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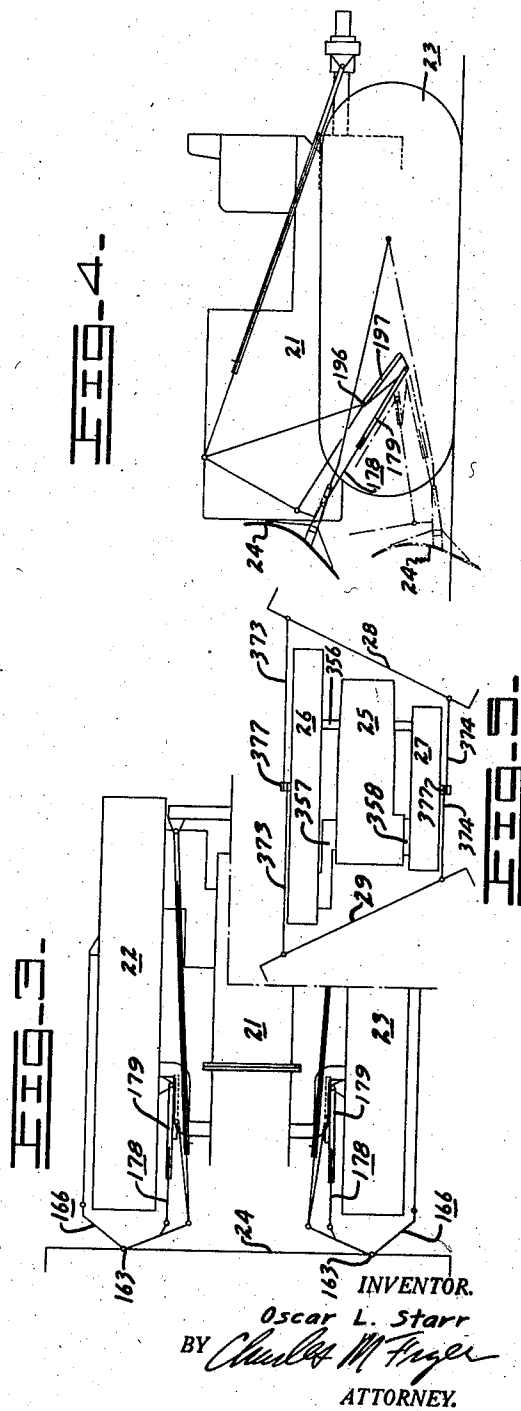
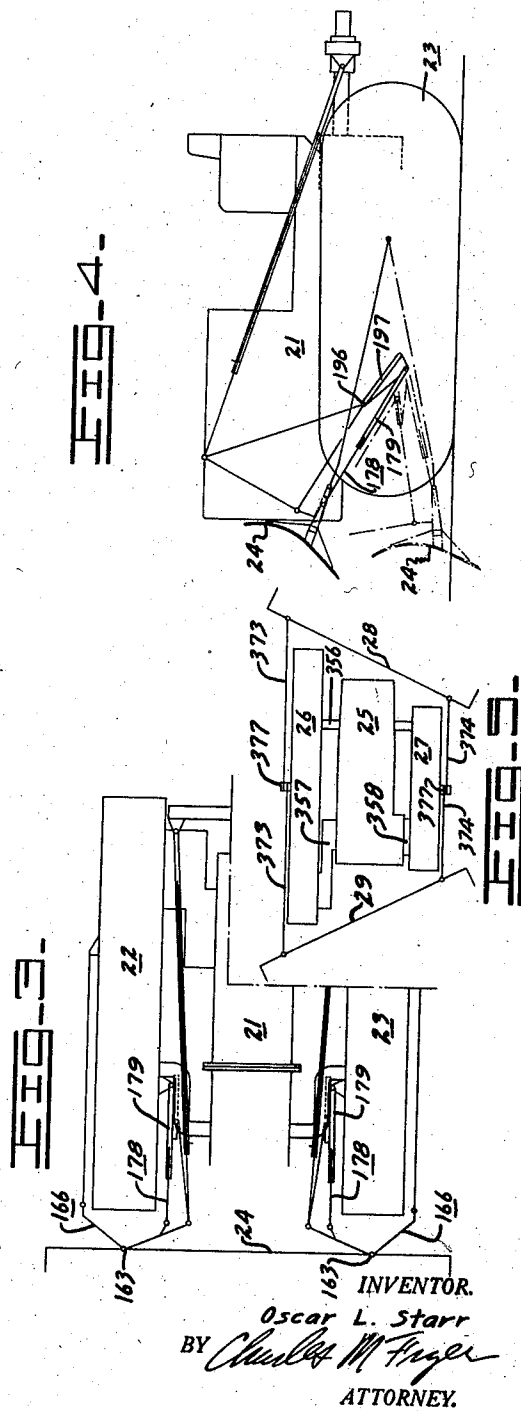
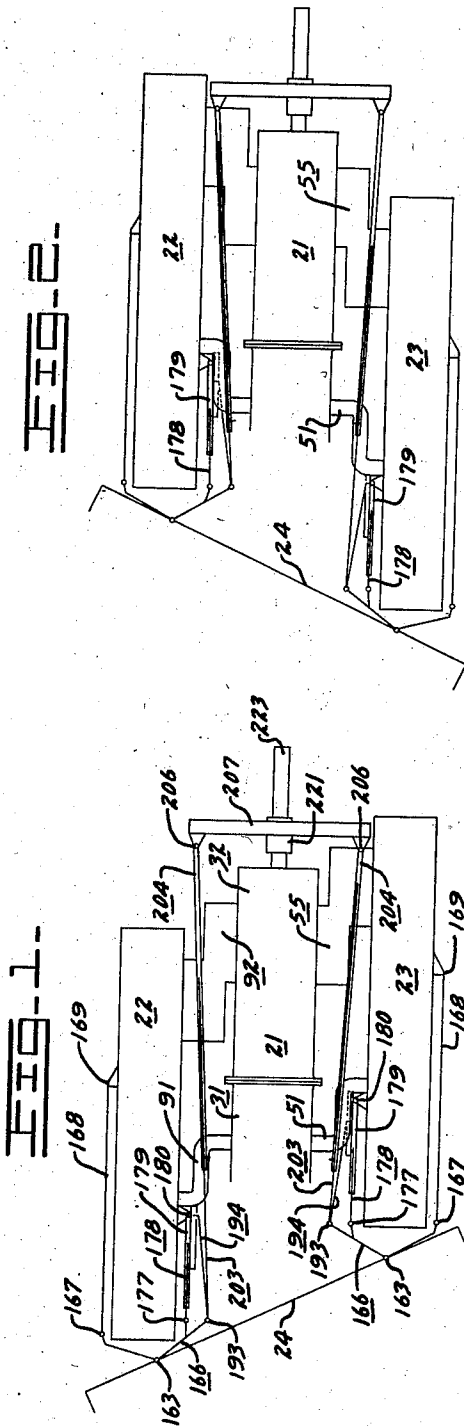
O. L. STARR

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TRACTOR

Filed May 25, 1934

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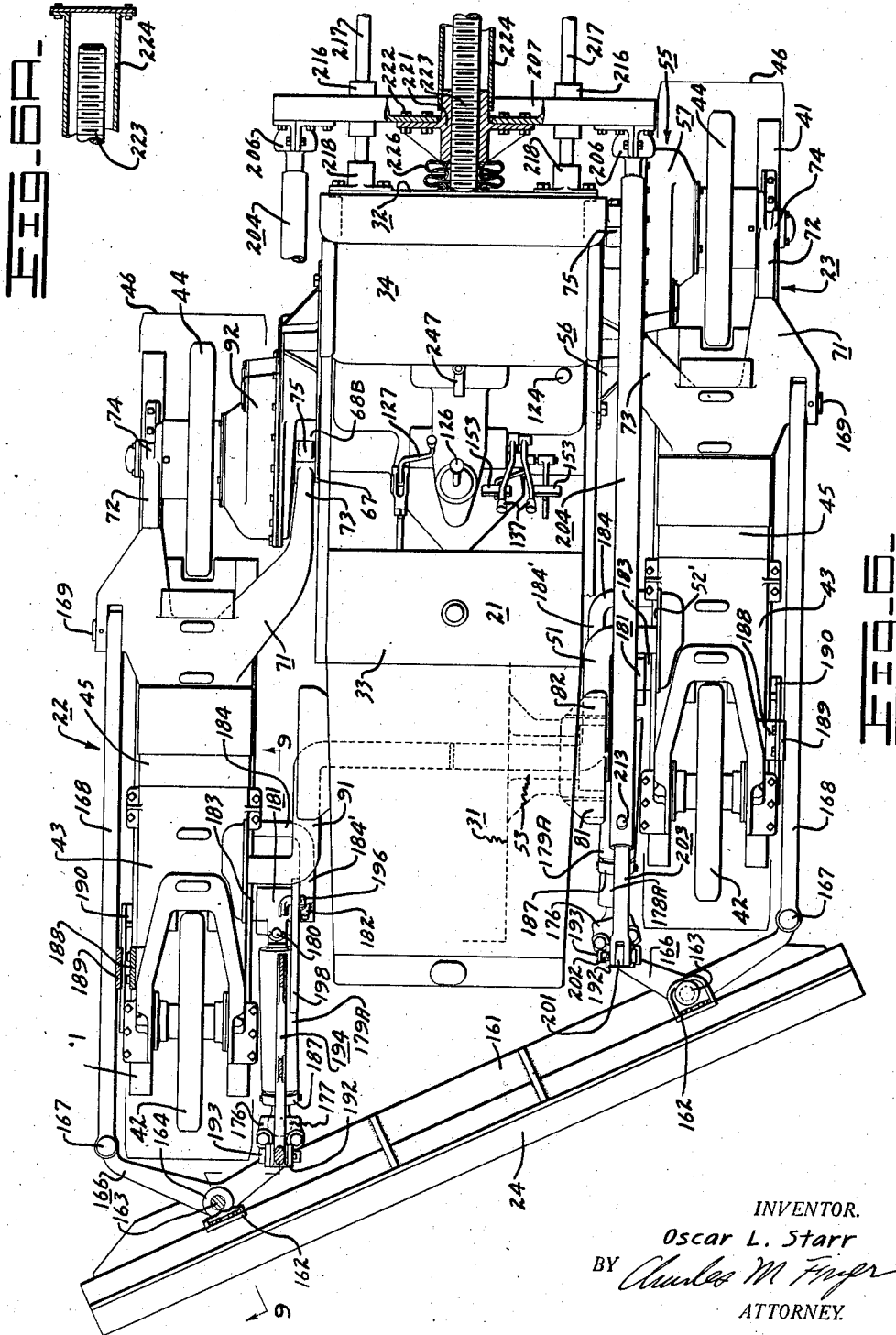
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TRACTOR

