March 3, 1936. R. L. BROWN 2,032,911

EXCAVATING MACHINE

Filed Oct. 26, 1933 5 Sheets-Sheet 1

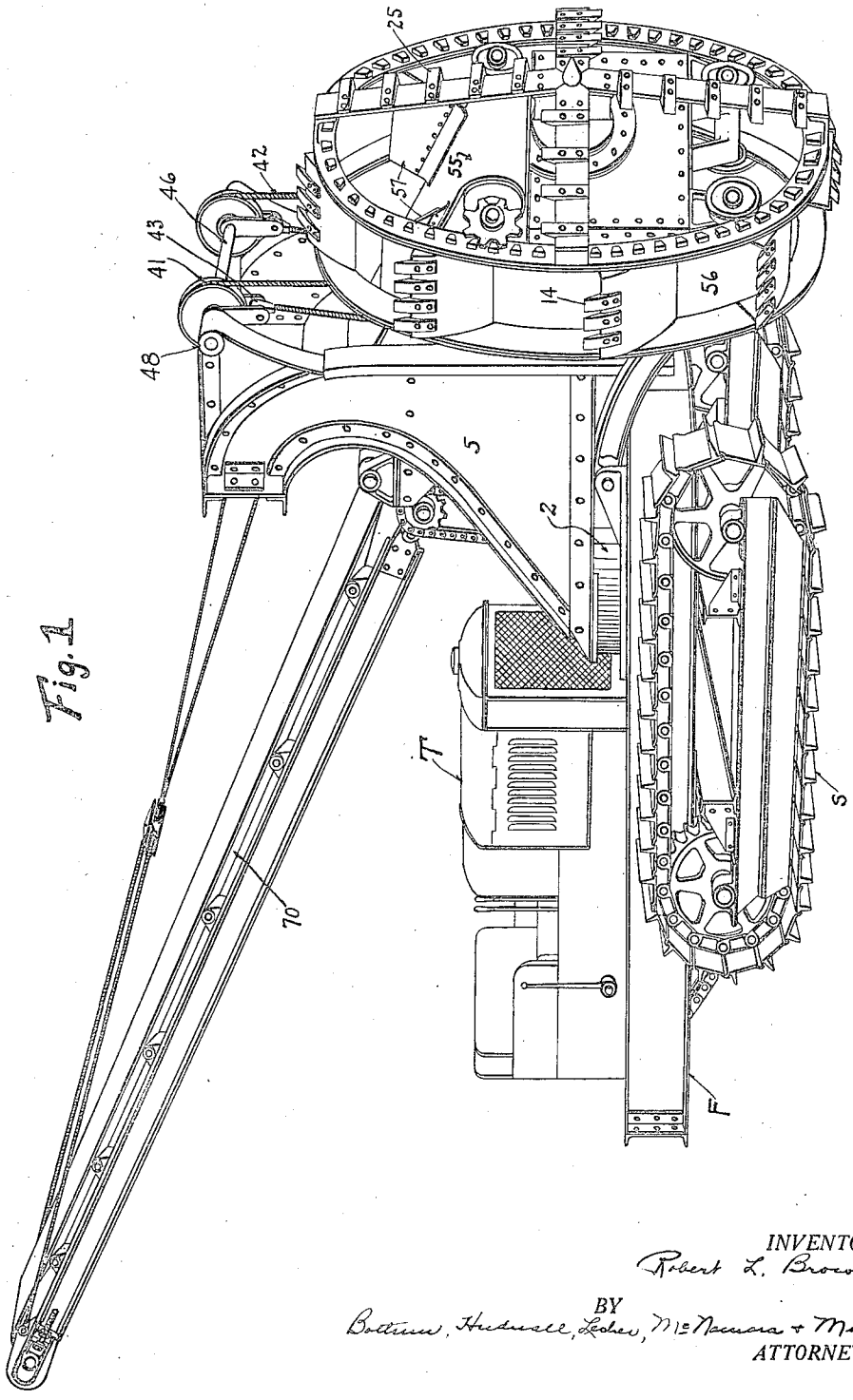

Fig. 1

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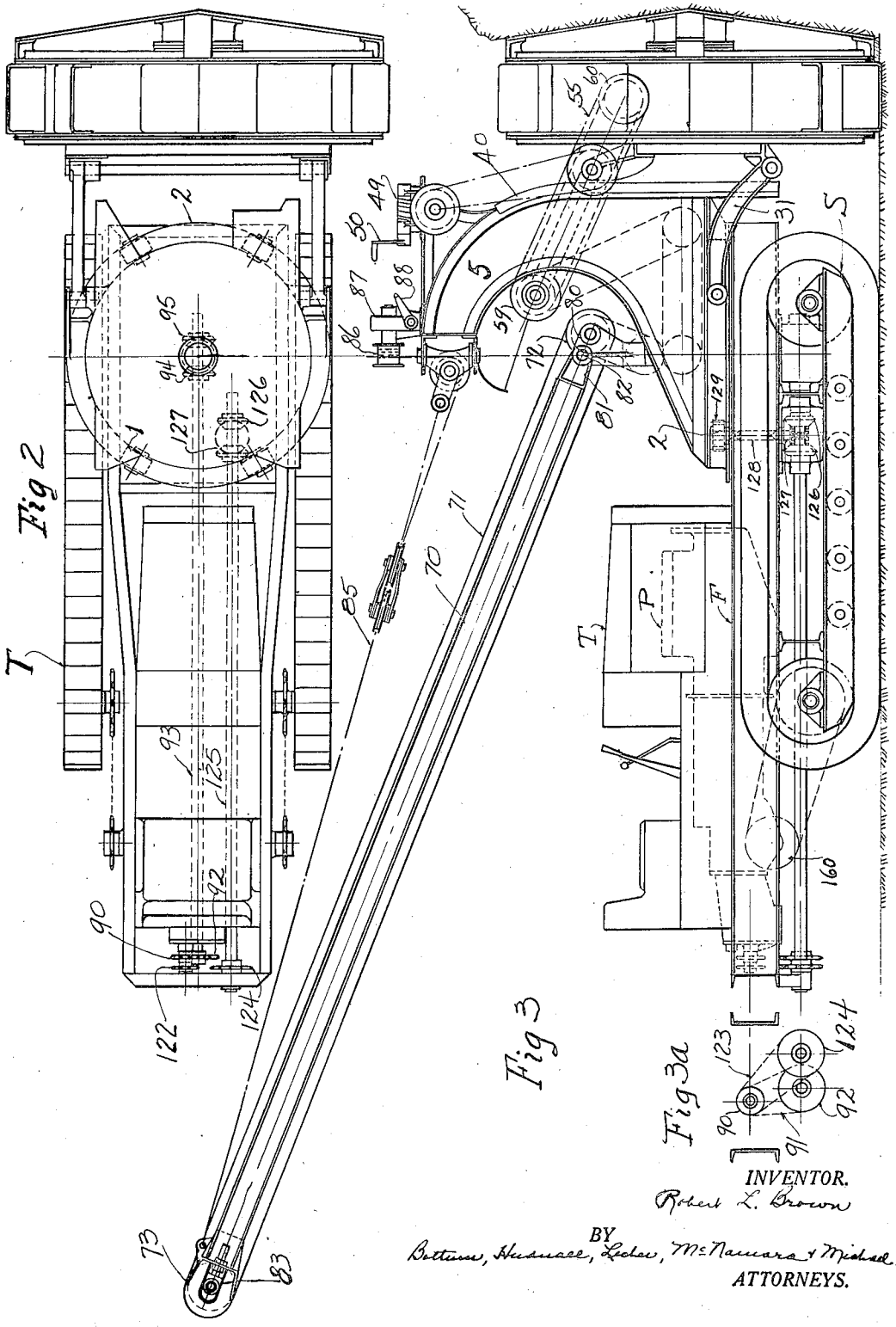
EXCAVATING MACHINE

