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DIAGONAL BRACE MOUNTING FOR TILTABLE BULLDOZER BLADE

Filed Oct. 17, 1960

2 Sheets-Sheet 1

Fig. 1.

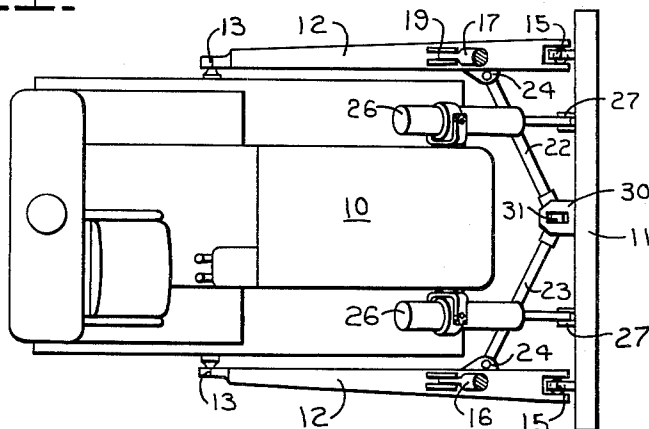
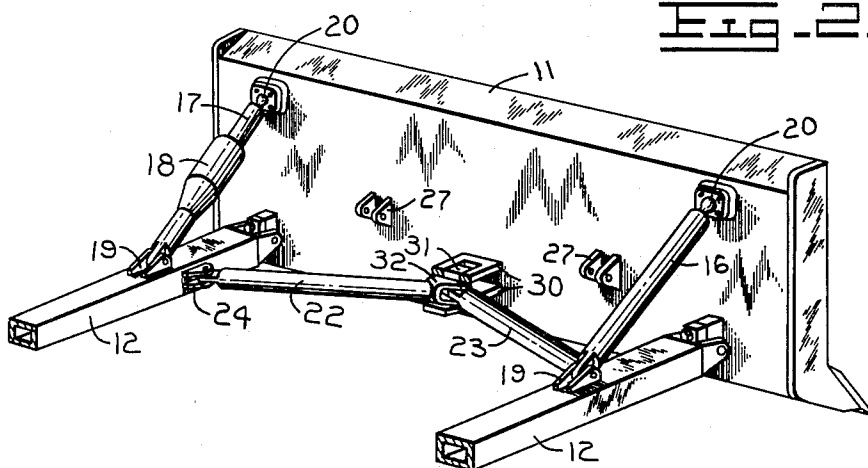


Fig. 2.



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3,025,620

2 Sheets-Sheet 2

Fig. 2.

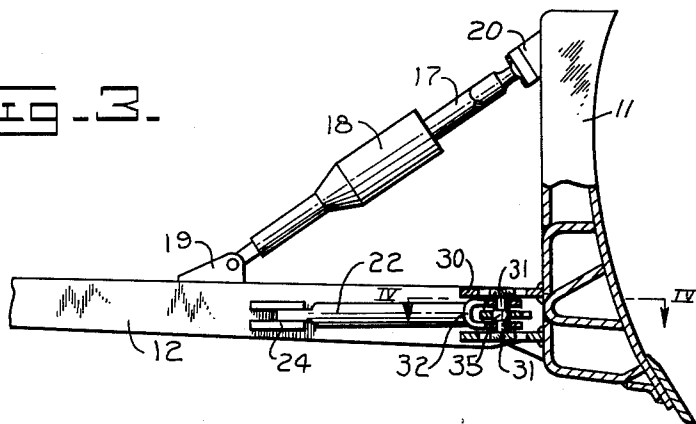


Fig. 4.

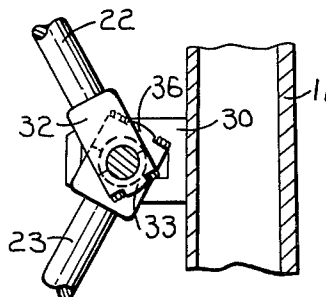
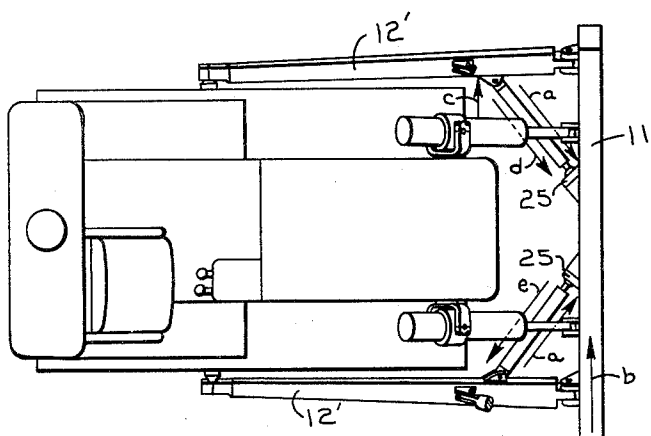


Fig. 5.



