

Dec. 28, 1926.

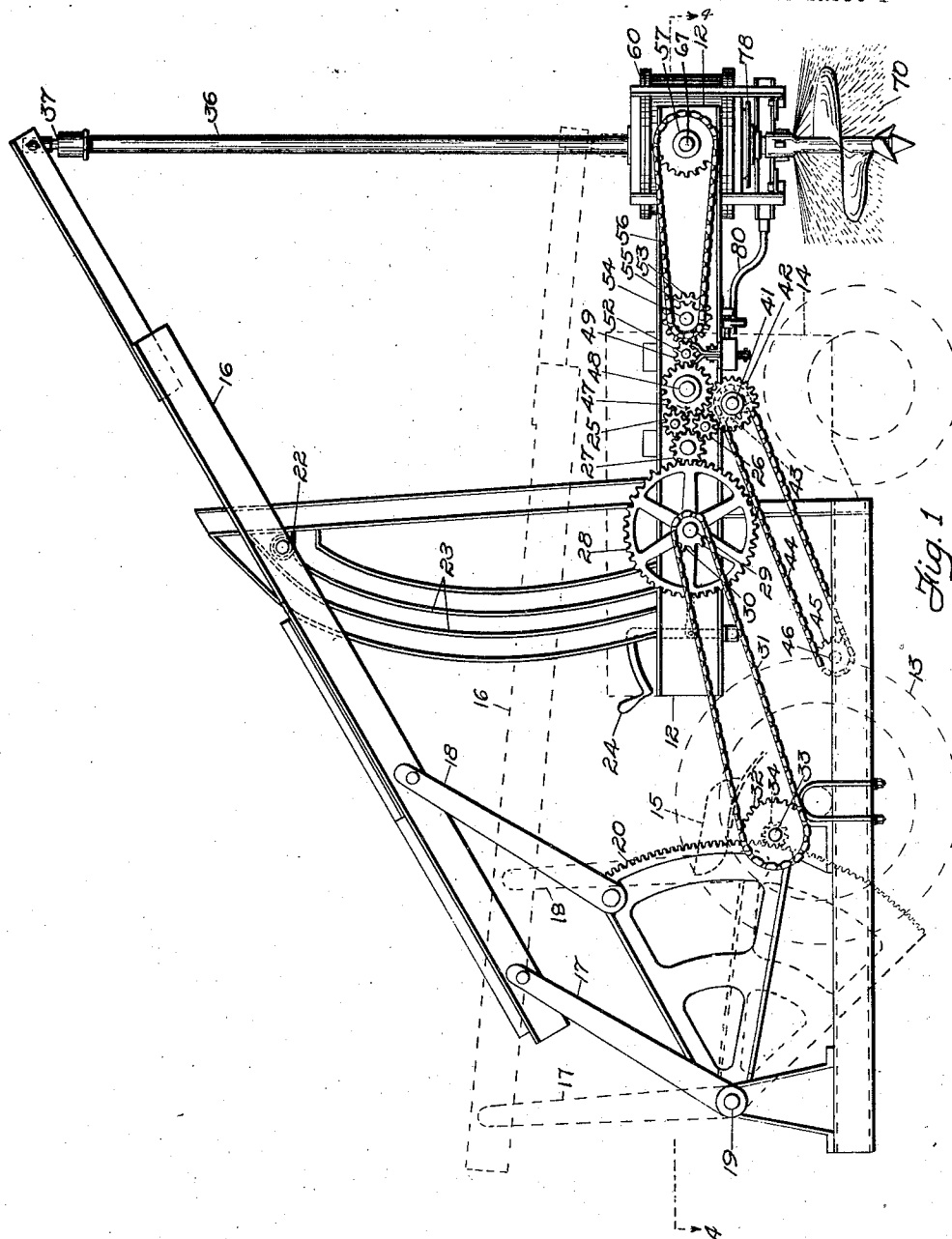
1,612,186

L. E. GIBSON

POSTHOLE DIGGER

Filed April 5, 1926

4 Sheets-Sheet 1



INVENTOR
Leo E. Gibson
BY William M. Swan
ATTORNEY

Dec. 28, 1926.