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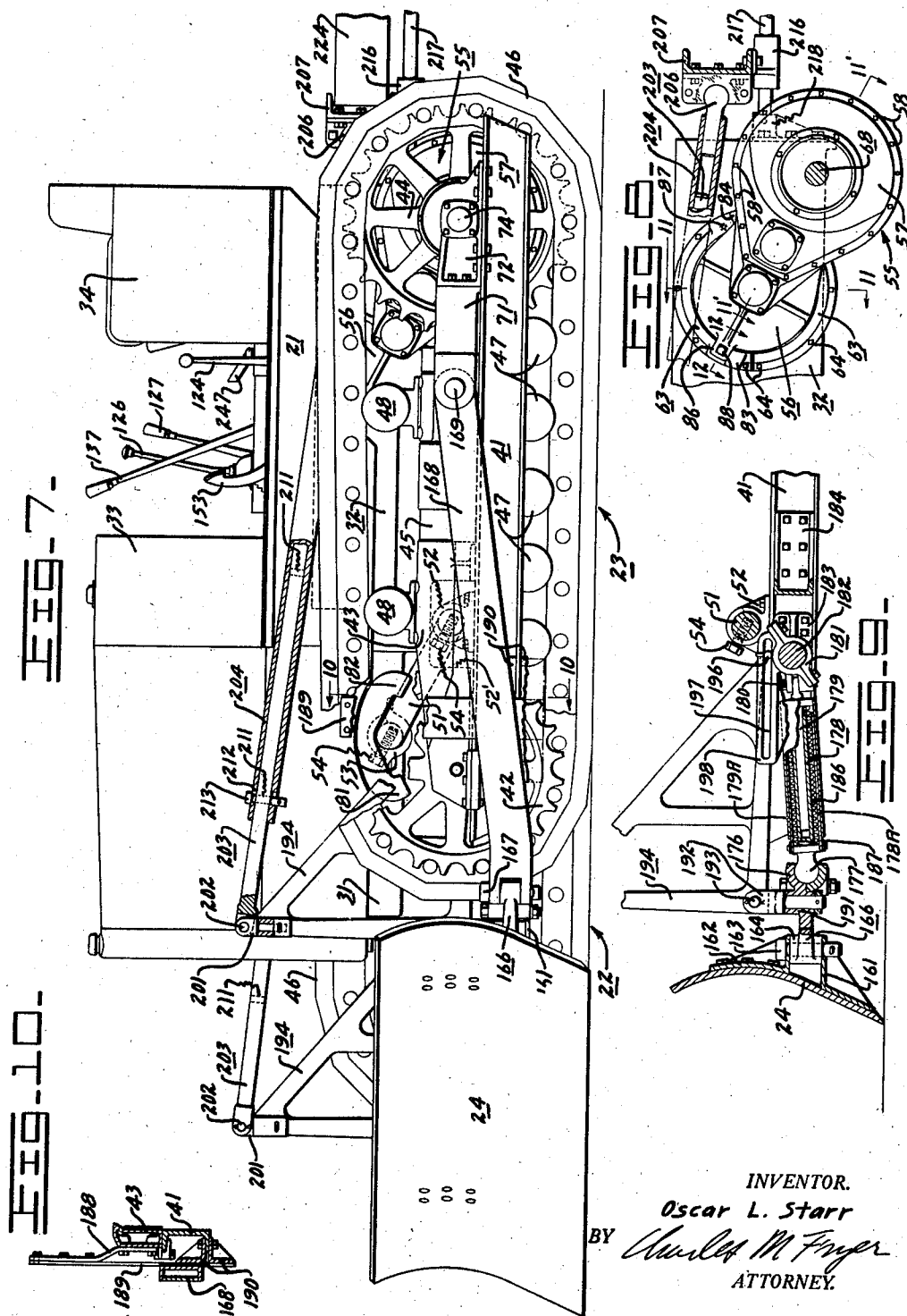
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TRACTOR

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O. L. STARR

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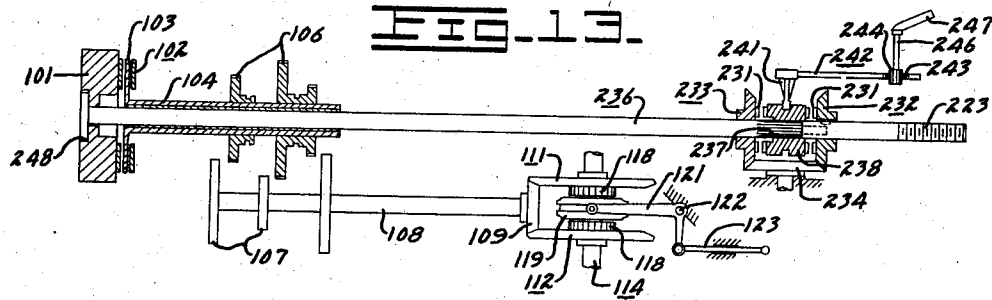


FIG-12.

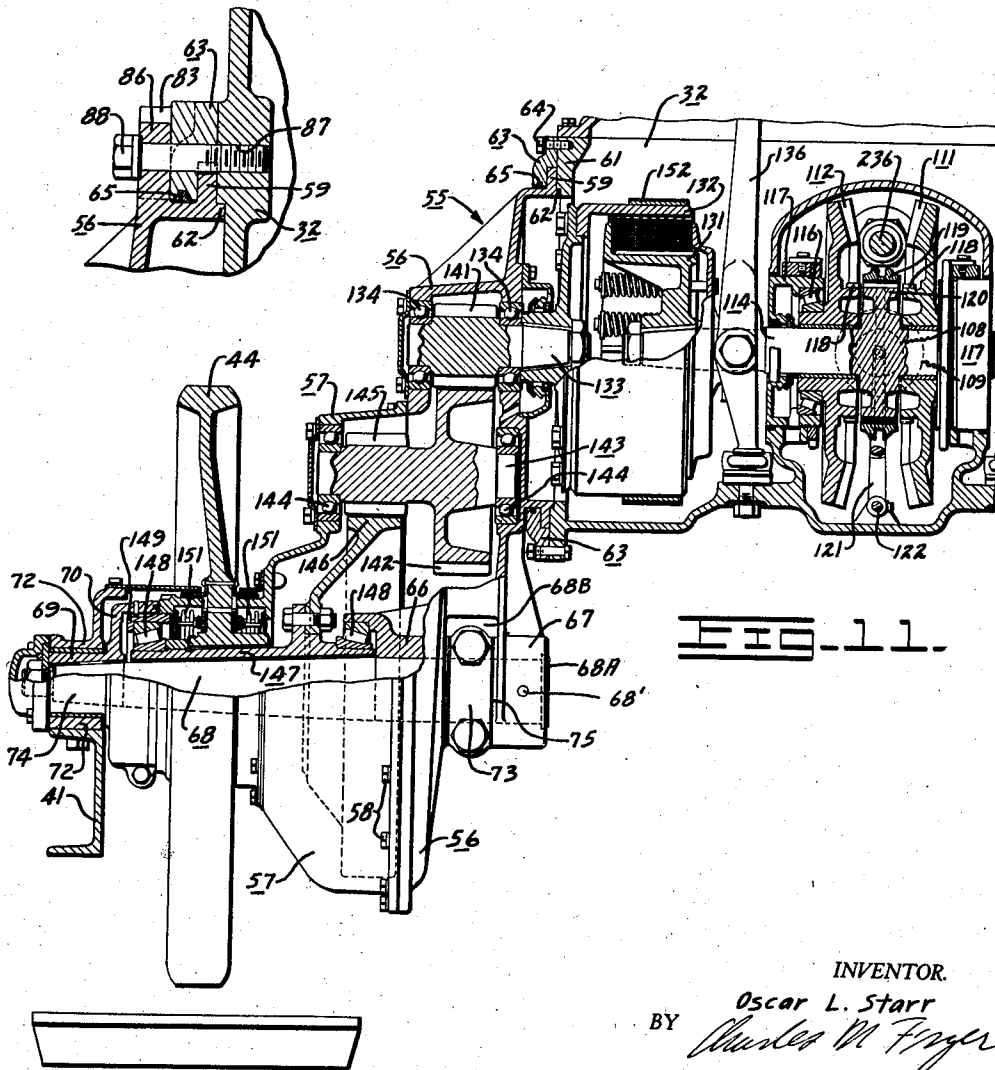


FIG-11.

