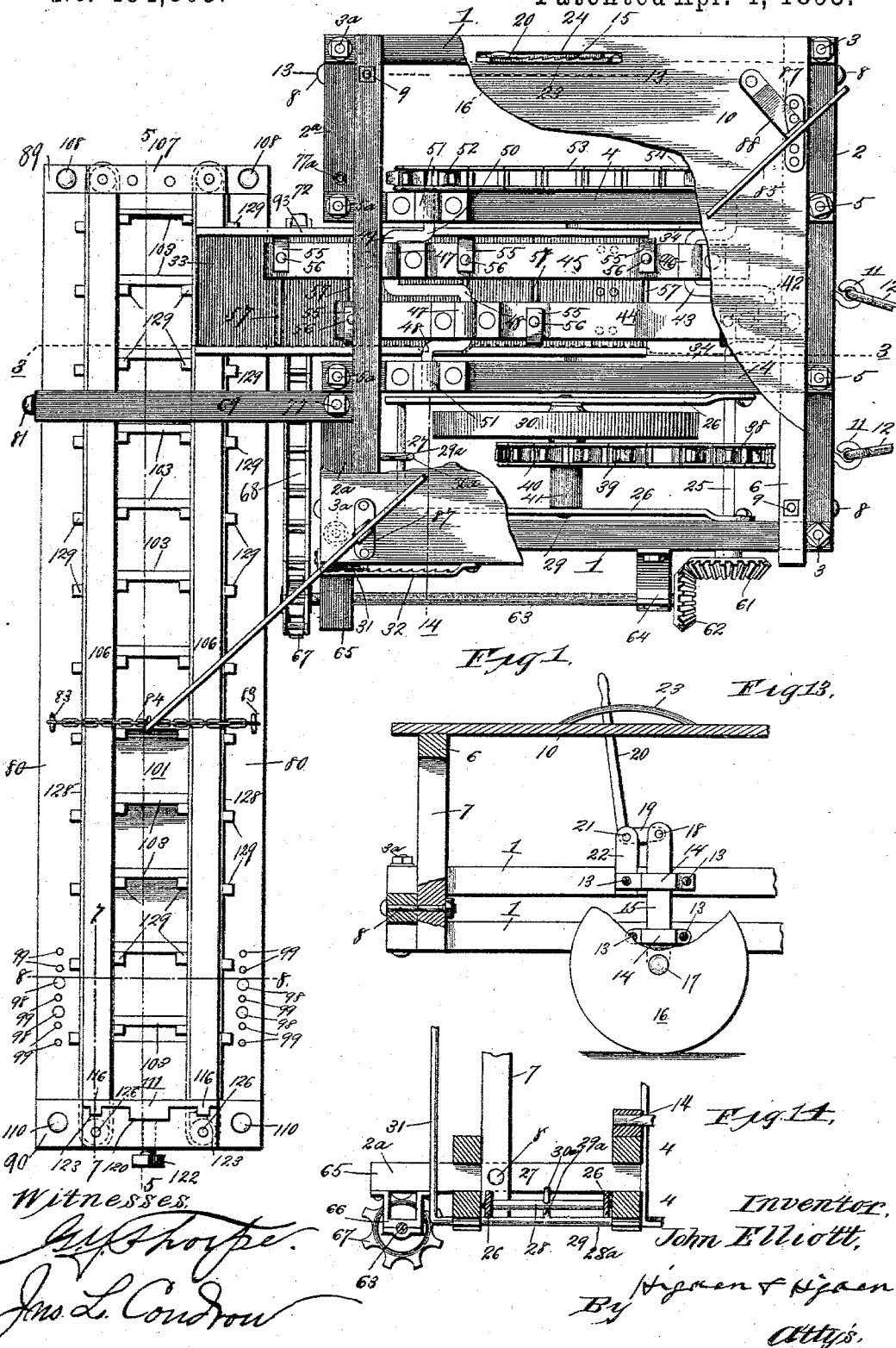


5 Sheets—Sheet 1.

No. 494,805.

