April 25, 1944. G. D. SHAEFFER 2,347,290

ANGLEDOZER

Filed Oct. 28, 1942 2 Sheets-Sheet 1

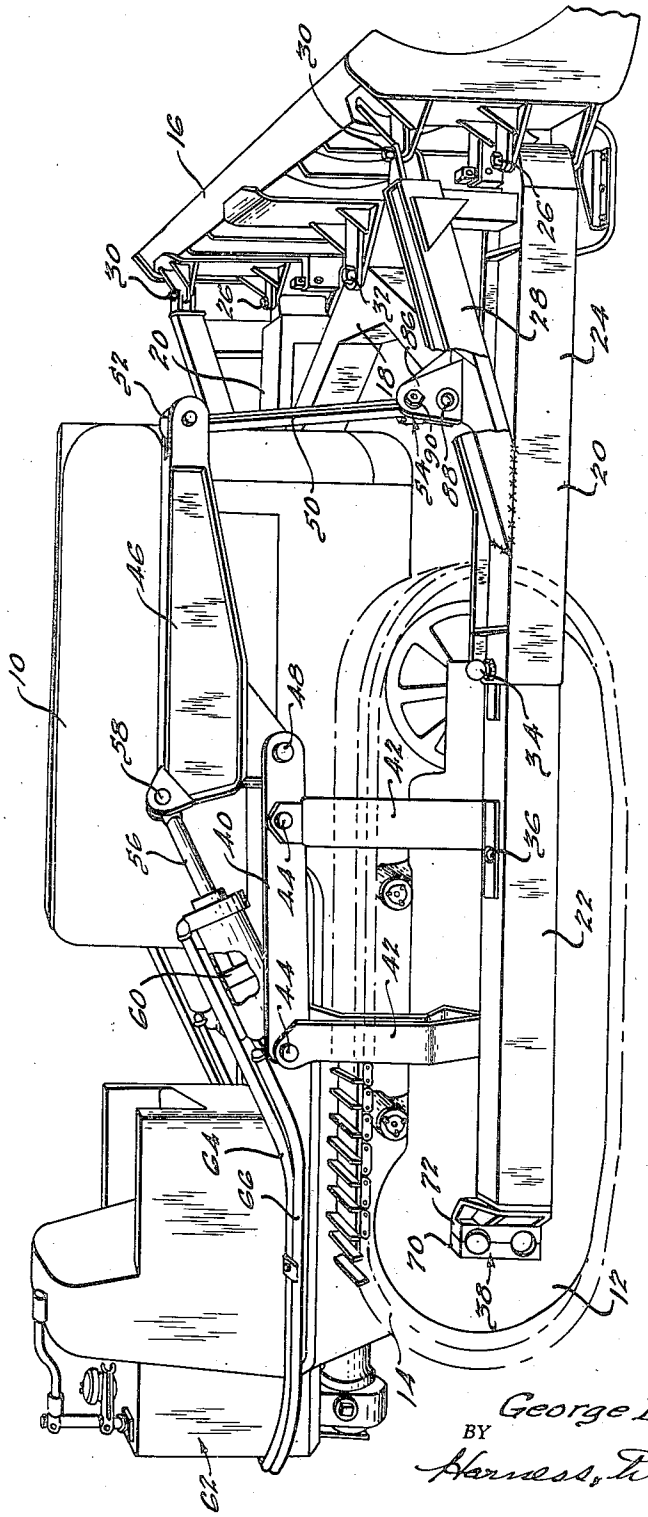


Fig. 1.