Filed Oct. 26, 1933 5 Sheets-Sheet 2



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EXCAVATING MACHINE

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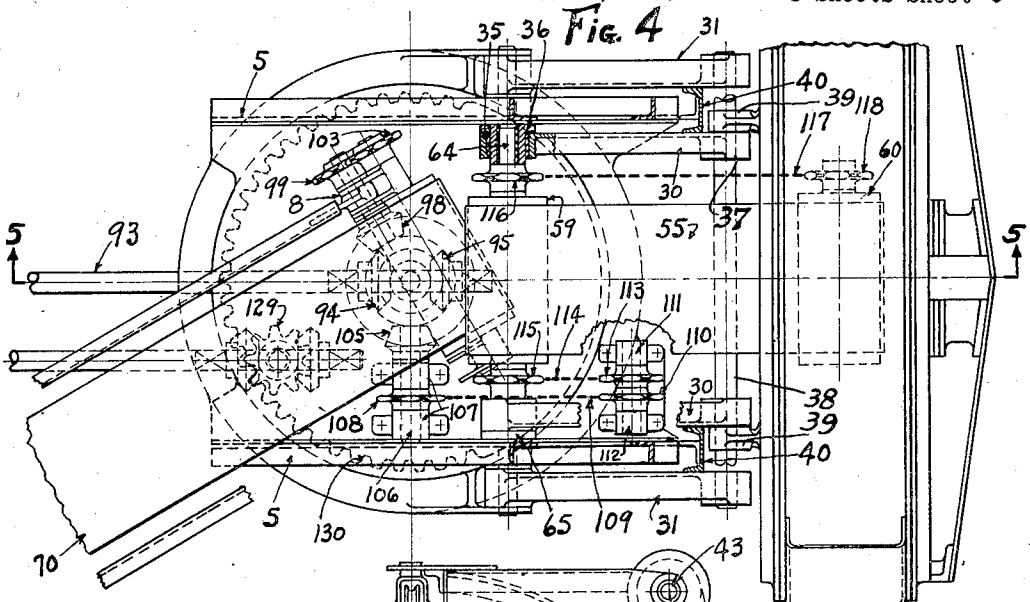
Fig. 4