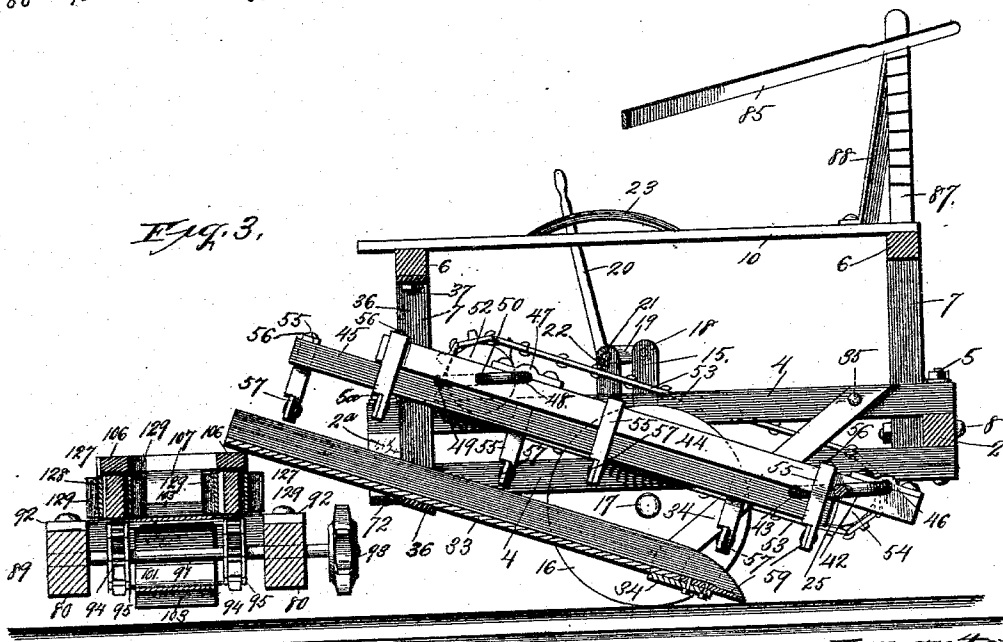
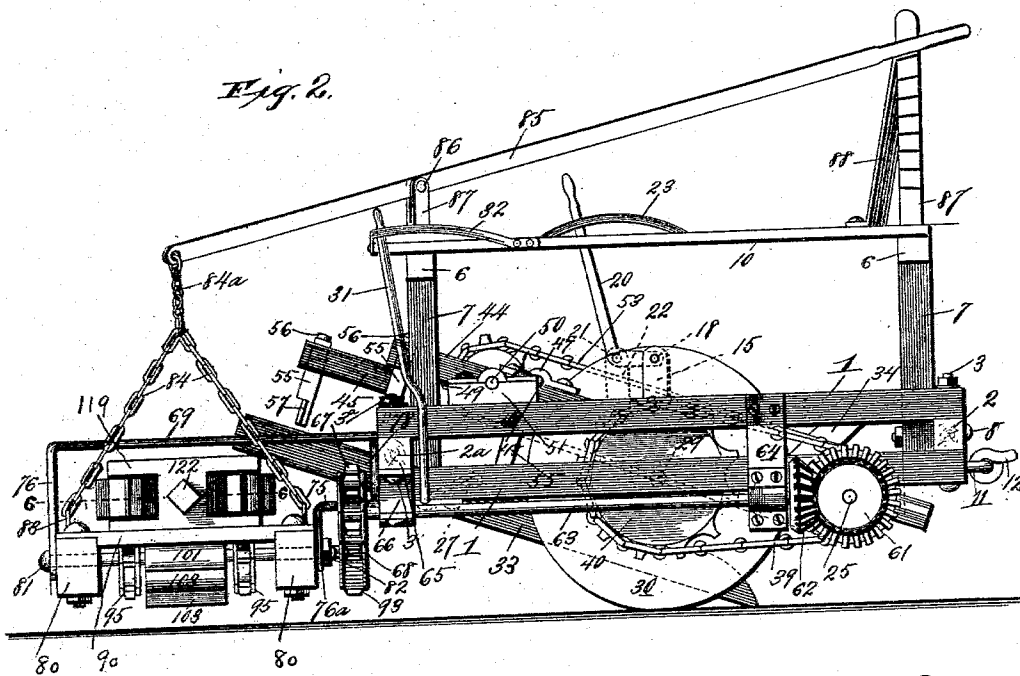
Patented Apr. 4, 1893.



5 Sheets—Sheet 2.

Patented Apr. 4, 1893.

No. 494,805.



Witnesses:

J. M. L. Coudron

Inventor:

John E. Elliott,
By H. Jacob & H. Jacob
attys.