1,612,186

L. E. GIBSON

POSTHOLE DIGGER

Filed April 5, 1926

4 Sheets-Sheet 2

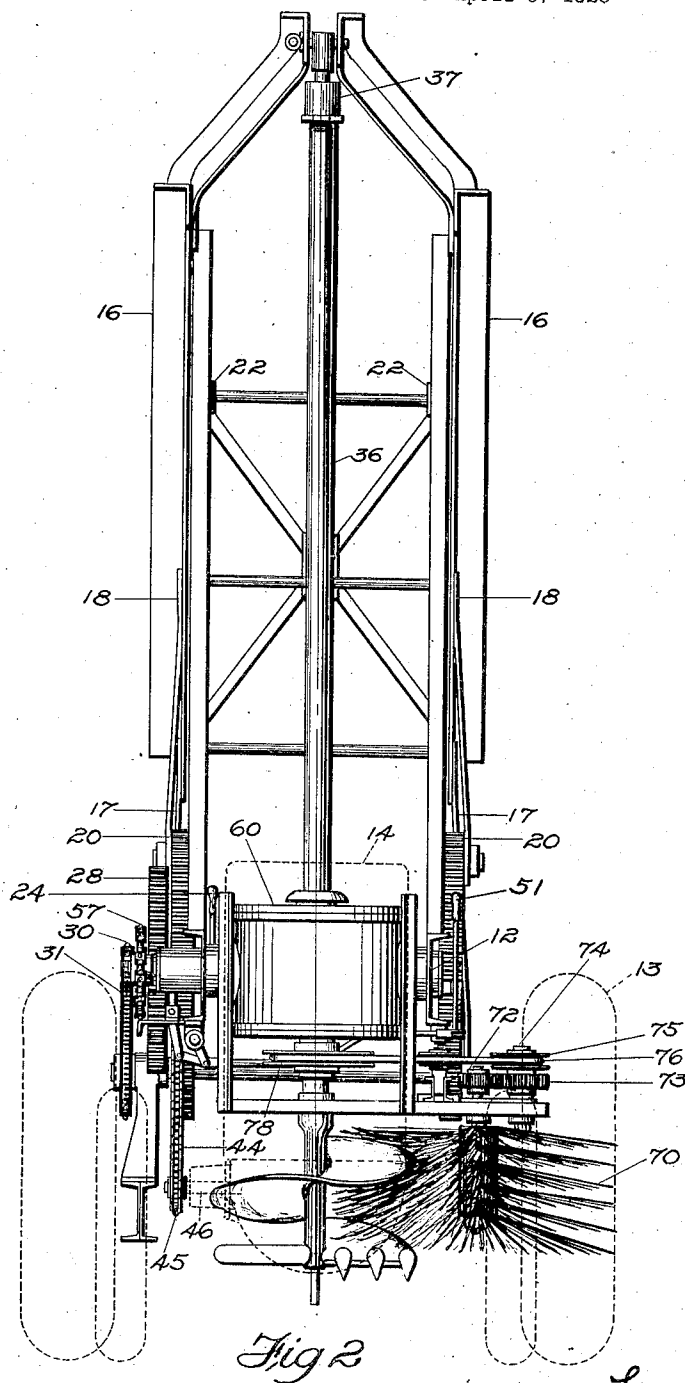


Fig 2

INVENTOR

BY

Leo E. Gibson
William M. Swan
ATTORNEY

Dec. 28 , 1926.