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EXCAVATING MACHINE

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Fig 6

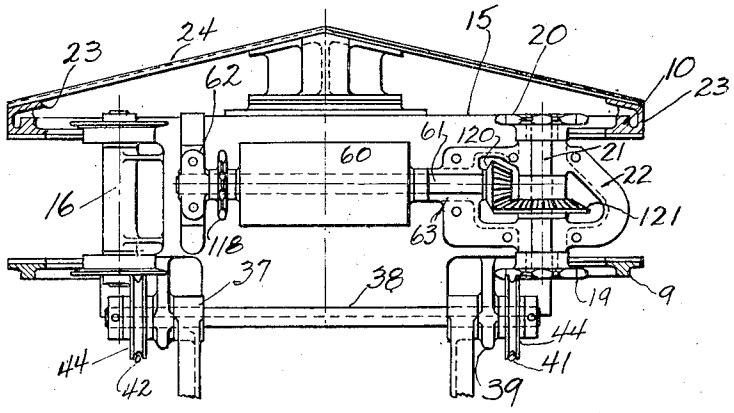


Fig. 6A

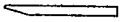


Fig. 7

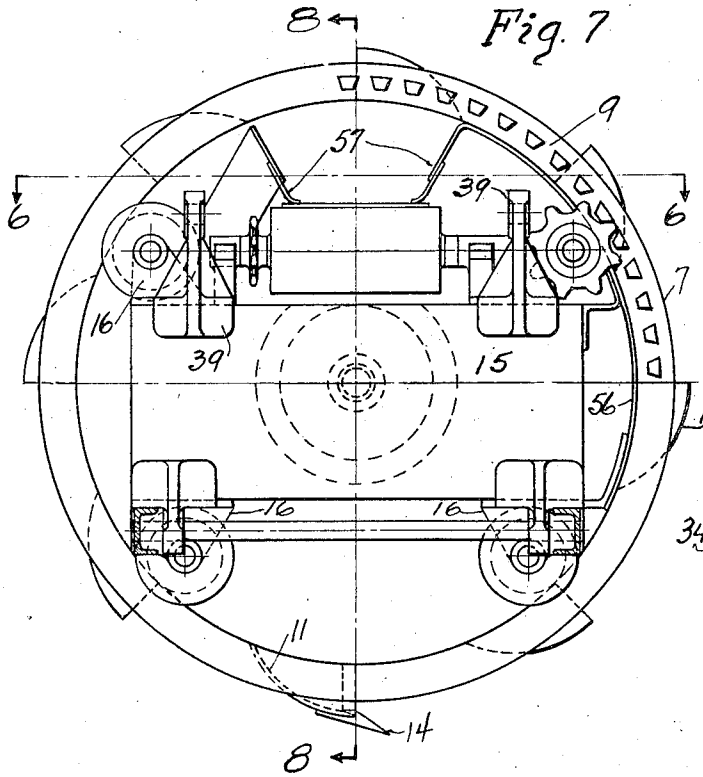
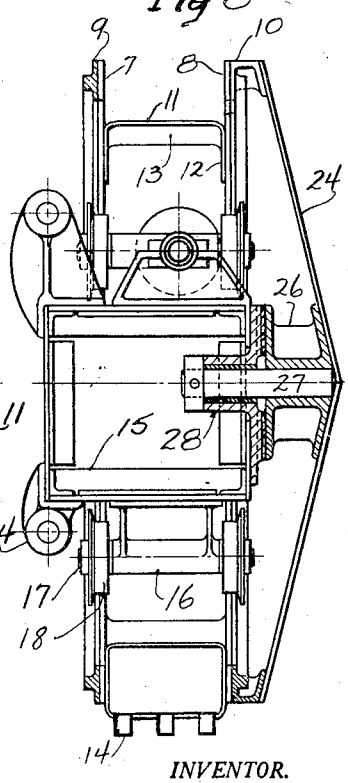


Fig 8



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EXCAVATING MACHINE

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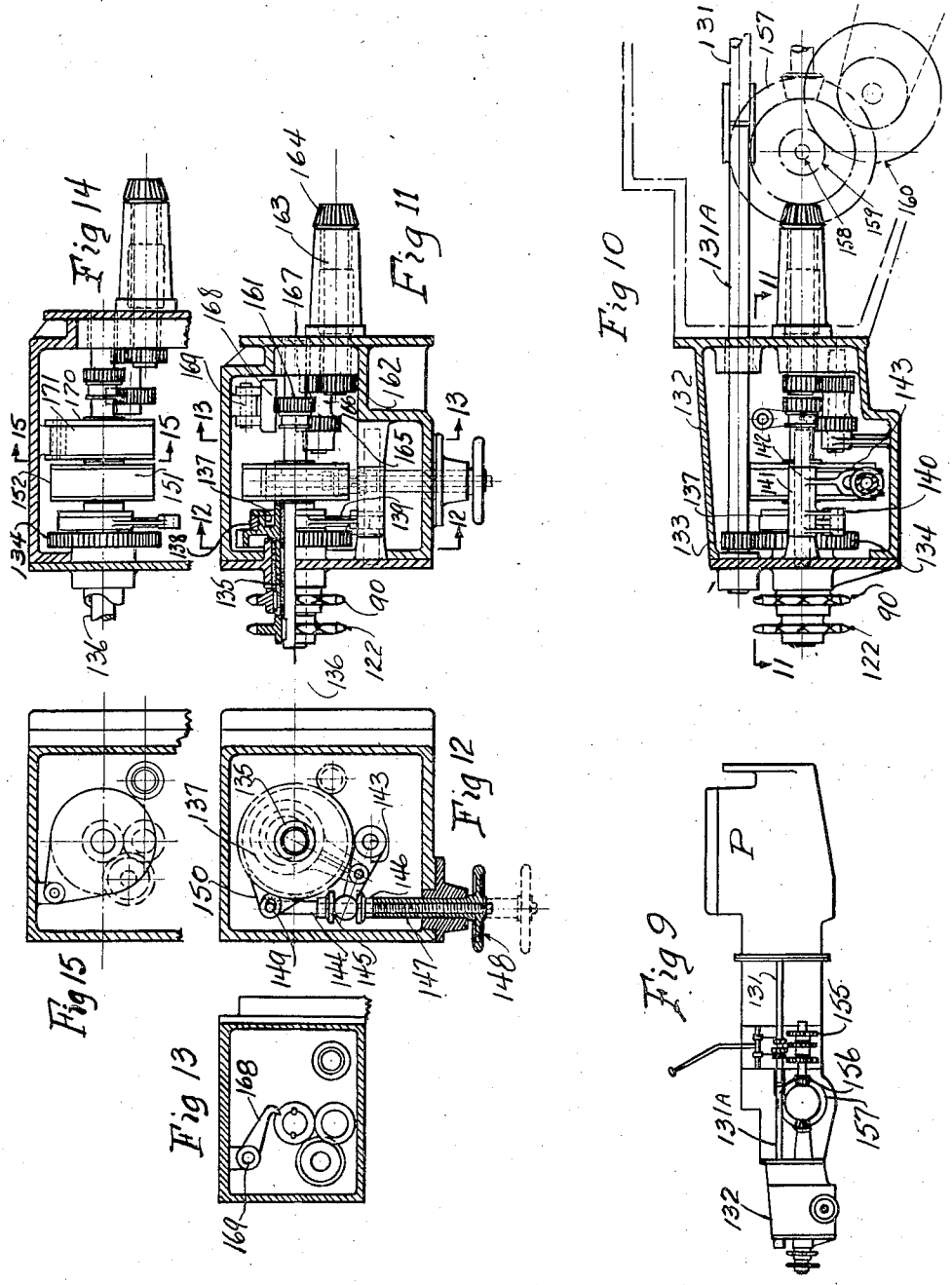

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UNITED STATES PATENT OFFICE

2,032,911

EXCAVATING MACHINE

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Application October 26, 1933, Serial No. 695,291

17 Claims. (Cl. 37—190)

This invention relates in general to excavators and more especially to earth and material handling machines for such purposes as cutting grades, digging in borrow pits, digging basements, drainage and irrigation ditches, mine stripping, digging through heavy snow drifts not movable by plow, backfilling ditches, loading sand, gravel and crushed stone as well as for other various uses and applications.

