Dec. 22, 1931. J. F. BERRY 1,837,753

EXCAVATING GRADER

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FIG. 1.

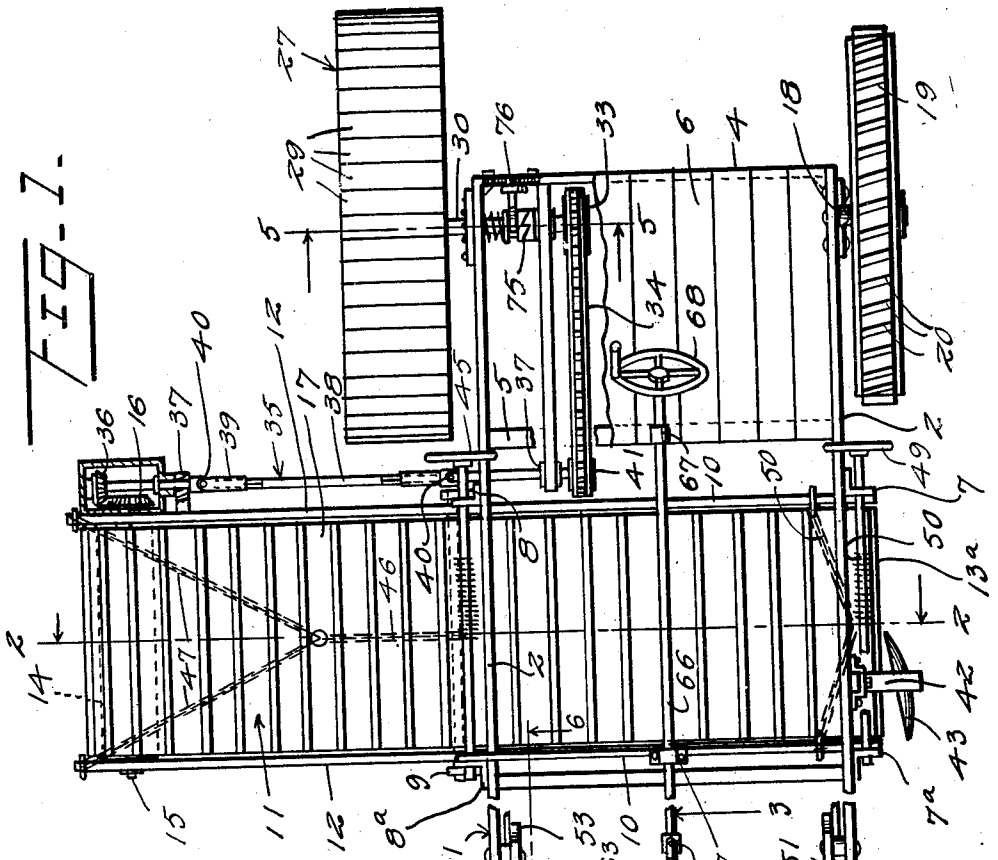
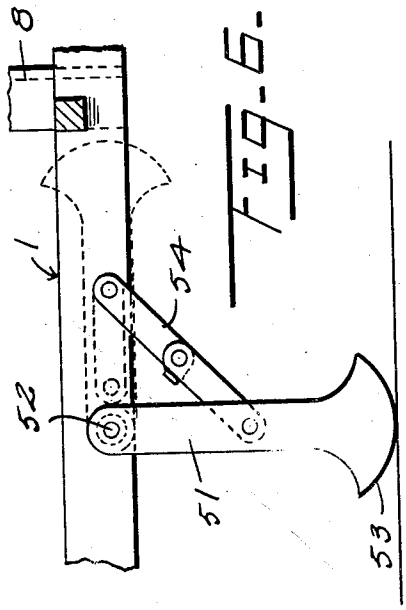


FIG. 6.