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DIAGONAL BRACE MOUNTING FOR TILTABLE BULLDOZER BLADE

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4 Claims. (Cl. 37-144)

This invention relates to bulldozers and particularly to means for bracing the blades of tiltable bulldozers to prevent damage resulting in part from stresses which are set up when a blade is adjusted to its tilt position.

The application relates to the correction of difficulties which are described in detail in a copending application of Robert W. Lichti for "Diagonal Brace Mounting for Bulldozer Blades," Serial No. 21,501, filed April 11, 1960. As described in said copending application, the conventional tiltable bulldozer is subjected to excessive compressive stresses in its diagonal braces when it is moved to a tilt position which stresses are reacted by the push arms and impart thereto bending forces often of sufficient magnitude to result in breakage of an arm.

It is the object of the present invention to provide a mounting for the diagonal braces of a tiltable type bulldozer through which the forces above referred to are materially reduced and through which many of the stresses to which bulldozer structures are subjected are eliminated.

Further and more specific objects and advantages of the invention are made apparent in the following specification by reference to the accompanying drawings.

In the drawings:

FIG. 1 is a schematic plan view of a tractor with a bulldozer embodying the present invention;

FIG. 2 is a perspective view showing the rear side of the bulldozer blade with the diagonal braces of the present invention and also showing the tilt braces and portions of the push arms;

FIG. 3 is a view in side elevation of the bulldozer with portions shown in section;

FIG. 4 is a fragmentary sectional view taken on the line IV-IV of FIG. 3; and

FIG. 5 is a schematic plan view of a tractor with a conventional bulldozer with the forces imposed on the diagonal braces and push arms indicated by arrows.

In FIG. 1 of the drawings, a tractor, generally indicated at 10, is shown as provided with a bulldozer blade 11 carried at the forward end of a pair of push arms 12. At their rearward ends the push arms are connected in a conventional manner to the truck frames of the tractor as by ball and socket type joints shown at 13. The bulldozer blade is pivotally connected to the forward ends of the push arms as by hinge connections 15 and held in an erect position by braces known as tilt braces shown at 16 and 17 (see FIG. 2). The tilt brace 17 includes adjustable means which may be in the form of a conventional extensible hydraulic cylinder 18. The tilt braces are connected as by pivot pins and brackets 19 to the tops of the push arms and ball and socket joints 20 to the back of the blade adjacent its upper edge. A pair of diagonal braces 22 and 23 extend between the inner sides of the push arms to which they are pivotally connected with brackets shown at 24 and these diagonal braces are, in conventional bulldozers, usually connected directly to the back of the blade by a ball and socket joint such as illustrated at 25 in FIG. 5 wherein a conventional bulldozer is shown. Conventional lift jacks are shown at 26 as extending between the tractor and bulldozer blade to which they are connected through brackets 27 fixed to the back of the blade. The present invention is also applicable to bulldozers wherein cable controls are employed in place of the lift jacks 26.

2

To effect tilting of the blade as for example toward the right, the tilt brace 17 is lengthened by extension of the cylinder 18, fluid to which is supplied in a conventional manner. Due to the bracing illustrated and above described, this lengthening of the tilt brace 17 raises the left end of the blade as well as the forward end of the push arm and imposes stresses on the diagonal braces and the push arms which are indicated by arrows in FIG. 5 of the drawings. In FIG. 5, the left side of the blade has been raised and both diagonal braces are placed in compression as indicated by arrows "a" thus imposing a bending stress on each of the push arms which are shown at 12' in FIG. 5. When this condition exists and the blade 11' is subjected to a side thrust as indicated by the arrow "b," the structure tends to collapse and a severe bending force is reacted by one of the push arms 12' at the point indicated by the arrow "c." This results from the addition of compressive stresses, arrow "d," to one of the diagonal braces while the stress on the other is relieved by the side thrust which imparts tension to the opposite diagonal brace as represented by the arrow "e."