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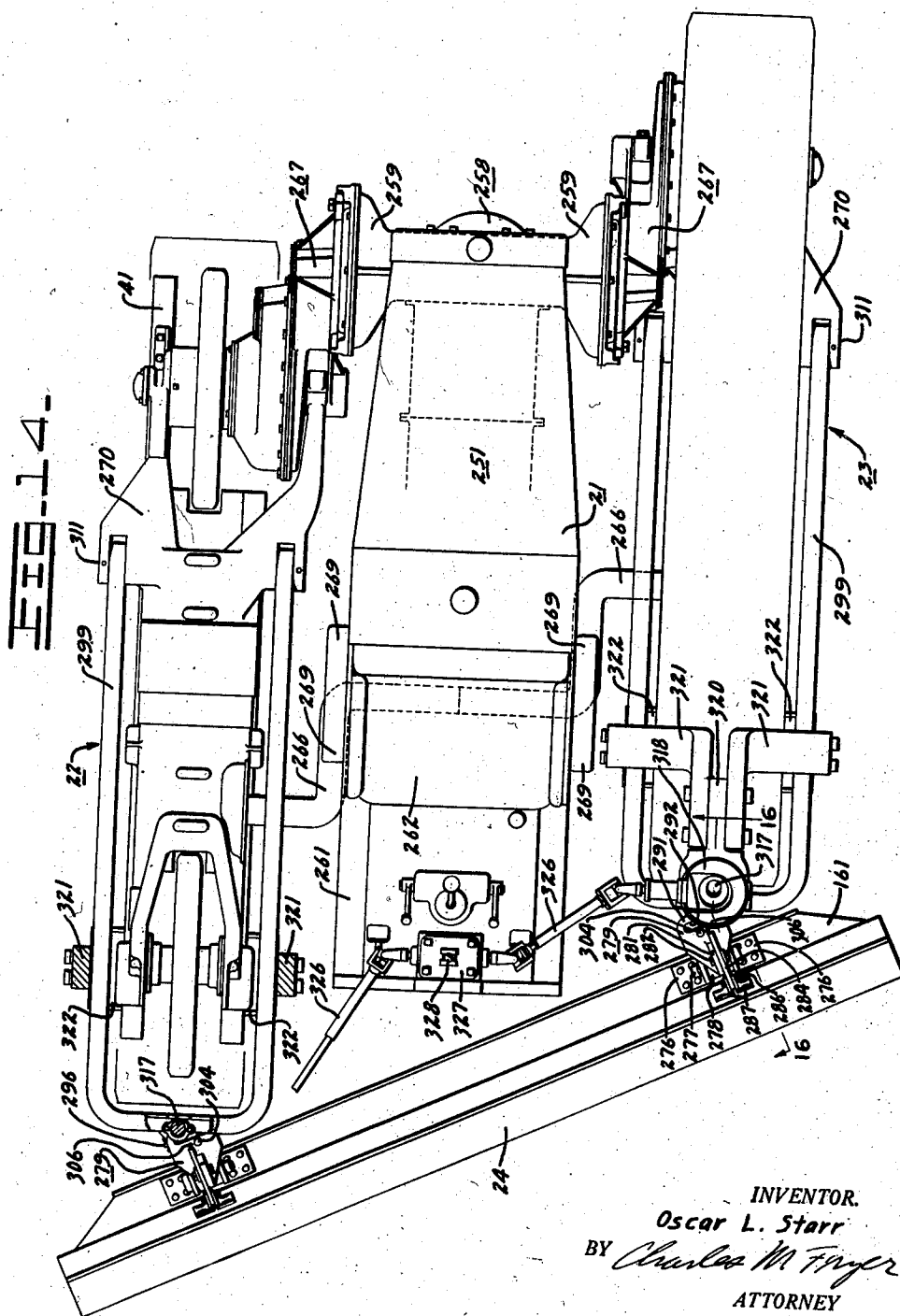
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FIG. 10 is a detailed cross-sectional view of the mechanical assembly shown in FIG. 9. It illustrates the internal components and their arrangement. Key features include:

- 22**: A vertical shaft or rod passing through the center of the assembly.
- 317**: A component at the top left, possibly a pulley or guide wheel.
- 268**: A large, curved component, likely a cam or lever arm, pivoted at its base.
- 269**: A smaller component adjacent to 268.
- 254**: A component below 269.
- 251**: A component below 254.
- 255**: A component below 251.
- 253**: A component below 255.
- 252**: A component below 253.
- 258**: A component below 252.
- 270**: A component below 258.
- 311**: A component below 270.
- 299**: A component below 311.
- 256**: A component below 299.
- 41**: A component below 256.
- 296**: A component below 41.
- 298**: A component below 296.
- 316**: A component below 298.
- 161**: A component at the bottom right, possibly a base or support.
- 24**: A label indicating a specific part or section.
- BY**: A signature or initials at the bottom right.

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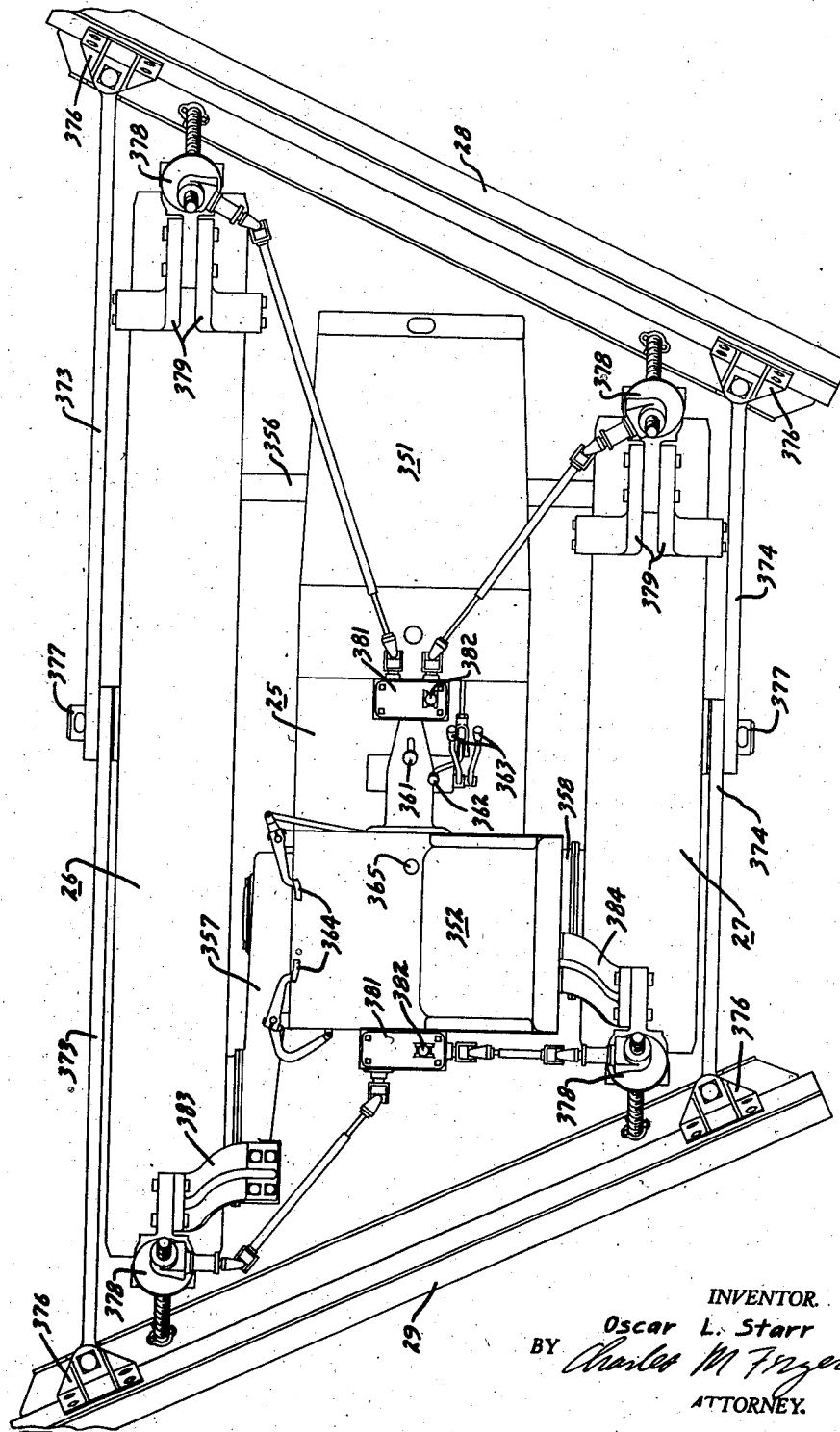
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Fig. 18.



UNITED STATES PATENT OFFICE

2,113,997

TRACTOR

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Application May 25, 1934, Serial No. 727,425

41 Claims. (Cl. 37-144)

Statement of invention

The present invention relates to earth working machines and more particularly to the provision of an integrally constructed, unitary earth working machine which is specially designed as a unit for bulldozing, trail building and the like work.

The operation of trail building, perhaps, places the most severe requirements on a machine of this character and such operation will be discussed briefly to enable a better understanding of the instant invention. The term "trail building" is applied to the operation of building roads or trails through mountainous or hilly country where none existed before. In this work, the machine has only wooded, rocky hillsides before it, and must leave behind it a road suitable for use by any vehicle.

In operation, the blade or tool is forced repeatedly into the hillside to uproot rocks, brush and earth which, by turning the machine sharply, are cast downhill to form part of the roadway. To accomplish such movement of the blade, the machine must be able to turn sharply under load and to move back and forth quickly. The blade must be mounted securely as a unit with the body, the mounting preferably providing for placing either end of the blade in leading position, and for easy adjustment thereof to operative or inoperative position. For bulldozing, the blade must be adjustable to a position normal to the longitudinal axis of the machine.

In machines of the character described, when an end of the blade is placed in leading position or, in other words, when the blade is disposed angularly with respect to the longitudinal axis of the machine, such leading end of the blade will be positioned further away from the machine ground supporting member adjacent thereto than the opposite or trailing end of the blade will be positioned from the other ground supporting member of the machine. Thus, although the trailing blade end can be positioned relatively close to the ground support adjacent thereto, the leading end of the blade will be comparatively widely spaced from the other ground support adjacent thereto.

As a result, when the machine is doing work, a disadvantageous leverage condition obtains adjacent the leading end of the blade because of the more widely spaced relationship of the leading end from the ground support adjacent thereto, which necessitates a longer lever arm connection from the leading end to the body of the

machine than from the trailing end to the body of the machine. The longer lever arm connection is less able to withstand working forces imposed on the leading end of the blade which bears the brunt of the work; and, consequently, the leading end of the blade and the machine support adjacent thereto will tend to have an unstable relationship relative to the ground, this unstable relationship being obviously undesirable. Furthermore, in machines, such as track-type tractors of the heavy type which are especially adapted for the described work, greater stresses will be imposed on the ground supporting means or track frame adjacent the more widely spaced leading end of the blade.

My invention is designed to obviate the foregoing described disadvantages in present machines having an angularly disposed blade, by providing a machine in which the ground supporting members thereof are spaced closely adjacent both the leading and the trailing ends of the earth working blade. With such arrangement, the foregoing described disadvantageous leverage condition is avoided; and by having both ends of the blade positioned closely adjacent the ground supports of the machine, working forces are transmitted from the blade and through the ground supports to the ground, at a position close to the blade adjacent each end thereof to thereby provide a stable support adjacent both ends of the blade.