One of the novel characteristics of the machine is that its digging action is a continuous motion of excavation, lost motion due to placing excavated material at a desired point and consequently detracting from the productive capacity of the machine being eliminated. Because of this fact, it is estimated that an excavating machine embodying the present invention will excavate at least twice as much material as other types of machines with corresponding power. Also the machine will weigh not more than one-third as much as present machines of corresponding power and consequently will cost less initially and cost less to operate.

In the construction of a machine embodying the present invention a further economy is realized in its fabrication by virtue of the use of a standard track type tractor of suitable construction to provide power for the digging member and discharge conveyor and also power for traction when the machine is being moved from job to job as well as the slower feed traction speed for forcing the machine into the material to be excavated. Moreover, provision is made for imparting a very slow motion to the digging member to force it into the material in a controlled arcuate movement which will not exceed but will be almost a 180° maximum.

It is to be understood, of course, that while a tractor unit is used for power it is possible to use any suitable power plant and transmission unit for the purposes which the tractor serves. A tractor is, however, desirable because of its economical cost, its high quality construction and its adaptability to the purpose. Another advantage which flows from the use of a tractor resides in the fact that it is entirely practical to reclaim the tractor for other purposes when the excavator is not at work and it is desirable to do so.

Another object of the invention resides in the provision of an excavating machine of this character which is simple and durable in its construction, reliable and efficient in its operation, susceptible of convenient control and easy and comparatively inexpensive to manufacture, operate and maintain.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, and in which:

Figure 1 is a perspective view showing one embodiment of the invention;

Figure 2 is a diagrammatic view in plan further illustrating the embodiment of the invention shown in Figure 1;

Figure 3 is a view similar to Figure 2 but showing a machine in side elevation;

Figure 3*a* is a diagrammatic view in end elevation to illustrate certain of the chain and sprocket gearing employed;

Figure 4 is a fragmentary sectional view taken on line 4—4 of Figure 5 and showing the turntable, digging wheel and associated parts employed at the forward end of the machine, parts being omitted and parts being shown in section for the sake of illustration;

Figure 5 is a view in section taken on line 5—5 of Figure 4 and with parts shown in elevation for the sake of simplicity in illustration;

Figure 6 is a fragmentary view taken on line 6—6 of Figure 7 and with parts shown in elevation for the sake of illustration;

Figure 6*a* is a detail view showing the beveled structure of the cutting blades;

Figure 7 is a view in elevation looking toward the rear of the digging wheel, the parts connected therewith being omitted for the sake of illustration;

Figure 8 is a view in vertical section taken on line 8—8 of Figure 7, parts being shown in elevation for the sake of illustration;

Figure 9 is a diagrammatic view in side elevation illustrating generally how the motor and transmission is connected up to the slow speed drive for the swing gear;

Figure 10 is a view partly in side elevation and partly in longitudinal vertical section illustrating the features of the construction of the slow speed drive for the swing gear and associated parts;

Figure 11 is a view in horizontal section taken on line 11—11 of Figure 10 and with parts shown in elevation for the sake of simplicity in illustration;

Figures 12 and 13 are views taken on lines 12—12 and 13—13, respectively, of Figure 11;

Figure 14 is a fragmentary view similar to Fig-

ure 11 but showing a slight modification of the structure; and

Figure 15 is a view in transverse section taken on line 15—15 of Figure 14.

Referring to the drawings, and more especially to Figures 1 to 3, inclusive, it will be seen that the present embodiment of the invention proposes the use of a tractor designated generally at T which may be of any standard type and construction appropriate to the present use. The tractor has, as usual, a power plant P, frame members F, self-laying tracks S and various other conventional features.

Rollers 1 which are mounted for rotation on the forward end of the tractor serve to support a turntable 2. The turntable 2 is constrained to rotate about a fixed axis by means of a hollow center pin or gudgeon 3 suitably secured to the frame of the tractor and fitted in a vertical bearing sleeve 4 integral with or fixed to the turntable 2. A pair of transversely spaced and vertically extending standards or frame members 5 are securely fixed to the turntable so as to be constrained to move therewith.

Forwardly of the turntable 2 and its standards 5 a digging wheel designated generally at 6 is provided and is supported for rotation about a horizontally disposed axis extending generally fore and aft of the machine as will hereinafter more clearly appear.

As shown in Figures 1, 6, 7 and 8, the digging wheel 6 comprises a pair of spaced body plates 7 and 8 of annular form and securely bolted or otherwise fastened to ring gears 9 and 10. At angularly spaced intervals digging buckets 11 are provided between the plates 7 and 8 and have their side walls 12 securely bolted or otherwise fastened to these body plates. The body portions 13 of the buckets are provided with digging teeth 14. To support the digging wheel for rotation and to provide for the drive of the same a box-like support 15 is disposed within the wheel. This support 15 is fabricated of plates and angles or other suitable structural elements. Three bearing brackets 16 are provided at spaced points on the support 15 and receive the shaft 17 which support three pairs of flanged rollers 18, these flanges rollers engaging the body plates 7 and 8 and plain portions of the ring gears 9 and 10 to mount the digging wheel for rotation. The support of the ring gear is completed and its drive is provided for by virtue of the provision of pinions 19 and 20 mounted on the opposite ends of a short shaft 21 supported for rotation in bearings provided therefor in a gear casing 22 secured to the support 15. The pinions 19 and 20 mesh with the teeth of the ring gears 9 and 10, respectively.

Cast integral with the ring gear 10 or otherwise suitably connected with the digging wheel are lugs 23 which provide supports for the outer ends of cutting blades 24, the latter being provided if desired with cutting teeth 25. The inner ends of the blades or cutters 24 are securely fastened to a hub 26 mounted for rotation on a short shaft 27 fixed to a combined bearing and thrust plate 28 provided therefor on the support 15.