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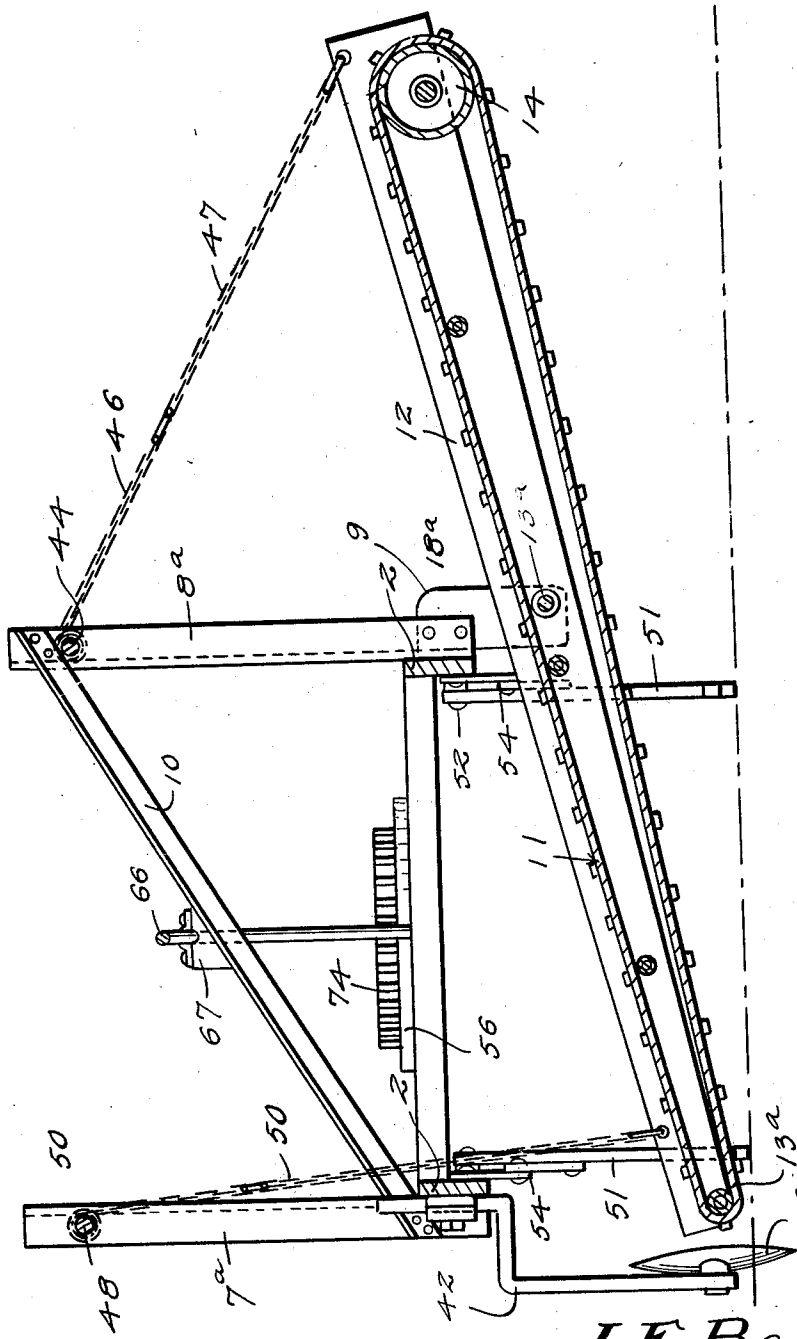


FIG. 2.

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Fig. 4.

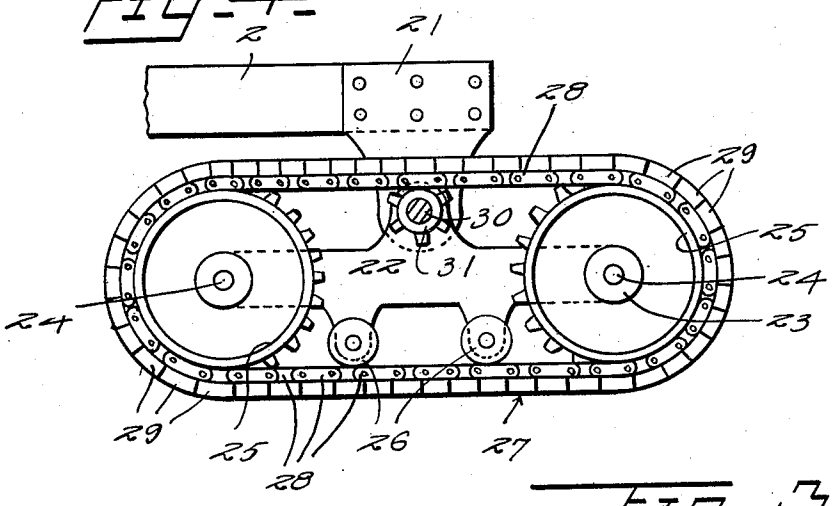


Fig. 3.