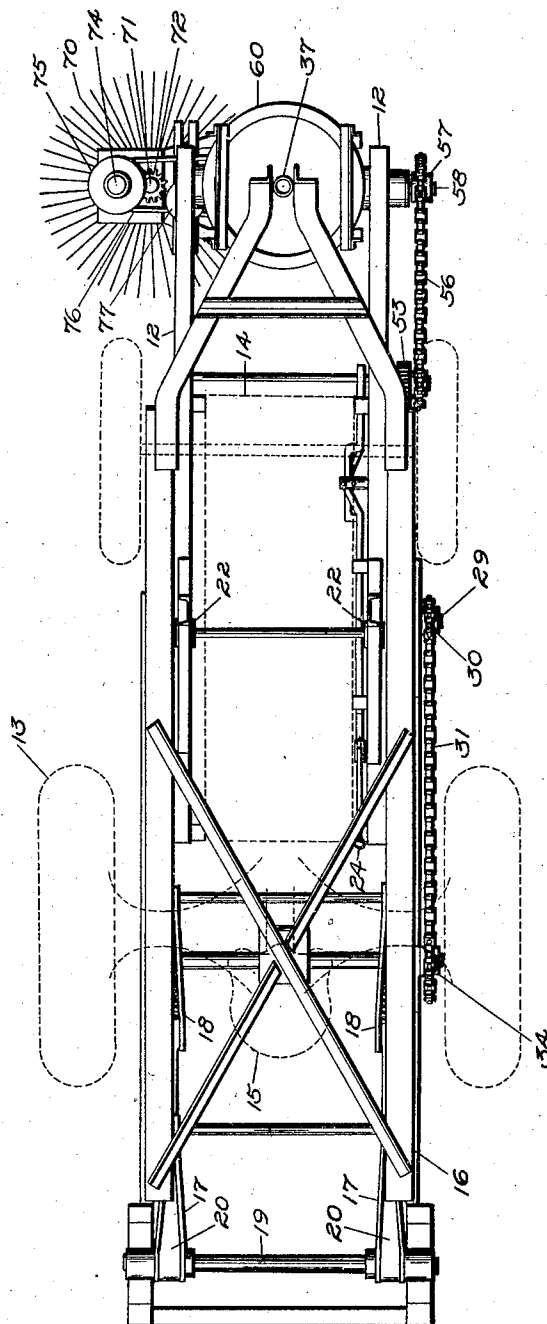
L. E. GIBSON

POSTHOLE DIGGER

Filed April 5, 1926

1,612,186

4 Sheets-Sheet 3



INVENTOR

Leo E. Gibson

William M. Swan
ATTORNEY

ATTORNEY

Dec. 28, 1926.

