ARTICULATED PUSH FRAME FOR EARTH MOVERS


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My invention relates to means of moving earth and similar material and is especially concerned with an earth mover of the bulldozer or track-frame type which ordinarily comprises a push plate mounted at the front of a tractor and designed to be "angled" or disposed at an inclination to direct the propulsion of the advance of the tractor.

It is an object of my invention in general to improve earth movers of the bulldozer or track-frame type.

Another object of my invention is to provide an earth mover of the bulldozer type which is readily adapted to mounting on a standard tractor and for operation by means of cables.

Another object of my invention is to provide an earth mover of the bulldozer type in which the push beams for holding the blade in bulldozing or track-building position are operated with considerable facility when changing from one position to another.

More specifically, the object of my invention is a provision in a bulldozer or track-frame where-in a push plate or blade is pivoted on a push frame, of foldable or articulated struts for locking and maintaining the push plate in any one of a predetermined selected number of angular positions with respect to the longitudinal axis of the vehicle.

The foregoing and other objects of the invention are attained in the embodiment illustrated in the drawings in which:

Fig. 1 is a side elevation of an earth mover constructed in accordance with my invention and shown as a trackbuilder mounted on a standard tractor.

Fig. 2 is a plan of the mechanism disclosed in Fig. 1, a portion of the tractor hood being broken away to disclose the interior arrangement.

Figs. 3, 4 and 5 are diagrammatic views showing different positions of the push frame blade and push beams.

In its preferred form, the earth mover of my invention is embodied as a bulldozer or track-frame type for use with a standard tractor provided with a main frame on which there is an engine compartment and provided at its rear with a cable winch. Included in the tractor are track frames spaced from the main frame and themselves including track mechanism and track beams. Located over portions of the track frames are running boards. Trunnions are mounted in the spaces between the track frames and main frame and are supported by arched brackets secured to the outside of the adjacent track beam and are reinforced by straps also secured to the track beam. On the trunnions a push frame is journaled with at least one member of the push frame having variable pivotal arrangement with the remaining portion. At the front of the push frame a pivot pin is mounted for variable inclination and a push blade is mounted to pivot on the pin, being held in selected position by folding push beams held in selected position by pins which can be variably positioned therein and in suitable apertures in the push frame. An operating cable is strung from the winch around a cable wheel which is movable into a suitable supporting position or into another position out of the way and the cable is extended through a tube secured to the running board and then passes around suitably aligned sheaves mounted on a bracket disposed at one side of the engine compartment on the main frame. The operating cable then extends through the engine compartment and around comparable sheaves on a bracket secured to the other side of the main frame and aligned with sheaves on the push frame so that when the cable is operated the trackbuilder is raised and lowered.

While the earth mover of my invention is susceptible to a wide amount of variation depending upon operating conditions to be met and the particular mechanism upon which it is to be mounted, it has successfully been embodied in the form shown herein and in connection with a standard tractor generally designated 6. This tractor includes the customary operator's station 7, disposed behind an engine compartment 8, both located on the central main frame 9 of the machine. On either side of the machine are running boards 11, which are fastened on the main frame and extend over the respective track frames 12 and 13 located on opposite sides of the main frame and disposed to leave an intermediate space 14 therebetween. Included in each of the track frames is a track mechanism generally designated 16 as well as an outer track beam 17 extending from the rear sprocket wheel 18 to a connection with the forward idler wheel 19. A transverse spring 20 or equalizer-bar relates the forward portions of the track frames 12 and 13 with the main frame 9.

In accordance with my invention I provide a suitable mounting for an earth moving implement and this comprises a push frame 21 which is preferably symmetrical on both sides of the longitudinal center line although there can be some variation in the construction on opposite sides. The push frame is preferably mounted on the track frames 12 and 13 and for that reason
dispose in each of the spaces 14 a trunnion 22. Since the opposite sides of the machine are preferably alike, a description of one applies to both. The trunnion 22 is mounted preferably on a shaft 23 which extends from a bracket 24 arched over the track mechanism 18 and being provided with fastening means 25 securing the arched bracket to the track beam 17 on the outer side thereof or on the side of the track beam away from the intermediate space 14. Reinforcing ribs 27 increase the strength of the arch bracket. - A further means of securing 26 the trunnion at 22 in position, a strap 28 is secured thereto and extends to fastening means 29 securing the forward end of the strap to the inside of the track beam 17. In this fashion a rigidly fixed trunnion 22 is afforded within the space 14.

The push frame 21 is adapted to be secured to the trunnions 22 and can either be the conventional, box construction U-type or can include adjusting mechanism to compensate for variations in environment and operating conditions. For example, the grousers on the tracks 12 and 13 sometimes are flat street plates and at other times are elevated ice engaging cleats so that the height of trunnions 22 from the ground surface or ice surface varies from time to time. Also it is sometimes desired to mount the push frame 21 with a permanent horizontal incline with respect to the main frame 9 of the tractor and I consequently provide for all of these conditions. The compensating means can be included in only one of the legs of the push frame 21 or can be included in both legs. A description of one of the mechanisms applies to both two are utilized.