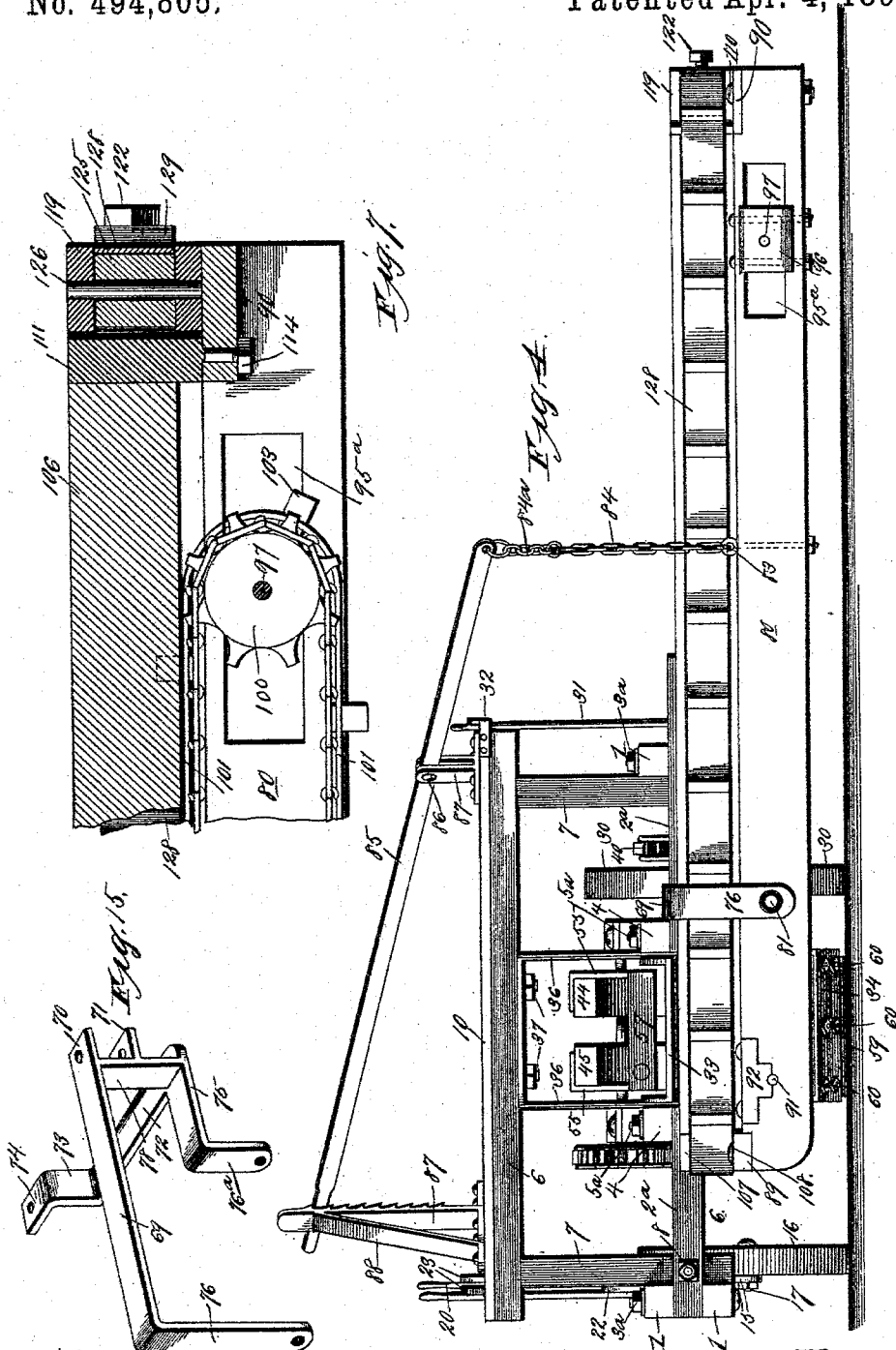
(No Model.)

5 Sheets—Sheet 3.

J. ELLIOTT.
EARTH GRADER.

No. 494,805.

Patented Apr. 4, 1893.



Witnesses:
G. H. Hooper.
Geo. L. Connor

Inventor:
John Elliott,
Higdon & Higdon
Attys.

UNITED STATES PATENT OFFICE.

JOHN ELLIOTT, OF LATOUR, MISSOURI.

EARTH-GRADER.

SPECIFICATION forming part of Letters Patent No. 494,805, dated April 4, 1893.