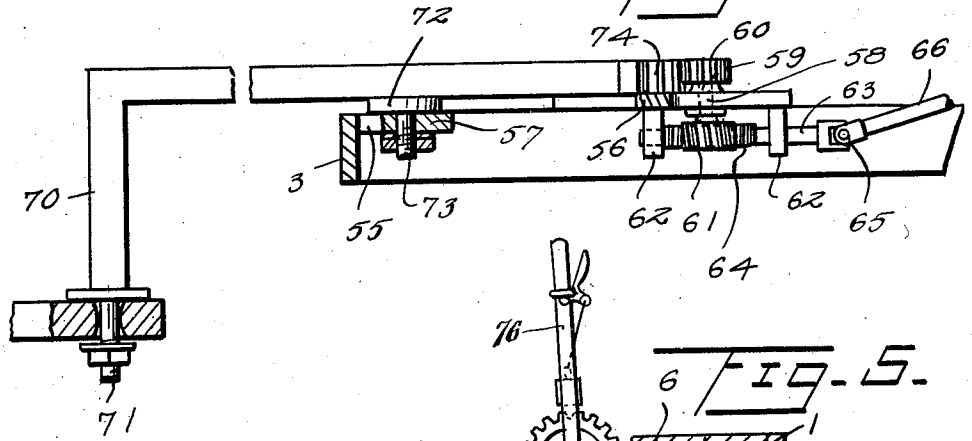
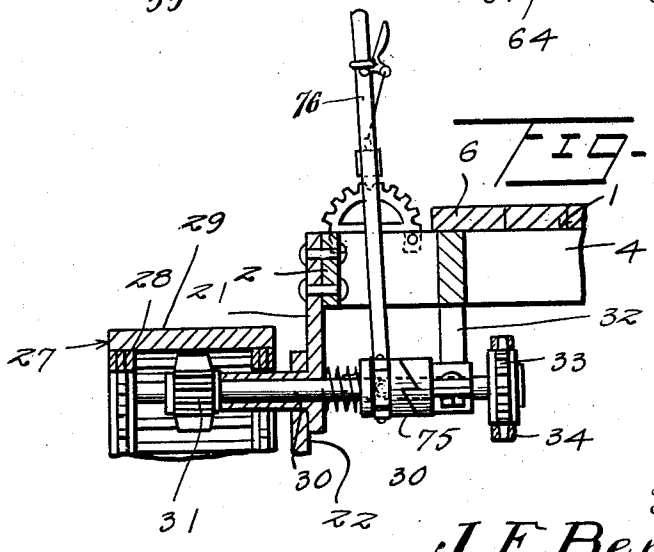


Fig. 5.



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UNITED STATES PATENT OFFICE

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EXCAVATING GRADER

Application filed November 2, 1929. Serial No. 404,420.

This invention relates to grading machines, more particularly elevating graders wherein earth is deposited upon a conveying element as it is loosened so that it will be carried to and dumped in a spot remote from the machine structure.

The primary object of the present invention is to provide an improved means for operating the dirt conveyor so that a positive steady drive of the same will be maintained at all times during the movement of the machine over the ground.

In graders of the type at present employed where ground engaging elements are used for imparting driving motion to the elevators, wheels mounted upon the frame of the machine are employed some of which wheels are equipped with ground engaging cleats with a view to preventing slipping of the wheel. However, such a driving means is found inefficient where the wheel passes over soft muddy or sandy ground as traction is not obtained and consequently the dirt conveyor or elevator fails to operate as necessary to the proper working of the machine.

The object therefore of the present invention is to provide means whereby a steady supply of power will be delivered to the dirt conveyor in accordance with the speed of the machine and this object is accomplished through the provision of an endless ground engaging element of the type commonly known as a caterpillar wheel or tread.

Another object of the invention is to provide an improved means for controlling or steering an excavating grader while the same is being drawn by a tractor or other machine.

A still further object of the invention is to provide an excavating grading machine of simple but strong and durable construction and designed to give efficient service under any condition.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:—

Figure 1 is a view in top plan of the excavating grader embodying the present invention.