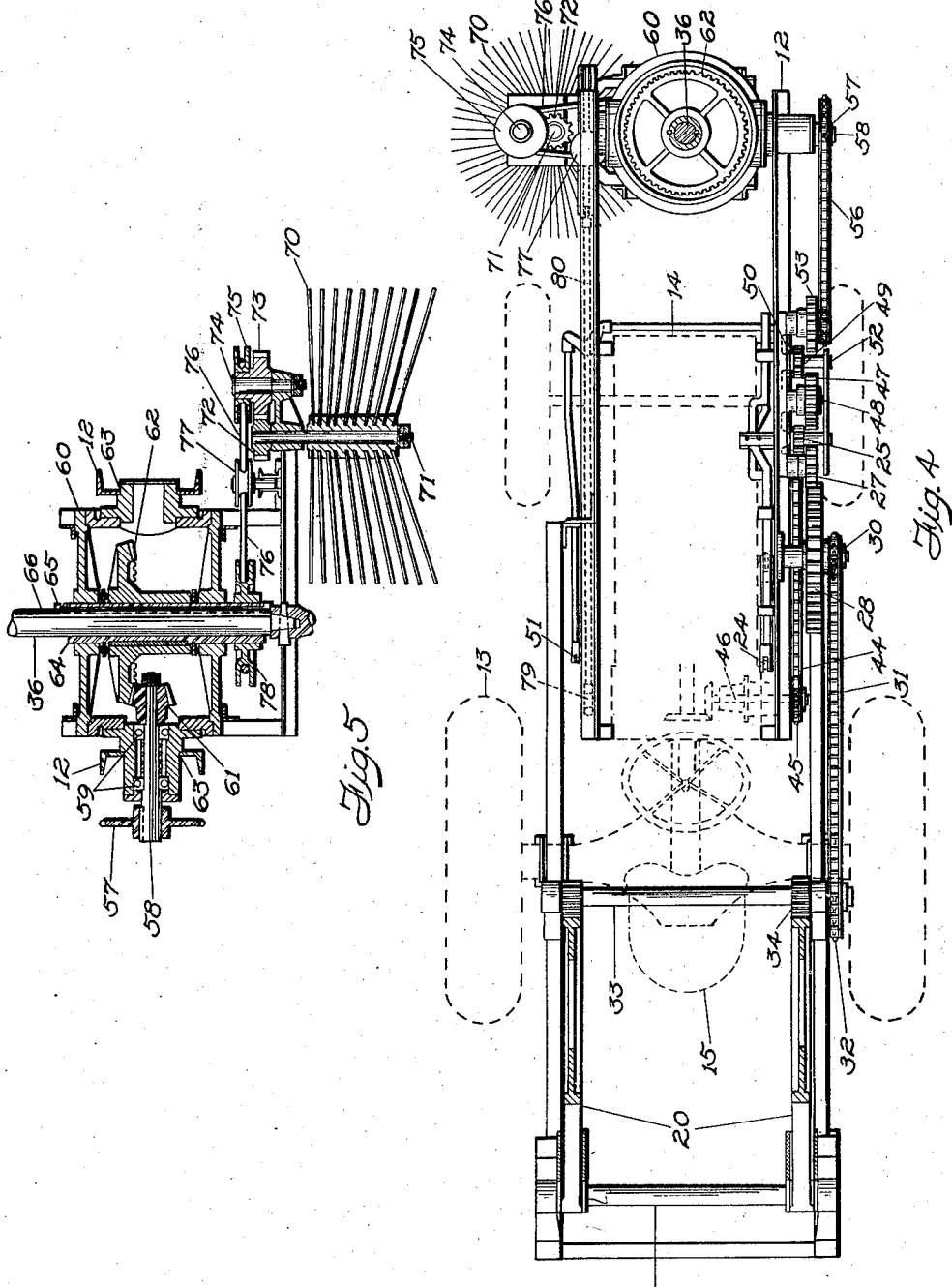
1,612,186

L. E. GIBSON

POSTHOLE DIGGER

Filed April 5, 1926

4 Sheets-Sheet 4



INVENTOR
Leo E. Gibson
BY William M. Swan
ATTORNEY

Patented Dec. 28, 1926.

1,612,186

UNITED STATES PATENT OFFICE.

LEO E. GIBSON, OF DETROIT, MICHIGAN.

POSTHOLE DIGGER.

Application filed April 5, 1926. Serial No. 99,706.

This invention relates to an earth boring machine, and has for its object an improved organization of parts by means of which post holes and the like may be easily and neatly bored in the ground at any selected location with a minimum handling of earth, and in consequence leaving the ground surrounding the hole when bored in its original firm and tightly packed condition, as contrasted with the relative looseness of the earth in case a larger hole is excavated, as by hand, with a subsequent attempt to manually repack the earth about the hole with sufficient firmness to hold it without resort to lateral guy wires.

In the drawings:

Figure 1 is a side elevational view of my improved construction.

Figure 2 is a front or end view.

Figure 3 is a plan view.

Figure 4 is a horizontal partly sectional view, taken along the line 4—4 of Figure 1, and looking in the direction of the arrows there shown.

Figure 5 is a partly sectional vertical elevation of the details of the auger-actuating and brush-rotating portions of the mechanism.

While any suitable or convenient type of chassis frame or engine may be employed in connection with the structural ideas herein disclosed, with modifications obvious to any one skilled in the art, it will be seen that I have illustrated my preferred construction in connection with the now well-known tractor and a suitable frame, whose parts are arranged in such a manner that all can be controlled and operated from a point within reach of the driver's seat, thus making my device especially a "one man" plant instead of requiring a crew of two or three, as in some of the prior devices with which I am familiar. Certain of these constructions as well embody principles of construction which are not only initially expensive, but which I have found in practice are likely to become clogged as the loosened earth is removed, and which if especially heavy downward pressure upon the boring blade is required to follow up the cutting movement thereof, involve more or less jamming and binding of the operative parts.

To avoid these difficulties, my device is made to embody with the tractor unit and its frame an over-engaging or over-reaching boom structure, from whose free end the

boring element is suspended for free rotation, and which by properly timed actuation of certain of the controls can be made to function efficiently both as a downwardly weighing element to assist the cutting movement of the auger blades, and as a medium for intermittently lifting the entire boring member, with what earth it has meantime loosened resting upon its blades, free and clear of the hole that has been cut in the ground, for removal of the loose earth therefrom in any desired manner, as for example, by means of the brush or sweep member, which I will hereinafter describe more fully.