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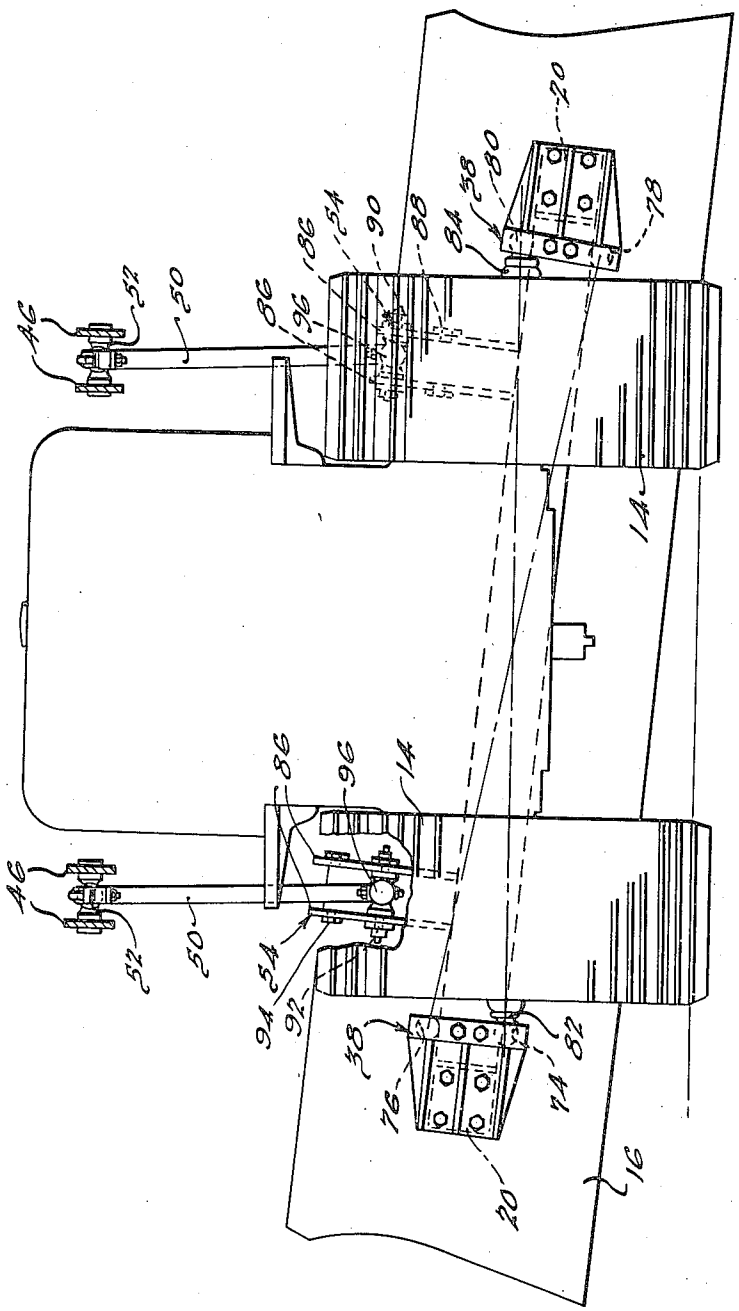


Fig. 2.

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UNITED STATES PATENT OFFICE

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ANGLEDOZER

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3 Claims. (Cl. 37—144)

The present invention relates to earth moving machines and particularly relates to improvements in hydraulically actuated bulldozer or angledozer constructions.

One of the primary objects of the present invention is to provide improvements in earth moving machines of the type mentioned whereby the blade may be disposed at a transverse angle with respect to the ground without affecting the range of stroke of the actuating hydraulic cylinder and piston assembly.

A further object of the invention is to provide improvements in constructions of the type mentioned in which one end of the dozer blade may be elevated with respect to the other end without affecting the range of stroke of the hydraulic cylinder and piston assembly.

A more specific object of the present invention is to provide improvements in constructions of the type mentioned in which the side pivot arms of the blade are mounted for pivotal movement about certain vertically spaced pivot points so that the blade may be mounted either horizontally or at a transverse incline with respect to the ground.

Other objects of the invention will become more clearly apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings, in which like numerals refer to like parts in the several different views throughout:

Figure 1 is a perspective view of an angledozer embodying features of the present invention; and

Figure 2 is a rear elevational view of the construction shown in Figure 1.

Referring to the drawings, an angledozer is illustrated which comprises a tractor including a motor unit 10 supported on the usual tractor frame. The tractor frame is pivotally connected to the track frames 12 on opposite sides of the tractor in the usual way and such track frames have crawler treads 14 mounted thereon in the usual way. The crawler treads 14 are driven by the operator in the usual manner.

An earth moving blade 16 is mounted forwardly of the tractor by means of a yoke-like supporting frame 18, having opposite side beams 20. The side beams 20 are each constructed of a pair of longitudinally movable rear and front sections 22 and 24. The rear sections 22 are integral with the base portion of the U-shaped frame; and the front sections 24 form telescopic extensions of the rear sections 22. The front sections 24 are connected to the blade 16 through pivotal connections 26. A brace 28 is mounted on each of the sections 24 and is pivotally connected to the blade 16 by means of a pivot 30. The blade 16 is also pivotally connected to the central portion of the yoke 18 by means of a pivot 32.

The rear ends of the forward sections 24 are rigidly secured to the beam sections 22 by means of vertical pins 34 which extend through openings in the side sections 24 and in one of the longitudinally spaced openings 36 provided in the beam sections 22. A suitable number of such openings 36 are provided along the length of the beam section 22, there being three of such openings on each of the beam sections 22 in the embodiment illustrated, so that by varying the position of the sections 24 with respect to their rear sections 22, the blade 16 may be disposed either straight across the tractor or at an angle with respect thereto.