It is an object of the invention, therefore, to provide an improved earth working machine in which thrust forces imposed on an angularly positioned earth working blade are transmitted to the ground at positions closely adjacent both the trailing and the leading ends of the blade, to thereby provide a strong and sturdy machine.

Another object of the invention is to provide an earth working machine having ground supports longitudinally offset or displaced with respect to each other for accomplishing the foregoing described object.

Another object of the invention is to provide an earth working machine comprising a track-type tractor power unit and an angularly positioned blade unit, in which the similar or corresponding blade ends of the track mechanisms are both closely positioned adjacent the blade, and in which the tracks of the track mechanisms have ground contact closely adjacent the blade ends thereof to bring the ground support for the blade as close to the blade as possible.

Another object of the invention is to provide an earth working machine having an angularly

adjustable earth working blade, in which the blade has stable ground support to the body of the machine adjacent both the leading and the trailing ends of the blade, regardless of the angularly adjusted position of the blade.

Another object of the invention is to provide an improved integrally constructed unitary earth working machine adapted for use in trail building, bulldozing and the like work.

Another object of the invention is to provide, as an article of manufacture, an improved integrally constructed, unitary earth working machine characterized by the provision of a bulldozer blade forming an integral part of the machine.

Another object of the invention is to provide an improved earth working machine characterized by the provision of a bulldozer blade which is mounted closely adjacent the ends of the ground-engaging supports for the machine.

Another object of the invention is to provide an improved earth working machine characterized by longitudinal displacement of similar ends of the ground-engaging supports therefor.

Another object of the invention is to provide an improved earth working machine in which the body can be rigidly secured with respect to the ground-engaging supports therefor.

Another object of the invention is to provide an improved earth working machine which can be turned sharply and quickly.

Another object of the invention is to provide an improved earth working machine which can be moved back and forth readily.

Another object of the invention is to provide an improved integrally constructed, unitary earth working machine which has a traction unit and a blade unit, both of predesigned construction for cooperation to provide a machine each part of which is specially designed for the work it must accomplish.

Another object of the invention is to provide an improved earth working machine of the track type, characterized by the provision of endless track mechanisms which are adjustable with respect to the body of the machine.

Another object of the invention is to provide an improved earth working machine of the track type, characterized by the provision of a blade forming an integral part of the machine and connected to the endless track mechanisms for adjusting movement therewith, whereby relative longitudinal displacement of the track mechanisms serves to place either end of the blade in leading position.

Another object of the invention is to provide an improved earth working machine of the track type, which is constructed to provide a high degree of stability against turning under the influence of side thrust applied to the blade.

Other objects will appear as the description progresses.

Description of figures

Figs. 1 through 5 are schematic views illustrating the invention.

Figs. 6 through 13 illustrate a specific embodiment of the invention.

Fig. 6 is a plan view of a preferred type of machine, with the upper stretches of the endless tracks omitted from the endless track mechanisms.

Fig. 6A is a continuation of Fig. 6.

Fig. 7 is a left side elevation of the machine with a part of the endless track broken away.

Fig. 8 is a fragmentary left side elevation of the

rear end of the tractor body and the final drive housing.

Fig. 9 is a sectional view taken in planes indicated by the line 9—9 in Fig. 6.

Fig. 10 is a fragmentary sectional view taken in the plane indicated by the line 10—10 in Fig. 7.

Fig. 11 is a transverse vertical sectional view taken in planes indicated by the lines 11—11, 11'—11' in Fig. 8, the portion taken through the final drive housing on line 11'—11' being rotated to coincide with the portion through the transmission case on line 11—11.

Fig. 12 is a fragmentary sectional view indicated by the line 12—12 in Fig. 8.

Fig. 13 is a schematic view illustrating the drive from the engine to the track mechanisms and power control mechanism.

Figs. 14 to 17 illustrate a second embodiment of the invention.

Fig. 14 is a plan view similar to Fig. 6.

Fig. 15 is a left side elevation similar to Fig. 7.

Fig. 16 is a sectional view taken in planes indicated by the line 16—16 in Fig. 14.

Fig. 17 is a fragmentary plan view indicated by the line 17—17 in Fig. 16.

Fig. 18 is a schematic plan view illustrating a third embodiment of the invention.

Description of machine

My invention is illustrated schematically in Figs. 1 through 5. The preferred machine has body 21 (Fig. 1) mounted on respective ground-engaging supports 22, 23 in the form of endless track mechanisms, which have their similar ends longitudinally displaced. Earth working tool 24, in the form of a bulldozer blade, is securely mounted closely adjacent similar ends of supports 22, 23, and is spaced substantially the same distance from each of said similar ends. In Fig. 2, supports 22, 23 are shown in the adjusted position thereof with respect to body 21 which places the leading end of support 23 ahead of support 22. This adjustment serves to place the opposite end of blade 24 in leading position from that illustrated in Fig. 1. In Fig. 3, supports 22, 23 are adjusted with their ends in transverse alignment, to place blade 24 in a transverse bulldozing position. Fig. 5 illustrates my invention in a machine including body 25 supported on respective long and short supports 26, 27 so that the similar ends thereof are longitudinally displaced. Blades 28, 29 are supported closely adjacent the ends of supports 26, 27 to place opposite blade ends in leading position.

Thus, my invention includes bulldozing blade means extending transversely of the body of the machine, and arranged to provide either one of opposite operative angular positions thereof with respect to the longitudinal axis of the machine. It is to be noted that similar ends of the opposite endless track mechanisms are spaced substantially the same distance from the blade means to provide for most efficacious transmission of bulldozing forces to the machine. The machine includes generally, therefore, a traction unit and a blade unit. Each of these units is of predesigned construction for cooperation with the other to provide an integrally constructed, unitary earth working machine.

While my invention can be embodied in various forms, it will be described in connection with certain preferred embodiments having various features which I consider to be desirable.

In the embodiment of my invention illustrated in Figs. 6-13, body or main frame 21 (Figs. 6

and 7) is supported on endless track mechanisms 22, 23 by means of respective pairs of crank members movably connected therebetween to provide for relative longitudinal adjustment between body 21 and either or both of respective track mechanisms 22, 23. By virtue of the pivotal connecting crank members, either of track mechanisms 22, 23 is adjustable to place its front end ahead of the other. Also, the front ends of track mechanisms 22, 23 are adjustable into transverse alignment.

Body 21 (Figs. 1, 6 and 7) includes crankcase 31 secured in a conventional manner to transmission case 32, thus forming the main frame of the machine. The source of power or engine is mounted on crankcase 31; and fuel tank 33 is positioned immediately rearwardly of the engine at the front of the operator's compartment, the back of which is formed by seat 34 suitably mounted on case 32. The body or main frame is integrally constructed to provide for connection thereof to track mechanisms 22, 23 in a manner later described.

Track mechanisms 22, 23 are similar in construction and only one will be described in detail. Each endless track mechanism includes track roller or truck frame 41 (Figs. 6 and 7) having idler sprocket wheel 42 movably mounted adjacent the front end thereof by means of hollow yoke member 43. Yoke member 43 is slidably mounted on track frame 41, and cooperates with suitable recoil mechanism, housed within shielding means 45 on top of the truck frame and within the hollow part of yoke member 43, to provide for yielding of idler sprocket 42 in the event the endless track becomes clogged. Adjacent the rear of track frame 41, driving sprocket 44 is journaled in a manner described more specifically hereinafter. Endless track 46 passes around track frame 41 over respective idler and driving sprockets 42, 44. The weight of the machine is transmitted to the ground stretch of track 46 from track frame 41 by track rollers 47; and the upper stretch of track 46 is supported by suitable track carrier rollers 48. As seen from inspection of Fig. 7, track 46 contacts the ground throughout the entire distance between the axes of front idler sprocket wheel 42 and rear driving sprocket wheel 44. Thus, the track contacts the ground adjacent the blade at a point as close as is practically possible, for the purpose previously explained. Also, because of the provision of a sprocket wheel for the idler 42, load forces imposed on the front end of the track mechanism when the blade is doing work, are more efficaciously distributed.

Each endless track mechanism is movably connected to the body of the machine to provide for relative endwise adjustment therebetween, so that similar ends of the opposite track mechanisms can be longitudinally displaced or transversely aligned. Means are provided for adjusting the movable connections by power from the engine; limiting means being provided to define the limits of relative movement between the track mechanisms and the body of the machine. After adjustment, means is provided to hold positively each track mechanism in the selected adjusted position thereof.

To accomplish the above purposes, spaced substantially parallel crank members are provided, each of which is pivotally connected at its ends to the associated track mechanism and to the body or main frame of the machine. Crank member 51 (Figs. 6 and 7) for track mechanism

23 has one end pivotally mounted in bearing bracket 52 rigidly secured on track frame 41 within hollow yoke member 43; the yoke member being provided with a suitable side opening 52' to permit entrance of the crank member end there- 5 in. The other end of crank member 51 is pivotally mounted in outwardly extending boss 53 integral with crankcase 31. Respective screws 54 extend through arcuate slotted portions of boss 53 and bracket 52 and have threaded engage- 10 ment with the ends of crank 51, to prevent endwise movement thereof while permitting relative pivotal movement. The second crank member between track mechanism 23 and body 21 is in the form of a housing crank which serves also to 15 house a final drive mechanism to sprocket 44, in addition to providing a shiftable supporting connection between body 21 and track mechanism 23.

Housing crank or member 55 (Fig. 11) comprises respective housing sections 56, 57, secured together by a plurality of screws 58. At its inner face, housing section 56 has annular flange 59 engaging the outer face of wall 61 of case 32, and also has lip or flange 62 which is journaled in a complementary recess in wall 61. To secure flange 59 against wall 61 and to provide pivotal movement of housing member 55 about an axis located centrally with respect to flange 59, a pair of semi-circular cooperating collars 63 are pro- 25 vided; being secured to wall 61 by cap screws 64. Collars 63 are recessed to fit over flange 59, thereby providing a journal for flange 59 and confining housing crank 55 to pivotal movement. Seal 65 seated in collars 63 and engaging housing section 56 prevents the entry of deleterious mat- 30 ter at the pivotal connection between housing 55 and case 32.