The push frame 21 is detachably connected to the trunnion 22 by the provision of a bifurcated end 31 on a push frame member generally designated 32 and included with a forward push frame member 33 in the push frame. The bifurcated end 31 fits snugly around the trunnion 22 which preferably is square and is removably positioned thereon by an L-shaped keeper 34 passing through suitable apertures in the bifurcated end 31 and retained in position by a cotter pin 35. The entire push frame can be removed by withdrawing the cotter pin and the keeper 34. Adjacent the forward end, the push frame member 32 is provided with part of a pivot connection 37 interengaging with a mating portion of a pivot connection 38 at the rearward part of the push frame member 33. A pivot pin 39 secures these members together for pivotal movement in a vertical plane.

The relative pivotal movement between the pivoted parts of the push frame is regulated or controlled by an adjusting screw 41 (provided with a lock nut 42) which engages an ear 43 upstanding from the push frame member 32 and likewise engages another ear 44 similarly upstanding from the push frame member 32. With this mechanism one part of the push frame can be raised or lowered with respect to the other and the height of the push frame can be regulated with respect to the structure of the tractor. This center portion of the blade structure 51 is provided with a pivot bracket 52, through which a normally vertical pivot pin 53 is passed. This pin likewise is engaged by a bracket 54 mounted on the push frame 21.

Adjacent each end, the blade structure 51 is provided with a plurality of pierced lugs 67 which are designed to receive a removable fastening pin 68. Also adapted to engage the fastening pin and occupy selected one of the positions between the lugs 67 are pierced lugs 83 which extend outward extremities of a push beam 71 or front link. The front push beam member is preferably a channel or hollow box which, adjacent one end is connected by a permanently positioned pivot pin 72 with a similar channel or hollow box push member 73 or rear link. The structures of the push beam members 71 and 73 are such that the rear one will be received within a portion of the front during folding or articulated movement about the axis 74 of the permanent pin 72. A removable pin 75 is designed to pass through aligned apertures 76 in the trailing end of the push member 71 and likewise in the forward portion of the rear push member 73. When the pin 78 is in such position the members 71 and 73 are in alignment and are rigid, constituting then in a sense a strut equal to the height of the tensioning pin. The rearward end of the push member 73 is provided with apertured bosses 77 designed to receive a removable pin 78 having several functions. In the straight across, or building position of the blade 51, as shown in full lines in Fig. 2, the two pins 78 on opposite sides of the machine are both engaged in the rearmost one 79, of several apertures which are provided in parallel flanges 81 and 82 extending from the side walls of the push frame 21.

In order to change the blade into an angling or trail builder position, both the pins 75 and 78 are withdrawn from their respective locations so that the push beams 71 and 73 are entirely free except for their relative pivotal connection and except for their pivoted connection by the pins 68. The being so, the first operation is to replace the pins 78 not in the rearmost apertures 79 in the parallel flanges 81 and 82, but rather in the foremost apertures 83 in the flanges 81 and 82. The same maneuver is performed on the opposite side of the machine. Then the push members 71 and 73 are folded with respect to each other about the axis of the push frame in the parallel flanges 83 and the pins 78 are placed therein thereby affording a rigid mounting. With this arrangement the push beams on opposite sides of the machine are hinged. If both sides of the push frame 21 are provided with a pair of pockets 85 and 86 to receive the ends of the forward push member 71. The pin 75 is then introduced into the aligned apertures 84 and 76 so that a rigid connection is so provided on one side of the machine. On the other side the members 71 and 73 are kept in their same alignment by the pin 75. The push beam is moved as a unit until the apertured bosses 77 and 79 align with the forward aperture 83 and the pin 78 is placed therein thereby affording a rigid mounting. With this arrangement the push beams on opposite sides of the machine are hinged. At each side of the forward portion of the
engine compartment 8, is preferably provided one of a pair of brackets 101 and 102 which, at its lower end is secured by fastenings 103 to the main frame 5. The brackets are fabricated of structural plates and serve as guides for the operating cable 134 which is guided in suitable forks 106 upstanding from the side portions of the push frame 21. On the brackets are stops 105 to limit the maximum upper movement of the push frame. The brackets are held in position on the frame by braces 107 preferably of a threaded adjustable character having chucks 108 and 109, the former of which is secured by a pin to a bracket 111 on the main frame 8 and the latter of which is secured by a pin to an extension 112 on the plate 101 or 102. In addition, the brackets 101 and 102 are cross-braced by a channel structure 113 which extends through the engine compartment 8 and on its opposite ends is connected by removable fastenings 114 to the brackets 101 and 102.

