, the cutting blade 26 is reversible so that when one cutting edge has become dull the blade may be reversed to present a new cutting edge.

The blade 23 is connected with the push frame 17 by trunnion means that is best shown in Fig. 4. As will be seen from this figure, the forward transverse part 21 of the push frame 17 has front and rear wall sections 28 and 29 that are formed with bearing flanges 31 and 32 that, taken together, provide a generally fore-and-aft extending bearing section in which a trunnion member 34 is disposed for rotation about a fore-and-aft extending longitudinal axis. The trunnion member 34 is generally hollow and of approximately conical formation, having front and rear portions 36 and 37 that fit rotatably within the bearing flanges 31 and 32. The lower portions of the bearing flanges 31 and 32 are shaped to form a continuous lower wall section 39.

The forward portion of the trunnion member 34 is shaped to provide a vertically extending sleeve section 41 in which a pivot member 42 is disposed. The lower or headed portion of the pivot member 42 extends through a bottom plate 44 that is fixed, as by welding or the like, to the shoulder section 25 of the blade 23, the bottom plate 44 being disposed generally in a horizontal plate and shaped approximately as a sector at its central portion with laterally extended parts 46 (Figs. 1 and 2). The bottom plate 44 is bent downwardly, as at 48, Fig. 4, at the zone of juncture with the lower portion of the blade 23. The upper portion of the pivot member 42 is reduced in cross section and extends upwardly through a horizontal crossbar 51 that is secured, as by welding or the like, to the back side of the blade 23. The lower plate 44 and the upper bar 51 are interconnected by a pair of vertical laterally spaced apart bars 53 and 54, and the upper ends of the bars 53 and 54 are secured, as by welding, to a pair of vertically arranged crossbars 56. The bars 56 are apertured centrally, as best shown in Fig. 2, to receive a trunnion member 57 having a screw-threaded opening therethrough in which a threaded rod 58 is disposed, the latter having an operating handle 59 at its upper end. The lower end of the rod 58 is connected to a swivel 61, which permits rotation of the rod 58 relative to the swivel 61, and the latter is pivoted, as at 62, to a depth shoe 63 that in the preferred form of the invention comprises a plate 64 that is pivoted at its forward edge, as at 65, to the lower portions of a pair of brackets 66 that are fixed to the forward portion of the bottom plate 44, whereby the depth shoe 64 is pivotally connected with the lower central portion of the blade 23. Turning the rod 58, as by proper manipulation of the handle 59, thus acts to raise or lower the depth shoe 63 relative to the cutting edge 26. As will best be seen from Fig. 4, the depth shoe 63 lies generally underneath the bottom plate 44 and also underneath the pivot 42 between the blade and the forward portion of

the push frame, and hence the depth shoe 63 not only controls the depth of operation but also protects these parts, at least to a certain extent, from dust, dirt and the like.

As will best be seen in Fig. 2, the bottom plate 44 is provided with a sector 71 having a central notch 72 and a laterally spaced notch 73 at each side of the central notch 72.

The purpose of the sector 71 is to provide means for locking the blade 23 against pivotal movement about the axis defined by the pivot 42, and to this end, latch means 74 is provided for cooperation with the sector 71. The latch means 74, as best shown in Fig. 4, includes a latch lever 75 pivoted, as at 76, on a transverse shaft carried in a cap member 77 that is fixed, as by the shaft 76, to the rear ends of the trunnion member 34, the rear end of the latter member extending rearwardly from the bearing sections 31, 32 of the push frame 17. A spring 78 is anchored at its forward end to a lug 79 formed on the inside of the hollow trunnion member 34, and the rear end of the spring 78 is connected into a notch formed in the lower portion of the lever 75. The lower end 79 of the latter extends downwardly through a slot 81 formed in the lower rear portion of the trunnion member 34 and is adapted to enter either the central notch 72 or one of the two lateral notches 73. An operating rod or the like may be connected to the upper end of the latch lever 75, as will be clear from Fig. 2, and a forward push on the rod will release the lower portion of the latch lever 75 from the sector 71, the cap 77 being cut out, as at 84 (Fig. 4), for the purpose of accommodating rearward movement of the lower end 79 of the latch lever 75. With the latter held in released position, the tractor may be driven forwardly and, by engaging one end or the other of the blade 23 with some fixed object, the blade 23 may be angled to the desired position, or restored to a transverse position, easily and conveniently.