As illustrated in Figures 1, 3, 4 and 5, the digging wheel is interconnected with the turntable and its standards 5 by means of an upper pair of links designated at 30 and a lower pair of links designated at 31. The rearward ends of the links 31 are pivotally connected as at 32 to the turntable while their forward ends are pivotally connected as at 33 to brackets 34 securely fastened to the box-like support 15. Similarly, the rearward ends of the upper links 30 have a pivotal mounting designated at 35 on bearing sleeves 36 carried by the frame members 5, while their forward ends are formed with bearings 37 through which a shaft 38 extends, the shaft 38 being supported by bearing brackets 39 secured to the support 15. These links 30 and 31 are constrained to move up and down vertically with respect to the turntable and its standards 5 by virtue of the provision of fixed vertical guides 40 in the form of channels which are securely interconnected with the turntable and its standards 5. The digging wheel, while thus adjustable vertically with respect to the turntable is positively constrained to swing therewith and receives a positive thrust therefrom.

Any suitable mechanism may be provided for raising and lowering the digging wheel. For the sake of illustration a hoisting mechanism is shown as being made up of hoist lines 41 and 42, each of which has one end dead-ended as at 43 on the standards 5, has its intermediate portion extending around a sheave 44 mounted on the ends of the shaft 38 and has its other end secured to and wound about hoist drums 45 fixed on a shaft 46. The shaft 46 is mounted for rotation in bearing brackets 48 and is actuated from a suitable power source or through a worm and worm wheel 49 from a hand crank 50. The material excavated by the wheel 6 is deposited on a conveyor 55, one end of which projects into the digging wheel and the other end of which extends back between the standards 5 of the turntable. Delivery of the excavated material from the digging buckets onto the conveyor 55 is insured by the provision of a shield or track 56 (see Figure 7) over which the buckets travel as they move upwardly after exerting their excavating action and by the provision of a trough 57 provided at the upper end of the shield and insuring discharge onto the conveyor. It will be understood that the shield 56 together with the trough 57 are mounted on the support 15.

The conveyor 55 comprises an endless belt 58 trained about supporting and driving rollers 59 and 60. The roller 60 is fixed to a shaft 61 (see Figure 6) journaled for rotation in a bearing 62 provided on the supporting box 15 and also in a bearing 63 provided in the gear casing 22. The roller 59 is similarly fixed to a shaft 64, one end of which is mounted for rotation in the sleeve bearing 36 (see Figure 4) and the other end of which is mounted in a similar sleeve bearing 65 carried by the opposite standard 5 of the turntable.

The conveyor 55 discharges onto a second or spoil conveyor designated generally at 70 and which has one end underlying the conveyor 55 in all of its positions and has its opposite end positionable to discharge clear of the machine and either onto a spoil bank or into a truck or otherwise as may be desired. The conveyor 70 comprises an endless belt 71 trained about a lower driving roller 72 and an upper idler roller 73. The roller 72 (see Figure 5) is fixed to a shaft 74 journaled in bearings provided in the upright arm 75 of a yoke-like swivel frame 76. The frame 76 has a sleeve-like bearing 77 which loosely fits over a vertical shaft 78 extended up through the center pin 3 and its downward movement is arrested by engagment with the hub of a beveled gear wheel 79 which in turn engages the upper end of the hollow center pin 3. The yoke-

like frame 76 has its arms provided with extensions 80 (see Figure 3) to which the lower end of conveyor frame members 81 are pivotally connected as at 82. The opposite ends of these frame members 81 are equipped with bearing members 83 for the shaft of the idler roller 73. With this construction the conveyor 70 may be raised and lowered vertically under the influence of a hoisting mechanism designated generally at 85 and which may be of any suitable construction. It may be power driven or may have its hoist lines controlled by one or more winding drums 86 actuated by worm gearing 87 from a hand crank 88.

A common drive is provided for the digging wheel 6 and the conveyors 55 and 70.

Referring now to Figures 2, 3, 3a, 4, and 5, it will be seen that this common drive is taken from a sprocket wheel 90 actuated in the manner which will be hereinafter described, and connected by a sprocket chain 91 to a sprocket wheel 92 fixed to the rearward end of an elongated shaft 93 which extends along under the tractor to the forward end thereof and which is provided beneath the shaft 78 (which is coincident with the axis of rotation of the turntable) with oppositely facing beveled gears 94 and 95. These gear wheels 94 and 95 are loose on the shaft 93 and they both may be left loose thereon or may be selectively clutched thereto by means of a shiftable clutch member 96 splined on the shaft 93 and connectible with and disconnectible from cooperable clutch members (not shown) provided on the hubs of the gears 94 and 95. These gears 94 and 95 constantly mesh with a gear wheel 97 fixed to the lower end of the shaft 78. The gear 79 previously referred to is a double faced bevel gear and its upper teeth or gear member meshed with a corresponding beveled pinion 98 fixed to a short shaft 99 rotatably mounted in bearings 100 provided therefor in the frame 76. The shaft 99 has a sprocket 101 fixed thereto which acts through a sprocket chain 102 to drive a sprocket wheel 103 fixed to one end of the shaft 74 on which the driving roller 72 of the conveyor 70 is secured.

From the foregoing it will be understood that with the shaft 93 rotating the clutch 96 may be thrown in to cause the conveyor 70 to be driven.

The drive for the conveyor 55 and the digging wheel 6 is taken from the under gear teeth or under gear member of the double bevel gear 79, there being a pinion 105 meshing with this under gear member, which pinion is fixed to one end of a short shaft 106 journaled in spaced bearings 107 mounted on the turntable and having intermediate such bearings a sprocket wheel 108 fixed thereto. The sprocket wheel 108 drives a sprocket chain 109 which in turn drives a sprocket wheel 110 fixed on a short shaft 111 journaled in bearings 112 provided on the turntable. A sprocket 113 is fixed to the shaft 111 adjacent the sprocket 110 and acts through a sprocket chain 114 to drive a sprocket wheel 115 fixed on the shaft 64 to which the driving roller 59 of the conveyor 55 is secured. On the other side of the roller 59 from that on which the sprocket wheel 115 is located a sprocket wheel 116 is fixed to the shaft 64 and acts through a sprocket chain 117 to drive a sprocket wheel 118 fixed on the shaft 61 (see also Figure 6). It will be understood from this description that a power drive is had for the conveyor 55 and is available whenever the clutch 96 is thrown in to drive the other conveyor 70. The drive for the digging wheel 6 is taken from the shaft 61, a beveled pinion 120 fixed on one end of the shaft 61, meshing with a beveled gear wheel 121 fixed on this shaft 21 to drive the shaft and consequently its pinions 19 and 20.