In this construction 12 represents the chassis or tractor frame, 13 the traction wheels and 14 the tractor plant, whose several power-delivering mechanisms may all be controlled by levers positioned conveniently adjacent the driver's seat 15. Positioned generally lengthwise over the tractor frame, and pivoted to either side through its lower ends, is a boom or frame piece 16, from the free swinging or outer end of which the boring shaft 36 is suspended in position of free rotation by means of the swivel 37. Each of the side pieces of the frame 16 has pivotally connected with it, toward its opposite end from which the boring shaft is suspended, the top ends of a pair of links 17 and 18. The lower ends of the links 17 are journaled on the shaft 19, whereas the lower ends of the links 18 are pivotally connected to the upper edge of the quadrant 20, which is also carried on the shaft 19 in position for a limited up and down movement by the operation of actuating means which will be later described. It will thus be obvious from an inspection of the full line and dotted line positions of the boom 16 and the links 17 and 18 shown in Figure 1, that, as the quadrant is moved up and down, the boom will be swung accordingly, due to the fact that in its intermediate portion each side of the boom frame carries a roller 22, which engages in a curved channel guide 23, which rises on each side of the vehicle frame, thus constituting a moving or slidable pivot point cooperating with the action of the links 17 and 18 to throw the boom to any intermediate positions between the full line position and the dotted line position shown; the curvature of the guides 23 and the relative length and positioning of the links 17 and 18 is such that the point of suspension of the boring shaft moves in

a uniform and accurately vertical line as the boom is lowered, thus enabling the operator to bore an accurately vertical hole, and without resulting in any binding of the auger-rotating parts.

The raising and lowering of the quadrant 20 and the consequent actuation of the links 17 and 18 and the boom or frame 16 is regulatable through the medium of the hand-controlled lever 24, which is mounted on the chassis conveniently adjacent the engine 14, and by means of which one or the other of the idler pinions 25 and 26 may be thrown into or out of engagement with the idler wheel 27, whose teeth are uniformly in mesh with those of the larger gear wheel 28 mounted on the shaft 29. This latter carries, so as to rotate with it, the reducing sprocket wheel 30, over which passes the endless chain 31. This latter in turn passes about the sprocket wheel 32 which is mounted upon the shaft 33, which latter also carries the smaller reducing gear 34, which lies in a plane coincident with that of the quadrant 20, and in such position with respect thereto that its teeth mesh with teeth in the periphery thereof. The boom and its supported boring shaft may thus be raised or lowered under manual control as regards their speed and degree of movement, in unison with the boring action, and according to the speed with which the boring blades make their way down into the ground.

For the transmission of power to the boring blade, I make use of a series of gear members and endless chain elements, which directly or indirectly derive their actuation from the gear wheel 42, which is carried on the end of the shaft 41, which, as regards the boring operations, may be regarded as the main shaft. The main shaft of the engine itself is, however, shown at 46; on it is carried the sprocket wheel 45, which cooperate with the sprocket wheel 43 on the shaft 41 in carrying the endless chain 44, and thus operatively connecting both the boring and the lifting mechanism with the engine. The teeth of the gear wheel 42 (on the shaft 41) are always in mesh with those of the pinion 47, which is carried on the stud or cross shaft 48. The rotation of the pinion 47 in the direction shown by the small arrow in Figure 1 imparts rotative movement to the idler pinion 25 in case the latter is thrown into mesh therewith by suitable pull upon the hand lever 24; the teeth of this pinion 47, being in mesh with those of the pinion 42, the rotative movement thus communicated to it is in turn passed on to the idler pinion 49, whose meshing or otherwise with the pinion 47 is regulatable by means of the shifting collar 50 and its hand lever 51, to move the pinion 49 into and out of the plane of the pinion 47. The idler pinion 49 is preferably mounted upon the stud

52, carried in the chassis frame. The teeth of the idler pinion 49 mesh with those of the pinion 53, carried on the shaft 54, on which is also mounted the sprocket wheel 55, over which passes the endless sprocket chain 56, for the communication of rotative movement to the sprocket wheel 57, which is rotatably supported on the shaft 58 which passes through bearings 59 in the box or shell 60, whence its rotative movement is communicated to the shaft of the auger or boring member 36 by the bevel gears 61 and 62.