When a blade, such as the blade 23 as shown in Fig. 1, is operated in an angled position, there is a certain amount of side thrust that, due to the pressure of the soil against the blade, tends to cause the latter to move laterally. That is, if the blade is angled toward the left, as shown in Fig. 1, there is a side thrust that tends to shift the blade 23, and the front end of the tractor, toward the right. To counteract this tendency, it is the purpose of the present invention to provide a landside means indicated generally by the reference numeral 90. Briefly, such landside means includes right and left hand landside plates 91 and 92 pivoted at their forward portions to the right and left hand ends of the bulldozer blade 23 and automatically controlled through right and left hand links 94 and 95 that extend generally parallel to the blade 23 and are connected to the bulldozer frame, preferably through the trunnion member 34 whereby movement of the blade 23 about a fore-and-aft extending axis does not affect the action of the links 94 and 95.

As will best be seen from Fig. 3, each of the landside members 91 and 92 includes a generally triangular plate pivoted, as by a vertical rod member 97 to a vertical bracket 98 fixed to each end portion of the blade 23. The rod member 97 serves as a pintle and includes an upper laterally turned section 99 that serves as a handle releasably engageable in a lock 101. By releasing the pin 102 of the lock 101, the handle 99 may be disengaged from the associated landside plate and disconnected from the latter, whereby the latter may then be disconnected from the blade 23. Upper and lower angle brackets 105 pivotally connect the outer end of each of the links 94 and 95 with the rear portion of the associated landside plate. The inner end of each of the links 94 and 95 is connected with a bifurcated lug 107 secured to or forming a part of the cap member 77. Preferably, there is a lug 107 on the cap member 77 at each side of the slot 84, the lug 107 shown in Fig. 4 being the one to which the inner end of the right hand link 94 is pivotally connected. This pivotal

connection, or the pivotal connection of the link with the outer angle brackets 105, or both of them, may be removable so that when the plates 91 and 92 are removed, the links may also be removed.

The two lugs 107 on the cap members 77 are disposed rearwardly from the pivot 42 of the blade about the same distance as the laterally outer pivot brackets 105 are spaced from the associated pivot member 97. Thus, when the blade 23 is swung about the vertical axis defined by the pivot 42, the two landside plates 91 and 92 are retained in substantially vertical fore-and-aft extending planes. Therefore, when changing the angle of the blade 23, the landside members 91 and 92 are also changed automatically. Different angled positions may be provided for by increasing the number of notches in the sector 71, as may be desired. It will be noted, particularly from Figs. 2 and 3, that the generally intermediate portions of the landside controlling links 94 and 95 are shaped so as to lie closely adjacent the rear side of the blade 23 and generally above the outer plate 44 of the blade. This particular construction is desirable since the bottom plate 44 thus prevents the links 94 and 95 from damage due to contact with obstructions or the like.

As described above, the trunnion member 34 and associated parts provide for movement of the blade 23 about a longitudinal fore-and-aft extending axis, the links 94 and 95 moving with the blade, and means for swinging the blade 23 about said fore-and-aft extending axis will now be described. An anchor member 111 is fixed to the upper central portion of the blade and comprises a bracket 112 and a generally fore-and-aft extending sleeve 113 that is welded or otherwise fixed to the bracket 112. The swivel bar 114 is disposed within a sleeve 113 and has its rear end pivotally connected, as at 115, to a sleeve member 116 that is internally threaded to receive a screw-threaded rod member 117, the rear end of which is extended into a bevel gear housing 118. The latter is swivelly anchored, by any suitable means, to the adjacent portion of the push frame 17. One of the bevel gears within the housing 118 is connected to the rear end of the threaded rod 117 the forward end of which is threaded into the sleeve 116, which is held against rotation by virtue of its connection with the swivel rod 114. The other bevel gear within the housing 118 is connected to a short shaft section 121 that extends outside the housing 118 and is connected by a universal joint or the like with a fore-and-aft extending shaft 122, the rear end of which is supported in any suitable way and carries an operating member 123, such as a hand wheel, accessible to the operator of the tractor.