It will be understood that by taking the drive for the conveyor 70 from the upper gear teeth of the beveled gear 79 and taking the drive for the conveyor 55 from the lower teeth of this gear member that the range of swing or angular adjustment of the conveyor 70 is not limited by any interference between the pinions 98 and 105 through which the drives are taken.

It will be also noted that a shield 5' may be provided to insure the deposit of dirt discharged from the conveyor 55 onto the conveyor 70.

The mechanism for rotating the turntable 2 in either direction, which may be termed the "swing gear", comprises a sprocket wheel 122 (see Figure 2) actuated in a novel manner, as will be hereinafter described, and connected by a sprocket chain 123 (see Figure 3a) with a sprocket wheel 124 fixed to the rearward end of an elongated shaft 125, the forward end of which has oppositely disposed beveled pinions 126 loosely mounted thereon but selectively clutched thereto and constantly meshing with a beveled pinion 127 fixed to the lower end of a vertical shaft 128, the upper end of which has a pinion 129 fixed thereto, which pinion 129 meshes with an internal ring gear 130 securely fixed to the vertical flange-like portion 2' of the turntable 2.

With this construction, when the sprocket 122 is actuated the turntable may be swung in one direction or the other depending upon which of the beveled pinions 126 is clutched to the shaft 125. The action of an excavating machine of this sort and its ability to deal with the varying conditions met with in actual use is materially enhanced by the provision of a variable speed mechanism for controlling and effecting the swinging of the turntable in one direction or the other. The present invention proposes a novel and effective means for accomplishing this desirable result.

Referring now to Figure 9, there is illustrated a portion of the power plant P of the tractor. The numeral 131 designates a shaft driven by the engine at engine speed. The shaft 131 is coupled to an alined shaft 131a which extends back into a gear box 132. Within the gear box or casing 132 a pinion 133 is fixed to the shaft 131a and meshes with gear wheel 134 fixed to a sleeve shaft 135 (see Figure 10) rotatably mounted on an inner solid shaft 136 (see Figure 11) the sleeve and solid shafts being appropriately supported for rotation in bearings provided therefor in the gear box. Integral with the body of the gear wheel 134 is an eccentric 137 with which an eccentric strap 138 is operatively fitted. The eccentric strap 138 has an integral arm 139 pivotally connected to a double crank arm 140 (see Figure 10) which may be formed integral with one end of a sleeve 141 mounted for rotation on a stud shaft 142 provided therefor within the gear box. The sleeve 141 also carries a rocker arm 143, the end of which is bifurcated and straddles a reciprocable rod 144. On the rod 144 is a fixed collar 145 engaging one side of the bifurcated end of the rocker arm. An adjustable collar 146 engages the other side of the bifurcated end of the rocker arm. The collar 146 is slidable along the rod 144 and its position is determined by adjusting a sleeve 147

which is threaded to the rod, abuts the collar 146 and is manipulated by a hand wheel 148. The inner end of the rod 144 is connected by a pin and slot connection 149 with the crank arm 150 of the driving member 151 of a one-way clutch 152. The driven member of this clutch 152 is fixed to the solid shaft 136.

With this construction and with the shaft 131a rotating at a constant speed its pinion 133 and consequently the gear wheel 134 and the eccentric 137 turn at a constant rate. The eccentric 137 through its arm 139 rocks or oscillates the crank arm 140 together with its sleeve 141 and the rocker arm 143. If the adjustable collar 146 is turned up to the position shown in Figure 12, the rocking or oscillation of the rocker arm 143 results in a corresponding reciprocation of the rod 144. As a result, on one stroke of the rod 144 the full motion of the rod is transmitted through the one-way clutch 152 to the shaft 136 and on the return stroke of the rod 144 the one-way clutch idles and the shaft 136 does not receive any motion. If, however, the hand wheel 148 be turned to back up the sleeve 147 and consequently free the collar 146 to an extent corresponding to that to which the sleeve is backed up, there will be lost motion between the rocker arm 143 and the rod 144 and a corresponding diminution in the amount of motion transmitted to the shaft 136. Now then, as the sprocket wheel 122 is fixed on this shaft 136 it is apparent that a wide range of speeds may be transmitted to the swing gear. The swing gear may be caused to fairly creep or to move at an approximately steady rate of speed. Moreover, a very large number of intermediate speed values are readily available by turning the hand wheel 148.

The traction drive is also taken from the shaft 131 through a transmission 155, shown diagrammatically in Figure 9, and preferably of the hand lever controlled selective type. The transmission 155 drives a pinion 156 which meshes with a gear wheel 157 whose shaft 158 is connected by means of gearing 159 and 160 to the driving sprockets of the traction device.

Convenient reversal of the traction drive, in instances where low feed traction (very slow speed traction) is desired—in which event the speed variation and reversal provided by the transmission 155 serving the range of high speed traction is not suitable—may be had by incorporating a reversing gear mechanism in the gear box 132. In carrying out this purpose a drive pinion 161 is splined on the shaft 136 and may be meshed with a driven pinion 162 fixed on one end of a shaft 163, the other end of which has a beveled pinion 164 fixed thereon and consequently meshing with the gear 157. The motion which the slidable pinion 161 imparts to the driven pinion 162 when directly engaged therewith may be reversed by sliding, this pinion 161 back into engagement with a pinion 165 fixed on one end of a sleeve 166 supported for rotation within the gear box, said sleeve also having a second pinion 167 fixed thereon and constantly meshing with the driven pinion 162.

It will be understood that when the pinion 161 meshes with the pinion 162 and the transmission 155 is in neutral that the variable low speed transmission in the gear box 132 is interposed between the power plant and the self-laying tracks S, thereby providing for variable speed and power ratios in the low or feed traction.