This box or shell 60 is carried on one end of the tractor frame 12, and being adequately housed in as regards the possible access of loose earth to its contained parts, the possibility of clogging from this source is reduced to a minimum. The auger shaft 36, however, extends movably therethrough, being operatively connected with the sleeve 64, which moves with the bevel gear 62, by means of the key 65 operating in the longitudinal keyway 66, which extends far enough up toward the swivel-supported upper end to permit of the shaft receiving rotative actuation from the gear box parts at any point along a longitudinal distance equal to the expected depth of the bore that it is desired to cut in the earth. Preferably, though not necessarily, the box 60 is connected with the frame 12 pivotally, as by mean of the transversely extending shaft 67, so that for convenience and avoidance of injury to the boring blade while the apparatus is being moved from one location to another the box and auger may be tilted at an angle, thus adequately raising the top of the blade above the surface of the ground.

When the operator, by pull upon the lever 51, starts the rotative and consequently earth-cutting movement of the auger he also actuates the boom-regulating lever 24, thus starting the cooperative action of the quadrants 20 and the links 17 and 18, in a way to cause downward or weighing pressure by the boom upon the shaft of the auger 36 coaxially thereof, thus aiding the downward cutting action of the blades into the earth. When the hole has been bored to the desired depth, or to such portion thereof as has resulted in the accumulation about the boring blade of a considerable quantity of loose earth, the further rotative movement of the boring shaft is temporarily halted by suitable actuation of the hand lever 51, and at the same time the downwardly weighing pressure of the boom 16 is terminated by a pull upon the lever 24, causing the mechanism already described to swing the boom upwardly, but thanks to the cooperation of the links 17 and 18 and the curved channel guides 23, in such a way as not to disturb the axial position of the shaft of the auger 36 with respect to the gear box 60, thus leaving

ing the shaft of the boring member 36 free to respond to the upward pull of the boom and moving smoothly through the sleeve 64 within the gear box.

When the boring member has been thus raised sufficiently so that its spiral boring blade and its now supported filling of loosened earth is raised to the proper height, the earth may then be removed, clear of the bore in the ground in any desired manner. To further carry out the idea of a "one man" operation of the device, I have provided for this blade-clearing purpose a rotatable sweep or brush 70, positioned at one side of the blade with its supporting shaft 71 rotatably supported in vertical position. The upper end of this shaft 71 carries a gear wheel 72, whose teeth mesh with those of the gear wheel 73 which is rotatably mounted on the shaft 74. Also fixed upon or attached to one face of the gear wheel 73 is a pulley 75, over whose periphery passes the endless belt 76, which passes as well over the idler 77 and also about the periphery of the pulley 78, which is carried upon the sleeve 64, and after the boring member has been raised, as already described, the auger may again be started rotating by pull upon the lever 51, thus causing all portions of the boring blade upon which the loose earth rests to be presented to similarly timed sweeping action of the brush 70, and resulting in the removal of the loose earth far enough away from the vicinity of the bore in the ground so that it will not clog further digging operations. During the auger's rotative or digging movement, as well as when the auger is inactive, the brush is of course not in use. As soon, however, as the entire auger or boring element has been raised from the partially finished bore in the earth by the lifting action of the boom 16, the normally loose and inactive endless belt 76 is tightened by pull of the operator's hand upon the lever 79, with which the link 80 is connected, and the rotative or blade-clearing movement of the brush is begun. This being followed by the lowering of the boom, and consequently of the auger, and by starting its rotation once more through the successive actuation of the levers 24 and 51 respectively, the digging of the hole in the earth to a further depth may be resumed.

What I claim is:

1. An earth-boring machine, having, in combination with a supporting frame, a link-supported boom member adjustably positioned thereover, fixed guide pieces with which an intermediate portion of said boom member is slidably connected, a boring member rotatably suspended from the free end of said boom member in uniformly vertical position, its axial position being unaffected by the link-actuated movements of said

boom, a power plant carried by said frame, means for regulatably communicating actuation from said power plant to the link connections of said boom, and means for regulatably connecting said power plant with the boring member to effect its boring rotative movement.