On either side of the main frame, the push frame 21 is provided with a pair of ears 116 which are connected by pins 117 to shear blocks 118 and 119 which block can contain a single sheave wheel 121 or a plurality thereof depending upon the desired reeling. In alignment with each of the shear blocks 118 and 119 are stationary sheave blocks 122 and 123 located on the brackets 101 and 102 respectively. These shear blocks 122 and 123 are disposed so that the intervening cables are substantially tangent to the pivot center of the push frame so that, approximately, a constant moment arm is available for the effective cable force during the entire travel of the push frame, thus minimizing the bearing loads and stresses in general. Disposed substantially tangent and at right angles to the sheave blocks 122 and 123 are transfer sheaves 124 and 125 respectively, fastened on the brackets 101 and 102 and extending partially into the engine compartment 8. On the bracket 101 and substantially tangent with the shear block 122 and approximately tangent to the running board 11 is a guide sheave 127.

Located on the main frame of the tractor at the rear of the operator's station 7 and designed to be driven by the tractor engine is a power control unit or winch 131 of a standard type. This is shown to drive a drum winch having a pair of Fairlead sheaves 132 and 133 thereon since such is the customary installation. But one of the drums and fairlead sheaves is utilized, however, in connection with the present mechanism. An operating cable 134 extends from the winch drum 136 and over the fairlead 132 to a cable wheel 137. This cable wheel is connected to the tractor by a pivot 138 on the winch housing and normally is held in the illustrated full line position by a movable pin 139. This installation of the cable wheel 137 can be considered permanent so far as the bulldozer and trawl builder mechanism is concerned but occasionally the same tractor is utilized for pulling a trailing vehicle without operation of the bulldozer. In that event the cable 134 is removed from any other connection, the pin 139 is withdrawn and the cable wheel 137 is swung in the axis of the pin 132 to occupy the dotted line position 141 shown in Fig. 2 so as to be entirely out of the way of a cable extending through the fairleads 132 and 133 to a trailing structure.

In the present arrangement of the structure with the cable wheel 137 securely plumed in place, the operating cable 134 extends around the cable wheel tangentially forward to the guide sheave 127, in the meantime passing through and being guided by a tube 142 which is preferably a pipe with flared ends secured by clamps 143 to the running board 11 of the tractor. In this way the operator's safety is unimpaired, the proximity of the operating cable 134 and his vision is not obstructed by any elevated cable mechanism. Emerging from the tube 142 the operating cable 134 is trained around the guide sheave 127 and then passes around the sheave block 122. One or several passes are made between such sheave block and the sheave block 118 and then the cable passes from the sheave block 118 around the transfer sheave 124 and through the engine compartment 8. The cable passes in very close proximity to the channel 113 and a plurality of loops 145 are provided on the channel to confine the cable somewhat and prevent it, especially when slack, from interfering with any of the surrounding engine mechanism. Having passed through the loops 145 the cable 134 then passes around the second transfer sheave 125 and engages the sheave block 123 on the bracket 102. Then the cable is reeled around the opposite sheave block 119 on the push frame and having made the requisite number of passes between such sheave block and the sheave block 123, is suitably dead ended.

From the above description, it will be observed that I have provided a bulldozer or trallbuilder wherein the pusher plate or blade is pivotally mounted on a push frame and wherein by the use of foldable or articulated push beams or struts the push plate readily can be locked in any one of a number of selected positions.

This application is a division of my application Serial No. 431,033, filed February 16, 1942, for an Earth mover.

I claim:

1. In an earth mover having a push frame with front, central and rear apertures therein, and a blade movably mounted on said push frame; a strut comprising a front link having a first pin hole therein and hinged to said blade; a rear link having a second pin hole therein and hinged to said front link; a first pin adapted to engage either said first and said second pin holes or said second pin hole and said central aperture; and a second pin adapted to engage said rear link and either said front aperture or said rear aperture.

2. An earth mover for use with a tractor comprising a push frame movably mounted on said tractor; a blade centrally pivoted on said push frame; a pair of folding struts, one of said struts being connected to said push frame and to the other end of said blade, each of said struts including a pair of articulated links; means for rigidly fastening one of said links of each pair to the other of said links of that pair; and alternatively operable means for fastening one of said links of each pair to said push frame.

3. An earth mover for use with a tractor comprising a push frame mounted on said tractor; a blade movably mounted on said push frame; a first link pivoted to said blade; a second link pivoted to said first link; means for fastening said second link to said push frame in either of two locations; and means for fastening said second link to said first link or to said push frame.

4. An earth mover for use with a tractor comprising a push frame mounted on said tractor; a
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blade mounted on said push frame to occupy an intermediate position and two extreme positions; a first pair of articulated links connected to said push frame and to said blade near one end thereof; a second pair of articulated links connected to said push frame and to said blade near the other end thereof; means for connecting both of said links of each of said pairs rigidly together to hold said blade in said intermediate position; and means for connecting one of said links of the respective one of said pairs rigidly to said push beam to hold said blade in the respective one of said extreme positions.

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The following references are of record in the file of this patent:

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