The push frame 17 may be raised and lowered in any suitable way, such as by a hydraulic jack 125 having its piston end 126 connected pivotally to lug means 127 fixed in any suitable way to the push frame 17. The cylinder end of the hydraulic jack 125 is pivotally connected with a heavy bracket 128 that is fixed to the tractor, such as by being fastened to the associated track frame 15. The tractor 11 is provided with a hydraulic power unit 130, and the latter is connected to operate the jack 125 through hose lines 132 and 133, an arrangement which is generally conventional in this art.

While I have shown and described above the preferred structure in which the principles of the present invention have been incorporated, it is to be understood that my invention is not to be limited to the particular details, shown and described above, but that, in fact, widely different means may be employed in the practice of the broader aspects of my invention.

What I claim, therefore, and desire to secure by Letters Patent is:

1. In a bulldozer, a frame, a blade pivotally connected, at a point spaced from one end of the blade, with said frame for movement relative thereto about a generally vertical axis, a generally vertical landside member

pivotaly connected along its forward edge portion with said one end of the blade, and means connected between said frame and said landside member for swinging the latter relative to said blade when the latter is shifted relative to said frame said means including a link that is generally U-shaped, the ends of said link being connected with said frame and landside member and the central portion of said U-shaped link being disposed closely behind said blade.

2. In a bulldozer, a push frame, a trunnion member rotatably mounted in the forward portion of said frame for movement relative thereto about a generally fore-and-aft extending axis, said trunnion member disposed at its forward portion forward of said frame, a transverse blade pivoted between its ends to the forwardly extending portion of said trunnion member for movement relative thereto about a generally vertical axis, a pair of landside plates, each landside plate being disposed in a generally vertical fore-and-aft extending plane means pivoting the forward portions of said plates to the outer ends, respectively, of said blade for movement relative thereto about generally vertical axes, and a landside control link connected with each landside plate, each link being disposed generally transversely and pivotaly connected at its inner end to said trunnion member and at its outer end to the associated landside plate.

3. The invention set forth in claim 2, further characterized by bottom plate means fixed to the lower portion of said blade and extending below said trunnion member and the adjacent portions of said control links.

4. In a bulldozer, a push frame including a forwardly disposed, fore-and-aft extending hollow bearing section, a generally transverse blade, a trunnion member rotatably disposed in said bearing section and extending therefrom at each end, said trunnion member being movable about the longitudinal axis of said bearing section, means pivotaly connecting said blade to the forwardly extended end portion of said trunnion member for movement relative to the latter about a generally vertical axis, a latch lever pivoted to the rearwardly extending portion of said trunnion member and extending downwardly of the latter, a plate fixed to said blade and disposed below said bearing section and trunnion member, and means on said plate to receive said latch lever whereby the latter holds said blade against pivoting about said generally vertical axis.

5. In a bulldozer, a push frame including a forwardly disposed fore-and-aft extending bearing section, a generally transverse blade, a hollow trunnion member rotatably disposed in said bearing section, means pivotaly connecting said blade to the forward end portion of said trunnion member for movement relative to the latter about a generally vertical axis, the rear end of said trunnion member being constructed and arranged to extend rearwardly out of said bearing section, a latch lever pivoted to the rearwardly extending portion of said trunnion member and extending downwardly of the latter, a plate fixed to said blade and disposed below said bearing section and trunnion member, means on said plate to receive said latch lever whereby the latter holds said blade against pivoting about said generally vertical axis, biasing spring means disposed within said hollow trunnion member and acting between the latter and said lever, and means connected to act between said push frame and said blade at a point spaced from the axis of said trunnion and bearing section for shifting said blade about said latter axis, said plate, trunnion and latch lever moving with said blade.