Through the present invention as through the invention described in the copending application hereinabove referred to, the compressive stress in the diagonal braces and the bending stress on the push arms is reduced and the compressive stresses upon the diagonal braces are distributed between them. This is accomplished as best shown in FIGS. 2, 3 and 4 by connecting the inner ends of the diagonal braces 22 and 23 together in a manner which permits slight twisting movement of one with respect to the other and by connecting them to the back of the bulldozer blade 11 by means which permits them to move forwardly with respect to the blade. These means comprise a pair of vertically spaced plates 30 secured as by welding to the rear face of the bulldozer blade and slotted to receive the squared end 31 of a pin to enable it to slide in a longitudinal direction with respect to the tractor. The diagonal brace 22 is provided with a bifurcated end 32 which embraces the pin at spaced points through bearing caps best shown at 33 in FIG. 4. A spherical portion 35 is provided centrally of the pin and between the spaced ends of the brace 22 and this spherical portion is embraced by a spherical socket formed between the end of the diagonal brace 23 and a cap 36 thereon. This end of the brace 23 fits loosely in the bifurcated end of the brace 22 as shown in FIG. 3 to permit twisting movement of the braces relative to each other while both are capable of limited rotation about the axis of the pin and forward and rearward movement relative to the blade.

With the construction described, upon tilting of the blade by elongation of the tilt brace 17, both diagonal braces tend to be compressed as represented by the arrows "a" in FIG. 5. However, due to their ability to slide forwardly in the slots of the plates 30, they are relieved of the compressive stress and the application of excessive forces which tend to bend the push arms outwardly is eliminated. When a side thrust is imparted to the blade as represented by the arrow "c" in FIG. 5 whether or not the blade is tilted, the tensile stress represented by arrow "e" on one brace and the compressive stress represented by the arrow "d" on the opposite brace are equalized because the stress of each diagonal brace is transmitted to the other through the articulated connection of the forward ends of the braces.

I claim:

1. In a bulldozer blade mounting which comprises push arms secured to the blade, tilt braces extending upwardly between the tops of the push arms and the blade, and diagonal braces extending inwardly from the inner sides of the push arms to the blade and means to adjust

3

the length of at least one of said tilt braces to effect tilting of the blade, means to reduce stresses set up in the mounting upon such tilting including, a universal connection between the inner ends of said diagonal braces connecting them to each other, guide means secured to the rear of the blade, and means connecting the inner ends of the diagonal braces to said guide means for limited movement in a direction normal to the blade.

2. In a bulldozer blade mounting which comprises push arms secured to the blade, tilt braces extending upwardly between the tops of the push arms and the blade, and diagonal braces extending inwardly from the inner sides of the push arms to the blade and means to adjust the length of at least one of said tilt braces to effect tilting of the blade, means to reduce stresses set up in the mounting upon such tilting including, a vertically disposed pin hingedly connecting the inner ends of said diagonal braces to each other, and means on the rear of the blade embracing said pin to guide it for movement in a direction normal to the blade.

3. In a bulldozer blade mounting which comprises push arms secured to the blade, tilt braces extending upwardly between the tops of the push arms and the blade, and diagonal braces extending inwardly from the inner sides of the push arms to the blade and means to adjust the length of at least one of said tilt braces to effect tilting of the blade, means to reduce stresses set up in the mounting upon such tilting including, a vertically disposed pin hingedly connecting the inner ends of said diagonal braces to each other, and means on the rear of

4

the blade embracing said pin to guide it for movement in a direction normal to the blade, said pin having an enlarged portion of spherical contour and one of said diagonal braces having a socket of complementary contour embracing said enlargement to permit limited universal movement between the diagonal braces.

4. In a bulldozer blade mounting which comprises push arms secured to the blade, tilt braces extending upwardly between the tops of the push arms and the blade, and diagonal braces extending inwardly from the inner sides of the push arms to the blade and means to adjust the length of at least one of said tilt braces to effect tilting of the blade, means to reduce stresses set up in the mounting upon such tilting including, a vertically disposed pin hingedly connecting the inner ends of said diagonal braces to each other, and means on the rear of the blade embracing said pin to guide it for movement in a direction normal to the blade, said means on the rear of the blade comprising a pair of vertically spaced plates having rectangular slots therein, and said pin having rectangular enlarged portions slidably guided in said slots.

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