The rear ends of the beams 20 are pivotally connected to the track frame 12 by a construction generally indicated at 38 which will be described in detail hereinafter.

In order to control the movement of the blade 16 with respect to the ground over which the tractor travels, identical hydraulic means are disposed on opposite sides of the tractor. Each of such hydraulic means, including the mountings therefor, comprise a supporting bracket 40 which is rigidly supported on the track frame unit 12 by means of upstanding braces 42. The lower ends of the braces 42 are fixed to the outer sides of the track frame 12. The supporting member 40 may be connected to the uprights 42 by means of pins 44. The member 40 projects forwardly of the front upright 42 and such forward end is pivotally connected to an actuating bellcrank 46 by means of pivot pin 48. The forward end of the bellcrank 46 has a depending rod 50 pivotally connected thereto by means of a universal joint 52 and the lower end of the rod 50 is connected to the frame member 22 of the side beam 20 by means generally indicated at 54, which will be described in detail hereinafter.

The rear end of the bellcrank 46 has a piston rod 56 pivotally connected thereto by means of a pivot pin 58. The piston rod 56 has the usual piston secured thereto which is slidably received within a hydraulic cylinder 60. The cylinder 60 is pivotally mounted on the pivot pin 44 of the rear bracket 42.

The opposite ends of the cylinder 60 are closed and, consequently, introduction of fluid pressure into either end of the cylinder will serve to cause pivotal movement of the bellcrank 46 about its

pivot 48 to raise or lower the frame 18 and the blade 16. A suitable fluid distribution and control unit is provided and such unit is generally indicated at 62. The control unit 62 may be of conventional construction and includes a pump driven from a power take-off of the tractor, a tank or reservoir, a control distribution valve, and an operating handle. The valve is connected to the opposite ends of each of the cylinders 60 by means of conduits 64 and 66 in the usual way. It is not believed to be necessary to describe further the details of the construction of the elements forming the control unit as such elements are well known in the art.

The present invention is primarily concerned with the connection of the side beams 20 with the track frames 12 by means of the connection generally indicated at 38 and also of the rod 50 with the frame 18 by means of the connections generally indicated at 54.

The connections indicated at 38 are such as to permit the scraper frame 18 and the blade 16 to be mounted so that the blade and frame may be disposed horizontally transversely thereof or to permit the blade and frame to be tilted transversely in either direction so that the blade is disposed at a transverse angle with respect to the horizontal.

The blade is raised and lowered by hydraulic means including cylinder and piston units, one disposed on each side of the tractor. It will be appreciated that when the scraper frame 18 is disposed at a transverse angle with respect to the horizontal the stroke of one of the pistons would be materially shortened as compared to the stroke of the other piston unless provision were made to compensate for this variation. Accordingly, in the connection between the piston and the frame, the effective distance is varied through the depending links 50 and their adjustable connections 54. This adjustment or compensating means could be provided in other of the interconnecting means between the piston and the frame, but in the simplest form the adjustment or variation is taken care of by adjustably varying the connection between the forward ends of the bellcrank levers and the frame through the depending links 50 and connection 54.

The rear ends of each of the side arms 20 are pivotally connected to the track frames 12 by the connections generally indicated at 38. Each of such connections includes a pair of separable members 70 and 72 which form vertically disposed sockets 74 and 76 for one of the side arms and vertically disposed sockets 78 and 80 for the other side arm. Pivot mounting elements 82 and 84 are fixed to the outer sides of the track frames 12 at substantially the same level, and such elements are formed with ball heads which are adapted to be received within the sockets. The sockets are so formed that the ball heads of elements 82 and 84 may be received within sockets 76 and 80, respectively, for one position of the scraper frame and blade, or may be received in the sockets 74 and 80, respectively, for another position of the frame and blade, or the elements may be received in the sockets 76 and 78 for another position of the scraper blade. In the first named position, the scraper frame and the blade are disposed horizontally, while in the last two positions mentioned the frame and blade are tilted transversely in opposite directions for the two positions. So that the frame and blade may properly be disposed in the positions mentioned, the centers of the sockets 78 and 80 are disposed on a common arc having as its center the center of the socket 76. The center of sockets 74 and 76 are disposed on a common arc having as its center the center of socket 80.