6. The invention set forth in claim 5, further characterized by said last mentioned means comprising a screw-threaded sleeve connected to the central portion of the blade above the trunnion axis, a rotatable member screw-threadedly engaging said sleeve and rotatably anchored to an adjacent part of said push frame, and

means connected with said rotatable member to rotate the same and adjust said blade about said trunnion axis.

7. In a bulldozer, a push frame including a forwardly disposed fore-and-aft extending bearing section, a generally transverse blade, a trunnion member rotatably disposed in said bearing section, means pivotaly connecting said blade to the forward end portion of said trunnion member for movement relative to the latter about a generally vertical axis, a latch lever pivoted to the trunnion, a plate fixed to said blade and disposed below said bearing section, means on said plate to receive said latch lever whereby the latter holds said blade against pivoting about said generally vertical axis, a depth shoe pivoted to said blade and disposed underneath the central portion of said plate and the pivot connection between said blade and said trunnion member, and means connected with said blade and said shoe to adjust the latter.

8. In a bulldozer, a push frame including right and left generally fore-and-aft extending frame bars and a forward transverse section rigidly interconnecting the front portions of said bars, a forwardly disposed fore-and-aft extending bearing section rigidly connected with said transverse section, a generally transverse blade, a trunnion member rotatably disposed in said bearing section, means extending forwardly out of said bearing section for pivotaly connecting said blade to the forward end portion of said trunnion member for movement relative to the latter about a generally vertical axis, the rear end of said trunnion member being constructed and arranged to extend rearwardly out of said bearing section, a latch lever pivoted to the rearwardly extending portion of said trunnion member, a plate fixed to said blade and disposed adjacent the rearwardly extending portion of the trunnion member, means on said plate to receive said latch lever whereby the latter holds said blade against pivoting about said generally vertical axis, biasing spring means acting against said lever to urge the latter to move toward said plate, and means connected to act between said push frame and said blade at a point spaced from the axis of said trunnion and bearing section for shifting said blade about said latter axis, said plate, trunnion and latch lever moving with said blade.

9. In a bulldozer, a push frame including a forwardly disposed fore-and-aft extending bearing section, a generally transverse blade, a trunnion member rotatably disposed in said bearing section, means pivotaly connecting said blade to the forward end portion of said trunnion member for movement relative to the latter about a generally vertical axis, the rear end of said trunnion member being constructed and arranged to extend rearwardly out of said bearing section, a latch lever pivoted to the rearwardly extending portion of said trunnion member and extending downwardly of the latter, a plate fixed to said blade and disposed below said bearing section and trunnion member, means on said plate to receive said latch lever whereby the latter holds said blade against pivoting about said generally vertical axis, and means connected to act between said push frame and said blade at a point spaced from the axis of said trunnion and bearing section for shifting said blade about said latter axis, said plate, trunnion and latch lever moving with said blade.

10. In a bulldozer, a push frame, a transverse blade pivoted between its ends to the forward portion of said frame for movement relative thereto about a generally vertical axis, a bottom plate disposed generally horizontally and fixed to the lower portion of said blade and carrying centrally thereof a sector portion arranged arcuately about said axis, a pair of landside members, one at each end of said blade, means pivotaly connecting the forward portion of each member to the associated end portion of said blade for movement relative to the latter about a generally vertical axis, the forward portion of said frame being disposed between said landside members, a link pivotaly connecting each blade with said

frame, each link extending generally parallel to said blade and lying above said bottom plate, and latch means engageable with said sector portion for locking said blade against movement about said axis.

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