The sliding gear 161 may be utilized to prevent retrograde motion of the shaft 136 by having coacting therewith an elongated pawl 168 pivotally mounted as at 169 within the gear box. The pawl is designed to idle over the teeth of the pinion 161 when motion is imparted thereto and to its shaft 136 by the one-way clutch 152 on the rocking or active stroke of the rod 144 but holds the shaft 136 against movement on the return stroke of such rod.

In lieu of the pawl, a second one-way clutch may be associated with the shaft 136 and arranged to operate oppositely with respect to the one-way clutch 152. The outer member of this clutch 170 is braked by means of a brake band 171. With this construction, when the one-way clutch 152 actuates the shaft 136 the second one-way clutch 170 idles but on the return or inactive stroke of the rod 144, during which the one-way clutch 152 idles, the second one-way clutch 170 holds the shaft 136 against retrograde movement.

With a machine constructed in this manner the tractor or other power plant employed rotates the digging wheel 6 which, under the control of its hoisting mechanism, is positioned in effective digging relation to the material to be excavated. As the digging wheel rotates the turntable is swung at the desired speed and with adequate power, the values of which may be selected by the operator. As the digging wheel is positively constrained to follow the turntable in its swinging movement, the digging wheel is thrust with requisite power against the material to be excavated or handled. As the material is excavated by the action of the cutting blades 24, their teeth 25 and the teeth 14 of the buckets 11, it is gathered up by the digging buckets 11 and carried up along the shield 56 to the trough 57 through which it slides onto the conveyor 55. The conveyor 55 carries the material up onto the conveyor 70 which is positioned to transfer the excavated material to the selected point of deposit. The machine may be advanced an appropriate increment between swings or cuts or may be slowly advanced as the cutting progresses during each swing.

A self-contained mobile unit of light weight but of unusual digging capacity is provided. Moreover, the provision made for raising and lowering the digging wheel increases the range of its action.

As hereinabove described and as shown in the drawings, the excavating means proper is preferably in the form of a digging wheel. Obviously, however, many of the advantages of the present invention may be had with a different or equivalent type of excavating means.

While I have shown and described one type of machine in which the invention may be embodied, it is to be understood that the machine shown has been selected merely for the sake of illustration and that various changes in the size, shape and arrangement of the parts and in the selection of the auxiliary accessories and instrumentalities may be resorted to without departing from the spirit of the invention and the scope of the subjoined claims.

The invention claimed is:

1. An excavating machine comprising a tractor having traction devices, a power plant and controllable gearing between the power plant and the traction devices affording high and low traction speeds for the tractor, a digging wheel disposed forwardly of the tractor with its wheel plane substantially vertical and transverse to the line of feed of the tractor, means supporting said

wheel from said tractor for rotation, for transverse bodily swinging movement and for raising and lowering movement relative thereto, said means constraining said wheel to partake of the feeding movement of the tractor, means for raising and lowering said wheel, means for rotating said wheel and means operable from said gearing for swinging said wheel at variable speed and power ratios.

2. An excavating machine comprising a mobile frame, traction devices therefor, a power plant thereon, controllable mechanism actuated from said power plant and connectible with said traction devices to provide variable rates of high and low traction speeds for the frame, a digging wheel having its wheel plane transverse to the line of feed of the frame, means supporting the wheel from the frame for rotation, transverse bodily swinging and raising and lowering movement relative thereto, said means constraining said wheel to partake of the feeding movement of the frame, means for raising and lowering said wheel, means for rotating said wheel, means operable from said mechanism for swinging said wheel at variable speed and power ratios, and conveying means movable with the frame for conveying the excavated material from the digging wheel to a point of deposit.

3. An excavator comprising a mobile frame, traction devices therefor, a power plant thereon, a driving connection between said power plant and said traction devices whereby to provide for a traction feed of said frame, a digging wheel having its wheel plane disposed transversely to the line of feed of said frame, means supporting said wheel from said frame for rotation about its own axis, for bodily swinging movement transversely to the frame and for raising and lowering movement, means operable to rotate said wheel, means operable to raise and lower the same, a variable speed gear set actuated from said power plant and connectible to said wheel for bodily swinging the same, and conveying means movable with the frame, for receiving the excavated material from the wheel and carrying the same to a point of deposit.

4. An excavator comprising a mobile frame, traction devices therefor, a power plant thereon, a driving connection between said power plant and said traction devices whereby to provide for a traction feed of said frame, a digging wheel having its wheel plane disposed transversely to the line of feed of said frame, means supporting said wheel from said frame for rotation about its own axis, for bodily swinging movement transversely to the frame and for raising and lowering movement, means operable to rotate said wheel, means operable to raise and lower the same, a variable speed gear set actuated from said power plant and connectible from said wheel for bodily swinging the same and comprising a constant speed driving member actuated by said power plant, a driven member connectible with said digging wheel for bodily swinging the same and a lost motion connection of variable amplitude between said driving and driven members.

5. An excavator comprising a mobile frame, traction devices therefor, a power plant thereon, a driving connection between said power plant and said traction devices whereby to provide for a traction feed of said frame, a digging wheel having its wheel plane disposed transversely to the line of feed of said frame, means supporting said wheel from said frame for rotation about its own axis, for bodily swinging movement transversely to the frame and for raising and lowering movement, means operable to rotate said wheel, means operable to raise and lower the same, a variable speed gear set actuated from said power plant and connectible with said wheel for bodily swinging the same and comprising a driving gear wheel rotated at a constant rate of speed from said power plant, a rocker arm oscillated from said gear wheel, a one-way clutch connectible with said digging wheel for bodily swinging the same, an actuating arm for said clutch and a variable amplitude lost motion connecting means between said rocker arm and said actuating arm.

6. An excavator comprising a mobile frame, traction devices therefor, a power plant thereon, a driving connection between said power plant and said traction devices whereby the latter may be utilized to provide a traction feed for said frame, a turntable supported on the forward end of said frame, a digging wheel disposed forwardly of said frame with its wheel plane transverse to the line of feed thereof, means interconnecting the digging wheel with the turntable to constrain the wheel to partake of the feed of the frame and of the swing of the turntable while leaving the wheel free for rotation about its own axis and for raising and lowering movement, means operable to raise and lower the wheel, means operable to rotate the wheel, a variable speed gear set actuated from said power plant and connectible with the turntable to swing the same at variable speed and power ratios, and conveying means movable with the frame for conveying material from the diggging wheel to a point of deposit.