Figure 2 is a transverse sectional view taken upon the line 2—2 of Figure 1.

Figure 3 is a sectional view taken substantially upon the line 3—3 of Figure 1.

Figure 4 is a view in elevation of the caterpillar tread used for operating the conveyor.

Figure 5 is a sectional view taken upon the line 5—5 of Figure 1.

Figure 6 is a sectional view taken upon the line 6—6 of Figure 1.

Referring more particularly to the drawings wherein like numerals of reference indicate corresponding parts throughout the several views, the numeral 1 indicates generally the frame of the grader structure embodying the present invention, this frame comprising as shown a pair of side beams 2 arranged in spaced parallel relation and brought together at their front ends to form the substantially semi-elliptical forward end portion 3, the rear ends of the beams being connected by a cross member 4. At a point forwardly of the rear member 4 a second cross beam 5 is mounted between the side beams 2 and from this second cross beam to the rear of the machine a platform 6 is constructed upon which an operator of the machine may stand for the control of the various manipulating wheels necessary for guiding the machine and for placing the plow and the elevator of the structure.

At each side of the frame adjacent the forward edge of the platform 5 there are mounted the upright beams 7 and 8 and forwardly of each of these beams are placed similar upright beams 7*a* and 8*a*. The beams 8 and 8*a* which are upon the same side of the machine are extended downwardly as shown a substantial distance below the machine frame and each carries adjacent its lower end a bearing 9.

Suitable cross bracing beams 10 are pro-

vided which extend transversely of the frame connecting the beams 8 and 8*a* with the adjacent beams 7 and 7*a* respectively.

Arranged transversely of and beneath the frame 1 is a conveyor element indicated as a whole by the numeral 11. This conveyor comprises the side panels 12 each of which is provided intermediate its ends with a stub shaft 13 which is mounted in a bearing 9 so that the conveyor is oscillatably suspended beneath the frame as shown, one end thereof, which end is normally in close proximity to the ground, being disposed beneath that side of the frame upon which the upright beams 7 and 7*a* are mounted.

At the lower end of the conveyor there is rotatably mounted between the side members or panels 12 a rotatable drum 13*a* while at the other end the panels support therebetween a similar drum 14 carried upon a shaft 15 which extends at the end adjacent the rear of the frame beyond the adjacent panel 12 and carries thereon a bevel gear 16. Passing over and connecting the drum 13*a* and 14 is the endless belt 17 of the conveyor upon which dirt excavated by the plow carried by the machine is thrown and carried to a point remotely positioned from one side of the excavator.

At the plow side of the machine frame, that is the side adjacent which the lowest end of the conveyor is located, the rear portion of the side beam 2 has secured thereto a stub axle 18 upon which is mounted a supporting wheel 19 the peripheral face of which is provided with ground engaging cleats 20 in the manner shown.

At the opposite side of the frame which may be referred to as the discharge side, the beam 2 has secured thereto a relatively heavy bearing bracket 21 which bracket supports a traction wheel carrying beam 22 which extends longitudinally of the frame beam in the manner shown, this traction wheel carrying beam having a bearing 23 at each end in which the axle 24 of a toothed endless tread supporting wheel 25 is mounted. The beam 22 it will thus be seen carries a pair of the toothed wheels 25 arranged in tandem and disposed between and in tandem with these wheels is a pair of idling rollers 26 rotatably supported from the lower edge of the beam 22 so that their peripheries are in the same plane at their lowest points as the wheels 25.

Connecting the toothed wheels 25 is an endless tread 27 which is of the type made up of a series of units consisting of side links 28 connected by cross members 29, the ends of the side links of one unit being pivotally connected with adjacent ends of the links of forwardly and rearwardly disposed units. This tread as shown passes beneath the idler rollers 26 which serve to maintain the tread in firm contact with the ground.

Extending through the bearing 21 and transversely through the adjacent beam 2 of the grader frame is a shaft 30 the outer end of which is disposed beneath the upper portion of the tread 27 and carries a toothed wheel 31, the teeth of which are engaged by the cross elements 29 of the tread so that when the tread moves about the wheels 25 rotary motion will be imported to the wheel 31 and the shaft to which it is attached.