Spaced below the axis of the pivotal connection thereof with transmission case 32, housing section 56 has spaced apertured bosses 66, 67 receiving a dead stud shaft 68 which has taper and has an inner end flange 68A seated in a complementary recess in boss 67. As will be noted in Fig. 11, housing section 56 is recessed at 68B 45 between bosses 67 and 66; the shaft 68 being held against rotation by pin 68' passing through boss 67 and the shaft. At its outer tapered end, shaft 68 is keyed within reduced outer end 69 of bearing housing 70, which is described more specifically hereinafter. To provide for pivotal connection thereof with shaft 68, track frame 41 (Fig. 6) has rear yoke member 71 rigidly secured thereon; and its spaced rear ends, comprising bracket 72 and arm 73, extend rearward- 50 ly and are pivotally connected at 74, 75 on reduced end 69 of housing 70 and on shaft 68 within recess 68B (Figs. 6 and 11). The effective length of the crank arm length of housing 55 is equal to the effective crank arm length of crank member 51, and the crank members are disposed in parallel relation.

Means are provided for limiting oscillation of the crank members 51 and 55 with respect to the body of the machine. Adjacent crank member 51 (Figs. 6 and 7) boss 53 has longitudinal extensions 81, 82, providing spaced stops lying in the plane of and adapted for engagement with crank member 51 intermediate the pivotal connections thereof with body 21 and track frame 70 41. Upper collar 63 (Fig. 8) has spaced integral extensions 83, 84 which are adapted for engagement by apertured lug 86 (Figs. 8 and 12) on housing section 56. Above and adjacent each of extensions 83, 84, collar 63 and transmission case 75

32 are provided with respective aligned tapped apertures 87 adapted to receive screw 88 to prevent relative movement between housing crank 55 and transmission case 32, as well as to provide a weight transmitting connection. When extension 86 is engaged with extension 83, as shown in Fig. 8, crank 51 (Fig. 7) is engaged with stop 82 and the crank members are thus maintained in their adjusted parallel relation. Upon oscillation of the crank members in a clockwise direction from the position illustrated in Fig. 7, by means later described, crank 51 will be engaged with stop 81, and extension 86 (Fig. 8) will be engaged with extension 84. By this adjustment, endless track mechanism 23 is displaced forwardly with respect to body 21. In each position of crank 55, it is fixedly held by means including screw 88 as previously explained.

Endless track mechanism 22 (Fig. 6) is similarly provided with parallel crank members 91, 92, similar in construction to crank members 51, 55 described above. Hence, like reference characters have been applied to the corresponding specific parts of the corresponding crank structures. The means for oscillating the respective crank members by power from the engine is described hereinafter.

In a preceding portion of the specification, it was stated that rapid and easy reversibility is one of the desirable features in an earth working machine adapted for bulldozing, trail building and like work. The power transmitting means disclosed herein provides, in addition to the usual clutch and change speed transmission, a reversible transmission which is controllable by independent means from the operator's station. From the reversible transmission means, power is transmitted through respective steering clutches and final drive gears to driving sprockets 44.

The engine includes flywheel 101 (Fig. 13) forming part of clutch 102 whose driven element 103 is connected to tubular shaft 104. Shaft 104 has shiftable transmission gears 106 slidably and non-rotatably mounted thereon and adapted to be selectively meshed with gears 107 on countershaft 108. Shaft 108 has bevel pinion 109 secured thereon at the rear end and meshing with opposite bevel gears 111, 112 (Figs. 11 and 13), which are journaled for rotation about drive shaft 114 by suitable bushings and by respective bearings 116 in bearing cages 117. Gears 111, 112 (Fig. 11) are provided on their inner faces with clutch teeth 118 adapted for engagement selectively with shiftable clutch element 119 having splined engagement with annular clutch supporting extension 120 of shaft 114, so as to be rotatable with shaft 114 but axially shiftable therealong. As seen in Figs. 11 and 13, shifting movement of clutch element 119 serves to establish a drive connection from one of gears 111, 112 to shaft 114. Shifting movement of clutch element 119 is controlled by fork 121 pivoted at 122 and having a pivotal connection with rod 123. Rod 123 is connected by a suitable linkage with reversing shift lever 124 (Figs. 6 and 7) adjacent operator's seat 34. Forwardly of reversing shift lever 124, gear shift lever 126 is mounted for controlling the conventional change speed transmission gears 106, 107; while clutch lever 127 is provided for controlling clutch 102.

From the foregoing description, it is seen that a drive can be transmitted to shaft 114 (Fig. 11) in either direction without operation of the conventional change speed transmission. This is very desirable as in a conventional change speed

transmission the gears are not arranged for rapid shifting from forward to reverse drive at any selected speed. From shaft 114, drives are transmitted to respective driving sprockets 44 through similarly constructed steering clutches and final drive gears. At its left end (Fig. 11), shaft 114 has driving element 131 of a conventional multiple disk steering clutch secured thereon; driven element 132 of the clutch being connected to the inner end of stub shaft 133 which is journaled in bearings 134 in housing section 56. As stated above, the construction of the steering clutch is conventional and is such that normally a driving connection is established thereby, which connection can be interrupted by operation of fork 136 (Fig. 11) movement of which is controlled in a conventional manner by steering clutch lever 137 (Figs. 6 and 7) at the operator's station.

Shaft 133 (Fig. 11) has integral pinion 141 meshing with gear 142 integral with shaft 143 which is journaled by bearings 144 in housing sections 56, 57. Within housing section 57, shaft 143 has integral pinion 145 meshing with gear 146 on final drive quill 147. Quill 147 is freely spaced from and journaled about dead shaft 68 by means of bearings 148 in housing section 56 adjacent boss 66, and in bearing cage 149 in housing 70 which is fixed to shaft 68 as was previously explained. Driving sprocket 44 is wedgedly splined for rotation with quill 147, between bearings 148; and seals 151 are mounted at each side of sprocket 44 to prevent entry of deleterious matter into the final drive housing crank 55.

A similar drive, connected to the opposite end of cross shaft 114, is provided for driving sprocket 44 associated with track mechanism 22.

Thus, it is seen that releasable and reversible drives are provided for the driving sprockets of the endless track mechanism, which drives can be interrupted by disengagement of the respective steering clutches. For short turning, brake means 152 (Fig. 11) are associated in the usual manner with each driven element 132 of each steering clutch, whereby either track can be locked against movement. Respective brake mechanisms 152 are controlled by pedals 153 (Fig. 6) at the operator's station.

The above-described drive mechanism for driving track sprockets 44 also serves as means for adjusting track mechanisms 22, 23 with respect to body 21 when desired. The adjustment of left-hand track mechanism 23 from the position shown in Fig. 2 to that shown in Fig. 1 will be described as an illustrative example. To condition the machine for adjustment of track mechanism 23, the right-hand steering clutch associated with right-hand track mechanism 22 is released by adjusting right-hand control lever 137; and the brake associated with the right-hand steering clutch is applied by depressing right-hand pedal 153. Thus, right-hand track mechanism 22 is locked against movement. Screw 88 is removed to enable free pivotal movement of crank housing 55. After the machine is conditioned as described above, the power transmitting means is applied to the left-hand sprocket 44, through main clutch lever 127, gear shift lever 126 and reversing shift lever 124, to drive left-hand sprocket 44 reversely, i. e., in a clockwise direction as viewed in Fig. 7. Normally with housing crank 55 locked by screw 88, such operation would result in turning of the machine; and locked track mechanism 22 would be twisted on the ground. However, as housing crank 55 is free

to pivot by virtue of the removal of screw 88, pinion 141 (Fig. 11) (which always rotates in the same direction as sprocket 44 and is coaxial with the pivotal connection between crank 55 and transmission case 32) in rotating causes not only axial, but also translational rotation of gear 142, pinion 145, gear 146 and sprocket 44. Thus, housing crank 55 is rotated in a counter-clockwise direction from the position illustrated in Fig. 2, to that shown in Figs. 1, 7 and 8, the entire machine being laterally tilted to the right as track mechanism 23 moves rearwardly. In effect, the final drive mechanism operates as epicyclic gearing, pinion 141 acting as the sun pinion having a fixed axis, crank housing 55 acting as the planet carrier, sprocket 44 acting as the planet pinion, and endless track 46 acting as the fixed ring gear. When body or main frame 21 is descending from its highest lifted position after crank members 51 and 55 are vertical during the track mechanism shifting operation, the same rate of movement obtains as existed when the body was being elevated, because the engine acts as a brake against any acceleration of body movement. After housing extension 86 contacts stop extension 83, the operator disengages main clutch 102; and screw 88 is again inserted in position to lock housing 55 to the main frame of the machine. If the clutch is not disengaged when stop extension 83 is contacted, no damage can occur as the drive is simply transferred to sprocket 44 and the machine will start turning as in normal operation.

From the preceding description of the track mechanism shifting operation, the manner in which such mechanisms can be shifted to assume the positions shown in Figs. 1 through 3, will be apparent; it being obvious that each track mechanism is capable of forward and backward shifting depending upon its initial position relative to the main frame 21.

Bulldozing blade means is adjustably mounted at the front end of the machine by thrust frames movably connected thereto and to track frames 41. The connections include shock absorbing means to prevent breakage of the parts, and to compensate for endwise movement of the blade during adjustment of the angular position thereof with respect to the longitudinal axis of the machine, which angular adjustment is accomplished by relative shifting of the track mechanisms 22 and 23.

Blade 24 (Figs. 6, 7 and 9) is of conventional construction per se. Bracing angle 161 (Figs. 6 and 9) is secured by welding to blade 24 adjacent the cutting edge thereof; and adjacent the ends of angle 161 and vertically spaced therefrom, brackets 162 are secured to blade 24. To provide for connection of each end of blade 24 to the associated track frame 41, each bracket 162 (Fig. 9) and angle 161 are apertured to receive pin 163 passing therethrough and through apertured boss 164 formed centrally of transversely extending crank member 166 (Fig. 6); a crank member 166 being associated with each track frame 41. At its outer end, each crank member 166 has one crank arm pivotally connected by pin 167 to thrust member 168, extending rearwardly therefrom and pivotally connected about a horizontal axis at 169 to yoke member 71 on track frame 41. At its inner end (Fig. 9), the other arm of crank member 166 has socket portion 176 engaged by ball portion 177 of sleeve 178 which telescopes over shaft 179. Shaft 179 is pivotally connected at its rear end (Figs. 6 and

9) by pin 180 to bracket 181 in turn horizontally pivoted on stub shaft 182 supported in spaced brackets 183, 184 on associated track frame 41. Brackets 183 and 184 are secured to the inner side of track frame 41; however, bracket 184 is L-shaped and has a forwardly extending portion 184' thereof spaced inwardly from bracket 183 (Fig. 6), to provide a space for receiving pivot bracket 181.