2. In an earth-boring machine, the combination, with a supporting tractor frame, of a power plant carried thereby, a boom member positioned lengthwise over said frame, a pair of guide members with which the central portion of the boom member has roller connections, link members operatively connected with one end of said boom member for effecting a swinging movement thereof cooperatively with its sliding engagement with said guide members, means for regulatably transmitting actuation from the power plant to said link members and thus to said boom member, a rotatable boring member suspended from the free end of said boom member, and means for selectively connecting said boring member and said power plant for the operative actuation of said boring member.

3. In an earth-boring machine, in combination with a tractor frame, a power plant mounted thereon, selective means for operatively connecting said power plant with a plurality of driven elements, a link-supported boom member positioned over said frame, laterally positioned guide members with which said boom member is slidably connected, adapted to cooperate with said link members in regulating the actuated swing of the boom member, a boring member rotatably supported from the free end of said boom member in uniform axial position regardless of the swing of the boom member, and means for transmitting rotative movement to said boring member from one of said selective connections with said power plant.

4. In an earth-boring machine, in combination with a tractor frame, an engine mounted thereon, selective power-transmitting connections through which said engine may deliver its power to either of a plurality of elements to be driven, a vertically positioned boring member adapted to be rotatively actuated from said engine, a link-supported boom member positioned over said chassis, from whose free end said boring member is rotatably supported, laterally positioned guide members adapted to cooperate with the supports of said boom member in regulating the upward and downward movement of said boom member, whereby the axial position of said boring member is protected against change during the working movements of said boom member, and means for regulatably connecting the supports of said boom member with said engine to effect the desired actuation of the

boom member relatively to the work in progress.

5. In an earth-boring machine, the combination of a supporting chassis, a link-supported boom positioned thereover, laterally positioned guide members with which said boom has a slidable engagement, adapted to cooperate with the link members in guiding the swing of the boom in a vertical plane, a boring member rotatably supported from the free end of said boom, a power plant carried by said chassis, and selective power-transmitting means whereby the actuative power of the engine may be distributed to the traction elements of the vehicle, to the boom, or to the boring member.

6. In an earth-boring mechanism, the combination, with a tractor frame, of an engine carried thereby, a plurality of link members supported by said frame in position of potential swing in a vertical plane, a boom member supported by said link members, stationary guide members with which said boom member is slidably connected and whereby, in cooperation with said link members, the possible movement of said boom member is regulated, a rotatable boring member suspended from said boom in uniformly vertical position, a normally inactive brush member adapted to rotatively engage the upraised blade of the boring member to effect the clearance therefrom of the earth loosened by its boring action, and a plurality of selectively actuatable operative connections between said engine and the several movable elements whereby its actuative movement may be transmitted to them when and to the degree required.

7. In an earth-boring mechanism in combination with a power plant and tractor frame carrying the same, a boom member adjustably positioned superiorly of said

frame, a boring member rotatably supported from said boom member adjacent one end of the frame, normally inactive means whereby the power plant may be operatively connected with said boring member, and means fixedly supported on either side of said boom member and with which said boom member is slidably connected for regulatably varying the position of said boom member relatively to the frame as the action of the boring member progresses, without impairment of the axial position of the latter relatively to the frame and to the earth location being worked upon.

8. In an earth boring mechanism, the combination, with a tractor frame and a power plant carried thereby, of a boom member positioned thereabove, means connectible with the power plant for varying the angular position of the boom member, a boring member rotatably supported from the free end of said boom member in axially vertical position adjacent an end of the vehicle chassis, means supported by said tractor frame and with respect to which said boom member is operatively connected whereby its actuated angular swing effects no variation in the axial position of the boring member, means connectible at will with the power plant for effecting the rotative actuation of said boring member at any point in its path of vertical travel, and normally inactive means positioned at one side of the axial location of the boring member whereby the blades of the latter may be cleared of loose earth when the same is raised to the upper portion of its axial path of travel.

In testimony whereof, I sign this specification.

LEO E. GIBSON.