With the scraper frame 18 of the blade 16 in its horizontal position, the ball heads of elements 82 and 84 are disposed in sockets 76 and 80, as mentioned above. The pistons within cylinders 60 have a predetermined stroke, so as to give the proper raising and lowering of the blade about the side arm pivots. When however, the frame and blade are disposed at a transverse angle to the horizontal, it will be appreciated that one of the side arms is raised to a higher level than the other side arm which would result in a relative shifting or repositioning of the pistons within their cylinders. The connection 54 on the raised side will be raised along with the frame, as best shown in Figure 2. The effect of this would be that one of the pistons would be restricted in its rearward movement while the other piston may be restricted in its forward movement. To compensate for this and to insure that the pistons in both cylinders are in their proper relative positions for determined piston stroke when the frame is transversely tilted, the connections 54 are provided.

Such connections 54 include upstanding brackets 86, which are formed with vertically spaced apertures 88 and 90 on one side thereof and vertically spaced apertures 92 and 94 on the other side thereof. The lower end of one of the links 50 may be pivotally connected to either of the apertures 88 and 90 by means of a universal joint 96, and the lower end of the other link 50 may be pivotally connected to either of the apertures 92 or 94 by means of a similar universal joint 96.

When the frame 18 and the blade 16 are disposed horizontally, the universal joints 96 are disposed in apertures 90 and 94. When, however, the frame and blade are tilted to the position shown in Figure 2, the universal joint 96 on the raised side of the frame is connected to the apertures 92, while the universal joint on the other side of the frame remains connected to the apertures 90. When the frame and blade are reversely tilted, the universal joint 96 on one side of the frame is connected to the apertures 88, while the universal joint 96 on the opposite side of the frame is connected to the apertures 94. In this way, the effective length of the connection between the piston and the frame 18 is adjusted in order to compensate for the different levels of the sides of the frame and so as to permit a predetermined stroke for both of the pistons without restriction in the stroke in either direction for the pistons.

What is claimed is:

1. In an hydraulic scraper, in combination, a tractor, a rigid U-shaped scraper frame having side arms disposed along the sides of said tractor, a scraper blade disposed transversely of said tractor and connected to the end of the scraper frame, means for pivotally connecting the ends of each of the arms of the scraper frame to the tractor, said means comprising means forming a pair of upper and lower pivot seats on the end of each of said arms, the upper and lower pivot seats on one of said arms being disposed on an arc with the upper pivot seat on the other arm as its center and the lower pivot seat on said other arm lying on an arc of the same radius as the first mentioned arc struck about the upper pivot seat on said one of said arms, a pivot element fixed to each side of said tractor adapted to be received within either of said pivot seats on its side of

the tractor, hydraulic means including a piston and cylinder unit on each side of said tractor for raising and lowering said blade, and means connecting said pistons with their respective arms.

2. In a scraper, in combination, a tractor, a rigid U-shaped scraper frame having side arms disposed along the sides of said tractor, a scraper disposed transversely of said tractor and connected to the end of the scraper frame, means for pivotally connecting the ends of each of the arms of the scraper frame to the tractor, said means comprising means forming a pair of upper and lower pivot seats on the end of each of said arms, the upper and lower pivot seats on one of said arms being disposed on an arc with the upper pivot seat on the other arm as its center and the lower pivot seat on said other arm lying on an arc of the same radius as the first mentioned arc struck about the upper pivot seat on said one of said arms, pivot elements fixed to opposite sides of said tractor adapted to be received within either both of the upper of said pivot seats or in the upper of the pivot seats on one side arm and the lower of the pivot seats on the other of the side arms, and means for raising and lowering said blade and frame.

3. In an hydraulic scraper, in combination, a tractor, a rigid U-shaped scraper frame having side arms disposed along the sides of said tractor, a scraper disposed transversely of said tractor and connected to the end of the scraper frame, means for pivotally connecting the ends of each of the arms of the scraper frame to the tractor, said means comprising means forming a pair of upper and lower pivot seats on the end of each of said arms, the upper and lower pivot seats on one of said arms being disposed on an arc with the upper pivot seat on the other arm as its center and the lower pivot seat on said other arm lying on an arc of the same radius as the first mentioned arc struck about the upper pivot seat on said one of said arms, pivot elements fixed to opposite sides of said tractor adapted to be received within either both of the upper of said pivot seats or in the upper of the pivot seats on one side arm and the lower of the pivot seats on the other of the side arms, hydraulic means including a piston and cylinder unit on each side of said tractor, and adjustable means interconnecting said pistons with the frame and pistons so as to maintain a predetermined stroke of the pistons for the different pivotal connections of the frame with the tractor.

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