Around sleeve 178 and shaft 179 (Fig. 9), compression spring 186 is provided. The spring is compressed between shoulders on sleeve 178 and shaft 179, to urge the inner arm of crank member 166 forwardly, and is housed by telescopic shields 178A, 179A fixedly secured to sleeve 178 and shaft 179, respectively. The compressed position of sleeve 178 and shaft 179 is limited by adjustable stop collar 187 secured at the outer end of shield 178A by suitable clamping screws, and engageable by the outer end of shield 179A. By virtue of the provision of the resiliently connected telescopic members 178, 179, shock absorbing means obtains to allow each crank member 166 to yield when blade 24 encounters an obstruction. However, the strength of each spring 186 is such that under normal forces, members 178, 179 are maintained in the expanded position shown.

From the foregoing description, it is seen that crank member 166, thrust members 168, and telescopic members 178, 179 form U-shaped thrust frames movably connected to track frames 41 and to blade 24. Also, such thrust frames are adjustable vertically about horizontal pivots 169 and 181.

Guide means are provided on each track frame 41 for absorbing side stresses from the thrust frames, in any vertically adjusted positions thereof, to thus brace the blade 24 against lateral movement. The outer face of each yoke member 43 (Figs. 6, 7 and 10) has upwardly extending brace 188 secured thereto to provide a mounting for guide plate 189 secured to the upper end of brace 188 and extending downwardly therefrom. The lower end of guide plate 189 is slidably disposed between guide and thrust brackets 190 secured on track frame 41, and the thrust member 168 associated therewith.

The thrust frames also provide compensation for the change in the effective width of blade 24 with respect to track frames 41 when endless track mechanisms 22, 23 are adjusted longitudinally with respect to body 21. The various conditions are illustrated schematically in Figs. 1 through 3; and in discussing these figures, reference to the right-hand and left-hand thrust frames will be made as looking from the operator's seat. The width between pins 163 (Fig. 3) is selected so that with blade 24 in the position shown, both sets of telescopic members 178, 179 are expanded by the springs compressed therein. When blade 24 is adjusted with its right end in leading position, by moving endless track mechanism 22 forwardly with respect to body 21, as illustrated in Fig. 1, the effective lateral width between pins 163 has been shortened so that crank members 166 are oscillated to compress both sets of telescopic members 178, 179; right-hand members 178, 179 being substantially fully compressed. This results in a slight inward thrust on telescopic members 178, 179 which is accommodated by the pivotal connections 180 at their rear ends. In Fig. 2, the left end of blade 24 is placed in leading position so that left-hand telescopic members

178, 179 are compressed more than right-hand members 178, 179.

Power operated lift means are provided for adjusting blade 24 vertically with respect to the ground, which is operable in any adjusted position of track mechanisms 22, 23 with respect to body 21. Such lift means includes opposite triangular crank members; each of which is pivotally connected at one apex to crank members 166 of the thrust frames, has a pivotal floating connection with the track mechanisms at another apex, and is pivotally connected at its third apex to a telescopic connection which extends rearwardly along the side of body 21. At their rear ends, the telescopic connections are movably secured to a transverse lift member mounted on body 21 for adjustment with respect thereto by means operated from the engine.

At the inner end thereof, each crank member 166 (Figs. 6 and 9) has vertically apertured boss 191 in which upwardly extending fork 192 is pivotally received. Fork 192 (Fig. 9) is pivotally connected by pin 193 to an apex of triangular lift crank 194. Each lift crank 194 at its rear apex terminates in integral transverse pin 196 pivotally and slidably received in slot 197 formed in extension 198 of pivotally mounted bracket 181. At its upper apex, lift crank 194 (Fig. 7) has fork 201, mounted therein and pivotally connected by pin 202 to shaft 203. Shaft 203 extends rearwardly along body 21 and is telescopically received within tubular shaft 204 having ball and socket connection 206 (Fig. 6) at its rear end with transverse lift member 207. Shafts 203 are provided with a plurality of longitudinally spaced vertical apertures 211 adapted to be aligned with elongated, longitudinally extending apertures 212 in tubular shaft 204. Pin 213 is placed through apertures 212 and one of apertures 211 to maintain the telescopically adjusted position of shafts 203, 204. By placing pins 213 in proper relation with elongated apertures 212 of tubular shaft 204 and selected aperture 211 of shaft 203, the combined effective lengths of shafts 203, 204 are adjustable in accordance with the longitudinally adjusted positions of track mechanisms 22, 23 with respect to body or main frame 21. Elongated apertures 212 provide for slight relative movement between shafts 203, 204 when telescopic housing members 178, 179 yield in acting as shock absorbing means.

Transverse lift member 207 (Figs. 6 and 8) has opposite longitudinally apertured brackets 216 secured thereon, which are slidably engaged with guide rods 217 fixedly mounted by brackets 218 on case 32 of body 21. Centrally of transverse lift member 207 (Fig. 6), nut member 221 is secured thereto by means of bolts 222. Nut member 221 has threaded engagement with screw member 223 which extends rearwardly there-through within tubular housing 224 (Figs. 6 and 6A). Screw member 223 is mounted only for rotation in body 21, and is power driven to adjust nut member 221 longitudinally thereof, by reversible clutch mechanism operated continuously from the engine by means independent of the drive for driving sprockets 44. To prevent the entry of deleterious matter while providing for longitudinal movement of nut member 221, flexible bellows 226 (Fig. 6) is provided around screw member 223 between nut member 221 and body 21.

The reversible clutch means for rotating screw 223 includes opposed clutch teeth 231 (Fig. 13) on respective bevel gears 232, 233, which are con-

nected by idler bevel gear 234. Bevel gear 232 is suitably keyed on screw member 223 for rotation therewith; while bevel gear 233 is journaled about shaft 236 which has a reduced end thereof journaled in a suitable end recess in screw member 223. Between bevel gears 232, 233, shaft 236 has splined portion 237, upon which double faced clutch element 238 is slidably and non-rotatably mounted. Clutch element 238 has clutch teeth at its ends adapted to mesh with respective clutch teeth 231 on bevel gears 232, 233, and is controlled by fork 241 mounted on shiftable shaft 242. Shaft 242 has rack 243 engaged by pinion 244 on control shaft 246 having operating handle 247 secured thereto. As seen in Fig. 6, handle 247 is located adjacent the operator's station immediately in front of seat 34. Shaft 236 (Fig. 13) extends forwardly through tubular clutch driven shaft 104, and has splined connection 248 with flywheel 101 at its front end.

Thus, by manipulation of handle 247, a selective drive in either direction can be imparted to screw member 223, to adjust nut member 221 longitudinally thereof in either direction. Longitudinal movement of nut member 221 adjusts transverse lift member 207 along guide rods or shafts 217; and through respective connections comprising shafts 203, 204, movement of lift member 207 effects oscillation of respective triangular crank members 194 about an axis determined by the position of shiftable pins 196. Such movement of the crank members 194 adjusts the front ends of the thrust frames, comprising crank members 166, thrust members 168 and the telescopic connections 178, 179, to adjust blade 24. In Fig. 4 the maximum lifted position of blade 24 is illustrated in solid lines; it being seen that each pin 196 is at the forward end of slot 197, and that telescopic members 178, 179 are extended. The phantom line position of blade 24 in Fig. 4 illustrates one of the lowest positions thereof. In such low positions, another of which is illustrated in Fig. 9, pins 196 are adjacent the rear ends of slots 197, and the telescopic connections are compressed.

It will be observed, from the preceding description of the preferred type of machine, that because the track mechanisms are positionable with their similar blade ends displaced or offset longitudinally with respect to each other, and relative to the body of the machine, the blade when operating at an angle as illustrated in Figs. 1 and 2 is positioned the same distance away from the similar ends of both of the track mechanisms, to enable both ends of the blade to be supported by the track mechanisms closely adjacent to the blade to provide for stabilization and efficient bracing of the blade at both ends thereof. Also, because of front crank arms 51 and 91, lateral spreading of the track frames 41 is obviated to cooperate in providing a sturdy machine.

Figs. 14 through 17 illustrate a second embodiment of the invention which is similar in many respects to that illustrated in Figs. 6 through 13.

In the second embodiment of my invention, body 21 of the machine is constructed to provide unimpeded vision for the operator in manipulating the blade. To accomplish this purpose, the power plant is positioned at the rear of the machine, and the operator's station is located forwardly of the power plant immediately behind the blade. In addition, the power plant construction provides a relatively low center of gravity for the machine.

The power plant (Fig. 15) includes engine 75

structure 251 which has its rear end supported on and rigidly secured by bolts 252 to transmission case 253 positioned below the engine structure, and is secured at its front end by suitable bolts to clutch housing 254. Clutch housing 254 extends downwardly from engine 251 and has integral rearwardly extending tubular portion 256 secured by suitable cap screws 255 to the front of the transmission case 253. The front of clutch housing 254 is closed by cover 257. Thus, engine 251, transmission case 253, clutch housing 254 and tubular portion 256 provide the main frame of the machine. Forwardly of engine 251 and suitably supported on the power plant, framework 261 is provided, for supporting operator's seat 262 and various control members described hereinafter. Rearwardly of transmission housing 253, steering clutch housing 258 (Fig. 14) is secured thereto, having bell extensions 259 at each end for connection to the final drive housings.