The inner end of the shaft 30 which is within the frame 1 is supported in a suitable bearing 32 and carries thereon a sprocket wheel 33 which has passing thereover a sprocket chain 34. A shaft 35 extends from a point within the frame 1 adjacent the rear edge of the conveyor 11 to the upper end thereof, carrying upon its upper end a gear 36 which is in mesh with the gear 16 of the conveyor belt pulley supporting shaft 15. Suitable bearings 37 are arranged at proper points on the adjacent conveyor panel and on the supporting frame 1 for maintaining the shaft 35 in position and outwardly of the frame 1 the shaft is made up of a series of separate units which comprise an intermediate portion 38 connected at its ends with the fixed portions of the shaft by means of the sleeves 39 which are joined to the fixed portions of the shaft by universal connections 40. With this construction the conveyor may be oscillated without interferring with the transmission of power to the belt driving drum 14. At its lower or inner end the shaft 35 carries a sprocket wheel 41 over which the chain 34 passes so that power may be transmitted from the shaft 30 when the machine is in motion.

Upon the plow side of the machine frame one or more plow beams may be secured as indicated at 42 each carrying at its lower end a disk or other suitable type of plow 43. This plow 43 is arranged relatively closely to the lower end of the conveyor 11 so that earth thrown inwardly thereby will be deposited upon the conveyor for transmission to the upper or discharge end thereof.

Extending longitudinally of the frame and mounted between the beams 8 and 8*a* is a shaft 44, that end adjacent the platform 6 carrying a hand wheel 45.

This shaft has secured thereto one end of a chain 46 which is divided to form two portions 47 at its outer end each of which portions is attached to the outer end of the conveyor in the manner shown. The beams 7 and 7*a* also have supported therebetween a shaft 48 which carries upon the end adjacent the platform 6 a hand wheel 49 and this shaft has attached thereto one end of an elevator controlling chain 50 the other end being attached at suitable points to the underlying end of the elevator or conveyor. By means of the controls 45 and 49 the inclination of the conveyor may be regulated, the control 45 being employed for pulling up the outer end

of the conveyor to lower the inner end to the ground while the control 49 may be employed for lifting the inner end thereof.

Forwardly of the conveyor 11 the frame 1 has secured to each side beam 2 thereof a supporting leg 51 the connection of the upper end of each leg with its frame beam being pivotal as indicated at 52, the lower end of each leg being relatively broad as at 53 to provide a substantial supporting surface. The hinged bracket 54 connects each of the legs with its supporting beam so that when the leg is lowered it will be held rigidly in position thereby.

At the forward end of the frame 1 there is mounted a bearing block 55 and extending across between the sides of the portion 3 is an arcuate plate 56 which is concentric with a bolt opening 57 formed in the bearing block 55. Intermediate its ends the arcuate plate 56 is formed to provide a bearing 58 in which is mounted in vertical position a stub shaft 59 upon the upper and lower ends of which are the gears 60 and 61.

Bearings 62 arranged on opposite sides of the lower gear 61 support a worm shaft 63 carrying a worm 64 which is in mesh with the gear 61 and the rear end of the shaft 63 is connected by a universal coupling 65 with a steering shaft 66 which extends rearwardly over the rear one of the beams 10 upon which it is mounted in a bearing 67. This steering shaft carries upon its rear end a hand wheel 68 by means of which an operator standing upon the platform 6 of the machine may control the steering of the same.

For the connection of the grader machine with a suitable pulling device such for example as a tractor there is provided a tongue 69 which is turned downwardly at its forward end as indicated at 70, the terminal of the down turned portion being provided with a suitable pin 71 for connecting the tongue with the hitch of a tractor. Intermediate its ends the tongue 69 is provided with a wear plate 72 and a central pin 73 the pin being adapted for extension through the aperture 57 in the bearing block 55 so that the rear end of the tongue will be located over the arcuate plate 56. This rear end of the tongue 69 carries a gear segment 74 which is of the same curvature as the plate 56 upon which it rides when the tongue is oscillated about its pivot 73. This ear segment has teeth upon the convex edge which mesh with the gear 60 supported by the plate. From this description it will be readily seen that when an operator rotates the steering shaft 66 the tongue 69 will be caused to swing relative to the longitudinal center of the frame so that the forward end thereof will be forced to move in the desired path.