7. An excavator comprising a mobile frame, traction devices therefor, a power plant thereon, a driving connection between said power plant and said traction devices whereby the latter may be utilized to provide a traction feed for said frame, a turntable supported on the forward end of said frame, a digging wheel disposed forwardly of said frame with its wheel plane transverse to the line of feed thereof, means interconnecting the digging wheel with the turntable to constrain the wheel to partake of the feed of the frame and of the swing of the turntable while leaving the wheel free for rotation about its own axis and for raising and lowering movement, means operable to raise and lower the wheel, means operable to rotate the wheel, a variable speed gear set actuated from said power plant and connectible with the turntable to swing the same at variable speed and power ratios, and conveying means movable with the frame for conveying material from the digging wheel to a point of deposit, in combination with a reversing gear set interconnectible with the variable speed gear set and the driving connection to modify the action of the latter so as to provide for reversal of the action of the traction devices in a low speed range.

8. In combination with a tractor having a frame, a power plant, supported on said frame, said frame projecting forwardly of said power plant and self-laying tracks supporting said frame, a turntable supported on the forward end of said frame, a digging wheel disposed with its wheel plane transversely of the tractor, means connecting said wheel to said turntable to constrain the wheel to turn therewith, means actuated from the power plant to rotate said wheel and to swing said turntable, and means for carrying off the material excavated by said wheel.

9. An excavator comprising a tractor having a frame, self-laying tracks supporting said frame, a power plant on said tractor and a power drive

between said power plant and said tracks, a turntable mounted on said frame, a digging wheel supported by said turntable and constrained to move therewith, a variable slow speed gear set actuated from said power plant, means actuated by said gear set for swinging said turntable, means operable from said gear set for imparting low feed traction to said tracks, and means operable to rotate said digging wheel.

10. An excavator comprising a mobile frame, traction devices therefor, a power plant on said frame, a driving connection between said power plant and said traction devices whereby the latter may be utilized to provide a traction feed for said frame, a turntable supported on the forward end of said frame, a digging wheel disposed forwardly of said frame and interconnected with said turntable to be constrained to swing therewith while free to raise and lower relative thereto, hoisting means for raising and lowering said digging wheel, and a conveyor mounted on said turntable for receiving excavated material from said digging wheel and conveying the same to a point of deposit.

11. An excavator comprising a mobile frame, traction devices therefor, a power plant on said frame, a driving connection between said power plant and said traction devices whereby the latter may be utilized to provide a traction feed for said frame, a turntable supported on the forward end of said frame, a digging wheel disposed forwardly of said frame and interconnected with said turntable to be constrained to swing therewith while free to raise and lower relative thereto, hoisting means for raising and lowering said digging wheel, a conveyor extending between said wheel and said turntable and receiving excavated material from said wheel and a conveyor supported on said turntable for pivotal movement about horizontal and vertical axes relative thereto and having one end positioned to receive the material from said first-named conveyor and having its other end extending rearwardly therefrom, and means for controlling the position of said second-named conveyor.

12. An excavator comprising a mobile frame, a turntable supported for rotation thereon, a digging wheel, a supporting member on which said digging wheel is rotatably mounted with its wheel plane transverse to the line of feed of said frame, said turntable having upright frame members, links pivotally and positively connecting said frame members and said supporting member, means constraining said links to vertical movement, hoisting mechanism for controlling the elevation for said supporting member and its wheel, means operable to rotate said wheel, means operable to swing said turntable, means for carrying off material from said wheel to a point of deposit.

13. An excavator comprising a mobile frame, traction devices therefor, a power plant thereon, a driving connection between the power plant and the traction devices to provide for a traction feed of said frame, a turntable supported for rotation on said frame, a digging wheel, a supporting member on which said digging wheel is mounted for rotation with its wheel plane transverse to the line of feed of the frame, links positively and pivotally connecting said turntable and said supporting member and constraining the supporting member and wheel to partake of the feed of the frame and of the swinging movement of the turntable while leaving the member and wheel free for raising and lowering movement and the wheel free to rotate, hoisting mechanism for controlling the raising and lowering of its supporting member and its wheel, means for rotating said wheel, and a variable speed driving connection between the power plant and the turntable for swinging the turntable at variable speed and power ratios.

14. An excavator comprising a mobile frame, a turntable supported for rotation thereon, a digging wheel, a supporting member on which said wheel is mounted for rotation, said turntable having upright frame members, links positively and pivotally connecting said frame members and said supporting members, hoisting mechanism for controlling the elevation of said supporting member and its wheel, means for rotating said wheel, means for rotating said turntable, a conveyor extending between the supporting member and the upright frame members and supported thereon with one end in position to receive material from the digging wheel, a second conveyor supported for rotation at the axis of rotation of the turntable and having one end in position to receive material from said first-named conveyor, said second-named conveyor being also swingable vertically, and means for controlling the position of said second-named conveyor.

15. An excavator comprising a mobile frame, a turntable supported for rotation thereon, a digging wheel, a supporting member on which said digging wheel is rotatably mounted with its wheel plane transverse to the line of feed of said frame, means interconnecting said supporting member with said turntable to constrain the same to swing therewith and to impart the feeding movement of the frame thereto, means controlling the vertical position of the supporting member, means for swinging said turntable, a plurality of cutting blades disposed forwardly of and extending transversely of said wheel and connected thereto adjacent their outer ends, and means between the inner end portions of the blades and the supporting member for taking up the thrust exerted during the excavating operation of said blades.

16. Mechanism of the class described comprising a turntable, a digging wheel carried by said turntable, an endless belt conveyor mounted on said turntable and positioned to receive material from said digging wheel and a spoils conveyor having one end positioned to receive material from said first mentioned conveyor in all positions thereof, said spoils conveyor itself being shiftable to deliver material to selected points of deposit.

17. The invention set forth in claim 16 and further characterized by a common drive for said digging wheel, said first mentioned conveyor and said spoils conveyor.

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