Endless track mechanisms, similar to track mechanisms 22, 23 described above, are employed and will, consequently, not be described in detail. The connections between the endless track mechanisms and the body or main frame are similar to those already described, and comprise front crank members 266 and rear housing cranks 267 similar, respectively, to crank members 51, 91 and housing cranks 55 described above. Respective crank members 266 have their inner ends pivotally received in bracket 268 (Fig. 15) secured, by suitable screws, across the front of cover 257. Bracket 268 has integral longitudinal extensions 269 at its ends providing stops for cranks 266, similar to those described above. Cranks 267 are journaled on bell extensions 259 in the same manner that cranks 55 are journaled on transmission case 32 as described above, and are similarly connected to yoke members 270 of track frames 41.

Adjustment of the track mechanisms with respect to the main frame or body is identical to that described in connection with the first embodiment of my invention, and will not be described in detail.

Blade 24 is connected adjacent its ends to U-shaped thrust frames embracing endless track mechanisms 22, 23, and pivotally connected thereto. The connections from blade 24 to the thrust frames include means for varying the angle of blade 24 with respect to the ground, and means compensating for the change in effective width of blade 24 upon longitudinal adjustment of track mechanisms 22, 23 with respect to the main frame or body. Bracing angle 161 (Figs. 14 and 16) on blade 24 has pairs of spaced brackets 276 secured thereon, pivotally receiving pins 277 passing through bosses 278 in connection brackets 279. Each bracket 279 is provided with upward extension 281 apertured to receive clamping bolt 282 passing through slot 283 in link 284. Link 284 is pivotally connected to blade 24 by pin 286 journaled in brackets 287. By loosening bolts 282, links 284 can be adjusted with respect to extensions 281 to oscillate blade 24 about the axis of pins 277, thus varying the angular position of blade 24 with respect to the ground.

Each bracket 279 (Figs. 16 and 17) has vertically spaced, rearwardly extending flanges 291 provided with transverse slots 292. Slots 292 provide a sliding mounting for a gear mounted on the ends of the thrust frames, and meshing with a rack between flanges 291 of each bracket 279

to provide for relative transverse movement between the thrust frames and the blade upon angular adjustment of the blade. Gear 296 is journaled on shaft 297 mounted in vertically spaced extensions of bracket 298 on each thrust frame 299. Each shaft 297 has reduced ends, provided with rollers 301 cotter-held thereon and disposed in slots 292. Gear 296 meshes with rack 302 welded on bracket 279 between flanges 291 thereof. To maintain the adjusted position of gear 296 with respect to rack 302, block 303 is provided, having teeth adapted to engage gear 296 to form a wedge between gear 296 and rack 302. Block 303 is held in position by bolt 304.

In an angled transverse position of blade 24 with respect to the body, i. e., as shown in Fig. 14, respective gears 296 are engaged with the outer portions of racks 302; and rollers 301 are engaged with the outer ends of slots 292. With blocks 303 removed and the blade adjusted from the angled position shown in Fig. 14 to the oppositely angled position, gears 296 travel inwardly along racks 302 and then outwardly again to the outer end thereof. If blade 24 is adjusted to its transverse position at right angles to the longitudinal axis of the machine, gears 296 remain engaged with the inner ends of racks 302, and rollers 301 are engaged with the inner ends of slots 292. In this position, blocks 303 are disposed to the outside of gears 296; pins 304 being disposed in the outer set of apertures 306 (Fig. 14).

Thrust frames 299 are U-shaped and extend rearwardly around track mechanisms 22, 23, and are pivoted by pins 311 to respective yoke members 270 rigidly secured to track frames 41.

Lift means are provided on endless track mechanisms 22, 23 for adjusting blade 24 vertically with respect to the ground. Each thrust frame 299 (Fig. 16) has ball and socket connection 316 with lift screw 317 (Figs. 15 and 16), which extends upwardly within housing 318 and has threaded engagement with a suitable nut member mounted in housing 318. Housing 318 is pivotally mounted by opposed trunnions 319 in fork 320 secured between the upper converging ends of support beams 321. Beams 321 extend rearwardly and then downwardly, and are connected by suitable screws to brackets 322 on the opposite sides of the track frame 41 associated therewith. It will be observed that the side members of thrust frames 299 are positioned between the sides of the track frames 41, and beams 321. Hence, beams 321 also serve to absorb transverse thrusts imposed on thrust frames 299. The nut members in housings 318 are operated by telescopic shafts 326 (Figs. 14 and 15) from a suitable reversible clutch mechanism in gear box 327, controlled by hand lever 328. Such clutch mechanism in gear box 327 is operated from engine 251 by a suitable drive connection including shaft 329 (Fig. 15). It is to be noted that the drive connection extends forwardly from the power plant and then upwardly to the gear box, providing a very simple structure. Shaft 329 is driven from engine 251 similarly to the constantly running drive for the power control means disclosed in the first described embodiment of the invention.

Fig. 18 illustrates more or less schematically a third embodiment of the invention. In this embodiment, the body of the machine is supported by rigid connections on opposite non-adjustable endless track mechanisms of different lengths. Oppositely angled bulldozing blades are

provided at each end of the machine closely adjacent the respective ends of the track mechanisms; each blade being independently adjustable vertically by power from the engine of the machine.

Body 25 includes engine 351 at one end, and seat 352 at the other end which faces toward the side of the machine supported on the long track mechanism. Also, body 25 is supported at one end on long track mechanism 26 and short track mechanism 27, by transverse member 356; and at the other end, body 25 is supported by respective final drive housings 357, 358. The track mechanisms are similar in construction, except as to dimensions, with those described above, and are controlled through similar transmission and final drive means, through gear shift lever 361, main clutch lever 362, reversing shift lever 365, steering clutch levers 363 and brake pedals 364. Respective bulldozing blades 28, 29 are pivotally connected about vertical axes to respective long and short thrust members 373, 374, by brackets 375. Thrust members 373 and 374 have common aligned transverse pivotal connections with track mechanisms 26, 27, on pins 377. Blade 28 and lift mechanisms 378 therefor are supported by beams 379 similar to those shown in Figs. 14 and 15. Lift mechanisms 378 (Fig. 18) are operated through telescopic shafting, by reversible clutch means in gear box 381, controlled by hand lever 382. Blade 29 is connected to lift mechanisms 378 on suitable brackets 383, 384, and operated through telescopic shafting by reversible clutch means in gear box 381 controlled by hand lever 382. It is to be noted that the controls are conveniently disposed around side seat 352 which is disposed facing long track mechanism 26, so that the operator can see the leading end of either blade while seated.

Although in the modification of Fig. 18 bulldozing blades 28 and 29 are not angularly adjustable, it will be observed that because they are oppositely angled at the ends of the machine and because the machine can be driven forwardly and rearwardly, either one of the blades can be employed to obtain the effect of a single angularly adjustable blade.

I, therefore, claim as my invention:

1. An earth working machine adapted for use in bulldozing, trail building and like work; said machine including a body; opposite endless track mechanisms supporting said body; said track mechanisms having similar ends longitudinally displaced; bulldozing blade means; thrust transmitting means spacing said blade means substantially equal distances from said similar ends of said track mechanisms; means for adjusting said blade means to different heights relative to said body; a source of power on said body; and means for driving said track mechanisms from said source of power.

2. An earth working machine adapted for use in bulldozing, trail building and like work; said machine including a body; spaced ground-engaging supports for propelling and supporting said body; said supports having similar ends longitudinally displaced; bulldozing blade means adjacent said similar ends; thrust transmitting means spacing said blade means substantially equal distances from said similar ends; means for adjusting said blade means to different heights relative to said body; a source of power on said body; and means for driving said supports from said source of power.

3. An earth working machine adapted for use

in bulldozing, trail building, and like work, said machine having a body, spaced ground-engaging supports for propelling and supporting said body, and a bulldozer blade adjacent one end of said body extending transversely thereof and disposed at an oblique angle with respect to the longitudinal axis of the machine, said supports adjacent said one end of said body having ends offset longitudinally with respect to each other.

4. An earth working machine adapted for use in bulldozing, trail building and like work, said machine having a body, opposite endless track mechanisms connected to said body, said track mechanisms having similar ends longitudinally displaced, bulldozing blade means extending transversely of said body adjacent said similar ends and arranged with said similar ends to provide either one of opposite operative angular positions with respect to the longitudinal axis of said body, and thrust means connecting said blade means and said track mechanisms, said thrust means spacing said similar ends of said track mechanisms substantially the same distance from said blade means.

5. An earth working machine adapted for use in bulldozing, trail building and like work, said machine including a body, opposite endless track mechanisms supporting said body, similar ends of said track mechanisms being longitudinally displaced, and an earth-engaging tool supported closely adjacent said similar ends.

6. An earth working machine adapted for use in bulldozing, trail building and like work, said machine having a body, opposite endless track mechanisms connected to said body, and bulldozing blade means connected to said track mechanisms and spaced substantially the same distance from similar ends thereof, said track mechanisms being connected to said body for relative adjustment with respect thereto to vary the angular position of said blade means relative to said body.

7. In an earth working machine adapted for use in bulldozing, trail building and like work, a body, opposite endless track mechanisms, and means connecting said track mechanisms to said body for adjustment relative to said body to dispose similar ends of said track mechanisms in longitudinally displaced position.

8. In an earth working machine, a body, and opposite endless track mechanisms movably connected thereto for endwise displacement to dispose similar ends thereof in longitudinally displaced relation.

9. In an earth working machine, a body, and ground-engaging supporting means therefor including an endless track mechanism movably connected thereto for relative endwise displacement.

10. In an earth working machine, a body, and opposite endless track mechanisms movably connected thereto for endwise displacement to dispose similar ends thereof in longitudinally displaced relation, the connections between said body and said track mechanisms allowing the placing of either of said similar ends in leading position.

11. In an earth working machine, a body, opposite endless track mechanisms, adjustable means supporting said body on said track mechanisms to allow relative endwise displacement therebetween, and means for adjusting said supporting means to place similar ends of said track mechanisms in longitudinally displaced relation.

12. In an earth working machine, a body, opposite endless track mechanisms, adjustable means supporting said body on said track mechanisms to allow relative endwise displacement therebetween

tween, and means for locking said supporting means in a selected adjusted condition thereof to maintain the corresponding relatively adjusted positions of said body and said track mechanisms.