In order to stop the operation of the conveyor when desired during the movement of the grader machine the shaft 30 may be provided with a clutch 75 preferably of the jaw type, this clutch being adapted to be actuated by the provision of a control lever 76 mounted upon the platform 6 at a point within reach of the operator.

From the foregoing description it will be readily seen that by providing an excavating grader with a caterpillar drive for the elevator or dirt conveyor thereof positive actuation of the conveyor at all times will be assured irrespective of the nature of the ground in which the machine is working. When the grader is uncoupled from the machine employed for towing it the supporting feet 51 may be lowered so that the forward end thereof will be maintained elevated with relation to the ground, it of course being understood that when the machine is in operation these feet are swung up out of the way.

Having thus described my invention, what I claim is:—

1. In an excavating grader employing a dirt conveyor and designed to be moved about by a draft vehicle, and a ground engaging and ground driven caterpillar tread structure coupled with the conveyor for driving the same.

2. In an excavating grader, a frame structure, a conveyor carried by the frame, means arranged to throw earth upon the conveyor, a caterpillar tread mechanism and driven through contact with the earth, and carried by and assisting in the support of the frame, and means connecting said mechanism with the conveyor for driving the same.

3. In an excavating grader, a frame structure, a ground engaging supporting wheel for the frame, a ground engaging caterpillar tread supporting the frame and driven through engagement with the ground, a conveyor carried by the frame for conducting earth to one side thereof, and drive means connecting the caterpillar tread with the conveyor for the operation of the latter thereby.

4. In an excavating grader, a frame structure, a ground engaging supporting wheel for the frame, a ground engaging caterpillar tread supporting the frame and driven through engagement with the ground, a conveyor carried by the frame for conducting earth to one side thereof, drive means connecting the caterpillar tread with the conveyor for the operation of the latter thereby, and means for oscillating the conveyor for raising or lowering one end thereof relative to the ground.

5. In an excavating grader, a frame structure adapted to be connected at one end to a draft mechanism, means for supporting the other end of the frame comprising a wheel rotatably mounted at one side thereof and a caterpillar tread mounted upon the other side, a shaft carried by the frame, means for coupling said shaft with said tread for transmitting power therefrom to the shaft, a con-

veyor structure carried by the frame, a driving shaft for the conveyor, and means for coupling said conveyor driving shaft with the first mentioned shaft.

6. In an excavating grader, a frame structure adapted to be connected at one end to a draft mechanism, means for supporting the other end of the frame comprising a wheel rotatably mounted at one side thereof and a caterpillar tread mounted upon the other side, a shaft carried by the frame, means for coupling said shaft with said tread for transmitting power therefrom to the shaft, a conveyor structure carried by the frame, a driving shaft for the conveyor, means for coupling said conveyor driving shaft with the first mentioned shaft, and means for oscillating said conveyor for raising or lowering one end thereof relative to the ground, said conveyor drive shaft being jointed to permit oscillation thereof without interrupting transmission of power thereto.

7. An excavating grader comprising a frame structure adapted for connection at one end to a draft device, a supporting wheel rotatably attached to one side of the frame at the other end thereof, a bearing carried at the opposite side of the frame from said supporting wheel, a beam carried by said bearing and extending longitudinally of the frame, a pair of toothed wheels carried by said beam, an endless tread carried by the wheels, a shaft supported by said frame and extending through said bearing, means for coupling one end of the shaft with said tread for imparting rotation thereto from the tread, a conveyor carried by the frame, and means for transmitting power from said shaft to said conveyor.

8. An excavating grader comprising a frame structure adapted for connection at one end to a draft device, a supporting wheel rotatably attached to one side of the frame at the other end thereof, a bearing carried at the opposite side of the frame from said supporting wheel, a beam carried by said bearing and extending longitudinally of the frame, a pair of toothed wheels carried by said beam, an endless tread carried by the wheels, a shaft supported by said frame and extending through said bearing, means for coupling one end of the shaft with said tread for imparting rotation thereto from the tread, a conveyor carried by the frame, means for transmitting power from said shaft to said conveyor, said conveyor being mounted to extend transversely of the frame at an inclination and having its lower end disposed beneath one side of the frame, and means adjacent the lower end of the conveyor for turning earth thereonto.

In testimony whereof I hereunto affix my signature.

JOHN FRANKLIN BERRY.