13. In a machine of the class described, a body, opposite endless track mechanisms, and means connecting said body to each of said track mechanisms, each connecting means comprising spaced parallel cranks movably connected to said body at one end and to the associated track mechanism at the other.

14. In a machine of the class described, a body, opposite endless track mechanisms, means connecting said body to said track mechanisms, each connecting means comprising spaced parallel cranks movably connected to said body at one end and to the associated track mechanism at the other, and driving means for said track mechanisms, one of said cranks of each connecting means providing a housing for a part of said driving means.

15. In an earth working machine; a body; opposite endless track mechanisms; each track mechanism including a track frame, an idler wheel adjacent one end of said frame, a driving sprocket wheel adjacent the opposite end of said frame, and an endless track extending around said wheels; and connecting means between each track frame and said body, including a crank movably connected at its ends to the associated frame and said body adjacent said one end of said frame, and a housing crank pivotally connected at its ends to the associated frame and said body adjacent said opposite end of said frame.

16. In an earth working machine; a body; opposite endless track mechanisms; each track mechanism including a track frame, an idler wheel adjacent one end of said frame, a driving sprocket wheel adjacent the opposite end of said frame, and an endless track extending around said wheels; connecting means between each track frame and said body, including a crank pivotally connected at its ends to the associated frame and said body adjacent said one end of said frame, and a housing crank pivotally connected at its ends to the associated frame and said body adjacent the said opposite end of said frame; and means for limiting oscillation of said cranks and housing cranks with respect to said body.

17. In an earth working machine adapted for use in bulldozing, trail building and like work, a body, opposite ground-engaging supports connected to said body for relative endwise movement with respect thereto, similar ends of said supports being longitudinally displaced with respect to each other, transmission means in said body for driving said supports, and means for conditioning said supports to provide for endwise movement thereof upon establishing a drive through said transmission means.

18. In an earth working machine adapted for use in bulldozing, trail building and like work, a body, ground-engaging supports connected to said body for relative endwise movement with respect thereto, and power-operated means for causing such movement.

19. In an earth working machine adapted for use in bulldozing, trail building and like work, a body, including a source of power, opposite endless track mechanisms connected to said body for endwise movement with respect thereto, and selectively operable means connected to said source of power for causing such movement.

20. An earth working machine adapted for use in bulldozing, trail building and like work; comprising a traction unit including a body, having a source of power, and opposite endless track mechanisms movably connected thereto for relative endwise adjustment; said mechanisms being adjustable to position similar ends thereof in longitudinally displaced relation with either of said similar ends in leading position or to position said ends in lateral alignment; and a blade unit including a blade, thrust means connected to said blade adjacent the ends thereof and connected to said endless track mechanisms, lift means for said blade, and means for operating said lift means from said source of power; the ends of said blade being adjustable through said thrust means simultaneously with said track mechanisms.

21. An earth working machine adapted for use in bulldozing, trail building and like work; comprising a traction unit including a body, and opposite endless track mechanisms movably connected thereto for relative endwise adjustment; said mechanisms being adjustable to position similar ends thereof in longitudinally displaced relation with either of said similar ends in leading position or to position said ends in lateral alignment; and a blade unit including a blade, and means connecting said blade adjacent the ends thereof to said endless track mechanisms; the ends of said blade being adjustable through said connecting means simultaneously with said track mechanisms.

22. In an earth working machine; a body including a case; opposite endless track mechanisms including track frames; and means connecting said track mechanisms to said body; each connecting means including a final drive housing, a pivotal connection between said housing and said case, a shaft mounted in said housing parallel to and displaced from the axis of said pivotal connection, and a pivotal connection between said shaft and the track frame of the associated track mechanism.

23. In an earth working machine; a body including a case having drive means therein; opposite endless track mechanisms; each track mechanism including a track frame having a forked end forming extensions; means connecting said track mechanisms to said body; each connecting means including a final drive housing, a pivotal connection between said housing and said case, a shaft mounted in said housing parallel to and displaced from the axis of said pivotal connection, and aligned pivotal connections between said shaft and said end extensions; a drive sprocket journaled in said housing about the axis of said shaft; and a drive connection from said drive means extending through said housing to said drive sprocket.

24. In an earth working machine, a body, opposite endless track mechanisms, means connecting said track mechanisms for relative endwise adjustment, an earth-engaging tool, means connecting said tool to said track mechanisms for movement therewith, and means associated with said tool connecting means for compensating for the effective change in width between the points of connection of said connecting means to said tool upon said endwise adjustment of said track mechanisms.

25. In an earth working machine, a body, opposite endless track mechanisms, means connecting said track mechanisms for relative endwise adjustment, an earth-engaging tool, and thrust

means connecting said tool to said track mechanisms for movement therewith, said thrust means being yieldable to compensate for the effective change in width between the points of connections of said thrust means to said tool upon said endwise adjustment of said track mechanisms.

26. In an earth working machine, a body, opposite endless track mechanisms, means connecting said track mechanisms for relative endwise adjustment, an earth-engaging tool, and thrust means connecting said tool to said track mechanisms for movement therewith, said thrust means being movably connected to said tool to compensate for the effective change in width between the points of connections of said thrust means to said tool upon said endwise adjustment of said track mechanisms.

27. In an earth working machine, a body, opposite endless track mechanisms, means connecting said track mechanisms for relative endwise adjustment, an earth-engaging tool, thrust means connecting said tool to said track mechanisms for movement therewith, and shock absorbing means associated with said thrust means and said tool allowing yielding movement of said tool.

28. In an earth working machine, a body, opposite endless track mechanisms supporting said body and connected thereto for relative endwise adjustment, a bulldozing blade adjustably connected to said track mechanisms adjacent one end of said body, lift means for said blade including a linkage connected thereto adjacent each end thereof, lift links extending from said linkages along said body, a transverse member mounted for longitudinal movement on said body and connected to said lift links, a power shaft mounted in said body, and selectively operable means connecting said power shaft and said member.

29. In an earth working machine, a body, opposite endless track mechanisms supporting said body and connected thereto for relative endwise adjustment, a bulldozing blade extending transversely of said body, U-shaped thrust frames embracing the front ends of said track mechanisms and having their respective open ends pivotally connected thereto, the closed ends of said frames being connected to said blade, and adjusting means connected to said thrust frames.

30. In an earth working machine, a body, supporting means for said body including a long track mechanism and a shorter track mechanism, the different lengths of said track mechanisms placing both sets of similar ends thereof in longitudinally offset relation, and bulldozing blade means at each end of said machine, the offsetting of said sets of ends serving to provide positioning of each of said blade means at an oblique angle with respect to the longitudinal axis of said machine.

31. In an earth working machine, a body, supporting means for said body including a long track mechanism and a shorter track mechanism, the different lengths of said track mechanisms placing both sets of similar ends thereof in longitudinally offset relation, bulldozing blade means at each end of said machine, the offsetting of said sets of ends serving to provide positioning of each of said blade means at an oblique angle with respect to the longitudinal axis of said machine, and an operator's station on said body and facing said long track mechanism.

32. In an earth working machine, a body, a track mechanism at each side of said body,

means for connecting said track mechanisms to said body with similar ends thereof adapted for longitudinal displacement with respect to each other, and means for effecting adjustment of said track mechanisms relative to each other to vary said displacement.

33. In an earth working machine, a body, a track mechanism at each side of said body, means for connecting said track mechanisms to said body with similar ends thereof adapted for longitudinal displacement with respect to each other, means for effecting adjustment of said track mechanisms relative to each other to vary said displacement, power transmitting means including a transmission in said body for driving said track mechanisms, and means independent of said transmission for reversing said drive whereby the machine can be operated backwardly and forwardly with rapidity.

34. An earth working machine comprising a body, means for positioning an earth working tool at an oblique angle with respect to said body, and spaced ground supports connected to said body for propelling said body along the ground, said ground supports having connections to said tool and being longitudinally displaced adjacent said tool to stabilize said tool at spaced locations.

35. An earth working machine comprising a body, opposite ground-engaging means for propelling and supporting said body, similar ends of said ground-engaging means being longitudinally displaced, and an earth working tool supported in stabilizing relationship by said ground-engaging means adjacent said similar ends.

36. An earth working machine comprising a body, ground supports for propelling said body and connected to said body for relative movement with respect to each other to provide for positioning of similar ends of said supports in longitudinally displaced relationship or in lateral alignment, and an earth working tool extending transversely of said body adjacent said similar ends of said supports and supported by said supports in stabilizing relationship with respect to said similar ends in any of the relatively adjusted positions of said supports.

37. An earth working machine comprising a body, opposite endless track mechanisms for supporting said body with similar ends thereof longitudinally displaced, and an earth working tool extending transversely of said body adjacent said similar ends of said endless track mechanisms and connected to said endless track mechanisms in stabilizing relationship with respect to both of said similar ends.

38. In an earth working machine, an earth working tool disposable at an oblique angle with respect to the longitudinal axis of the machine, spaced ground-engaging means for supporting and propelling said machine, means mounting said ground-engaging means for relative longitudinal adjustment with respect to each other, and means to support said tool on said ground-engaging means to maintain a substantially constant relationship between the ends of said tool and said ground-engaging means irrespective of the angle of said tool and the adjustment of said ground-engaging means.

39. In an earth working machine, spaced endless track mechanisms for supporting and propelling the machine, an earth working tool positioned adjacent similar ends of the track mechanisms and disposed at an oblique angle with respect to the longitudinal axis of said machine, and means for supporting both end portions of

the tool on said track mechanisms in substantially the same stabilizing relationship including an arrangement whereby the end of the track mechanism adjacent the leading end of the tool is in advance of the corresponding end of the other track mechanism.

40. In an earth working machine, spaced endless track mechanisms supporting said machine with similar ends longitudinally offset with respect to each other, and an earth-engaging tool extending at an oblique angle with respect to the longitudinal axis of the machine and connected to said endless track mechanisms substan-

tially the same distance from each of said similar ends.

41. A track-type bulldozer machine adapted to support a bulldozer tool in an oblique position adjacent an end thereof for bulldozing and the like work, comprising a tractor body, and spaced endless track mechanisms for propelling and supporting said body, the ends of said track mechanisms adjacent said tool end of the machine being longitudinally offset to cooperate with said tool in providing stabilizing supporting means therefor in the oblique position thereof.

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