Application filed June 6, 1892. Serial No. 435,738. (No model.)

To all whom it may concern:

Be it known that I, JOHN ELLIOTT, of Latour, Johnson county, Missouri, have invented certain new and useful Improvements in Earth-Graders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to machines for excavating earth for grading, ditching, road and railway work, and for other similar and kindred purposes, and the objects of my invention are to produce an earth excavating and grading machine which shall be simple, strong, durable, and inexpensive in construction, of light draft and also of great power, and which shall be compactly and easily under the control of an attendant or operator. Furthermore, to produce an earth excavator and grader which shall, in addition to the advantages above enumerated, be capable of easy adjustment so as to cut at any desired depth, and so also as to discharge the excavated earth at any desired point, whether such point be upon a level with the machine, or below or above such level.

A still further object of my invention is to produce an earth excavator and grader which shall be entirely automatic and reliable in its operations, and the discharging conveyer of which shall be readily adjustable so as to accord both with the requirements of the point of delivery of the excavated earth, and with respect to the tension of its delivering-belt, so as to accord with variations in load and character of materials delivered.

To the above purposes my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which:

Figure 1 is a plan view of an earth excavating and grading machine embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse vertical section of the same, on the line 3—3 of Fig. 1. Fig. 4 is a rear elevation of the same. Fig. 5 is a longitudinal vertical section on an enlarged scale of the delivery attachments of the ma-

chine, on the line 5—5 of Fig. 1. Fig. 6 is a longitudinal section of the same also on an enlarged scale, and on the line 6—6 of Fig. 2. Fig. 7 is a vertical longitudinal section of the same, also on an enlarged scale, and on the line 7—7 of Fig. 1. Fig. 8 is a transverse vertical section of the same, also on an enlarged scale, and on the line 8—8 of Fig. 1. Fig. 9 is a detached perspective view also on an enlarged scale, of the fixed portion of the tension-mechanism of the delivery belt or apron of the machine. Fig. 10 is a detached perspective view, also on an enlarged scale, of the movable tension-bracket for the delivery belt or apron of the machine. Fig. 11 is a detached perspective view, also on an enlarged scale, of the pivotal hangers and shoe of the excavating-trough or scoop. Fig. 12 is a detached perspective view, also on an enlarged scale, of the pivotal hanger for one of the carrying-wheels of the machine. Fig. 13 is a vertical longitudinal section of the machine, also on an enlarged scale, and on the line 13—13 of Fig. 1. Fig. 14 is a transverse vertical section of the same, also on an enlarged scale, and on the line 14—14 of Fig. 1. Fig. 15 is a detached perspective view of the pivot-bracket for the delivery-frame.

The main framework of the machine is preferably of rectangular form and of skeleton construction, as shown; said frame consisting of the pairs of parallel longitudinal beams or bars 1 located at each side of the machine frame, the one above the other, the said pairs of beams constituting the sides of the main frame. At their front ends, these two pairs of beams or bars 1 are connected together by a horizontal cross bar or beam 2 which forms the front end of the main frame, and the ends of which are interposed between the front ends of the side-bars or beams 1 and bolted thereto, as at 3, or otherwise securely connected thereto. Intermediately of the two side bars or beams 1, and parallel therewith, are placed two pairs of longitudinal bars or beams 4 one beam or bar of each pair being located directly above the other and said pairs of beams being located at opposite points from the transverse middle of the frame; the front ends of said intermediate bars or beams 4 being bolted to the upper and lower sides of the front bars or beams 2, as shown at 5, or otherwise suitably

secured in said position. The rear end of the main frame is composed of two horizontal cross beams or bars 2^a which are placed in alignment with each other, and the outer ends of which are bolted, as at 3^a, between the rear ends of the side bars 1. The inner ends of these two cross-bars are separated from each other a suitable distance, to permit of the required passage of the rear end of the scoop or trough, as hereinafter described—and said inner ends are bolted, as at 5^a, or otherwise securely connected between the rear ends of the intermediate bars 4 of the frame. At each end of the main frame of the machine, and at a suitable height above the same, extends a horizontal cross-beam or bar 6; these two cross beams or bars extending parallel with each other transversely of the machine frame, and being supported upon the upper ends of four vertical standards 7 which rise from the four corners of the machine frame, as shown; the lower ends of the standards being bolted, as at 8, to the frame, and the upper ends of said standards being bolted, as at 9, to the ends of the side beams or bars 6. It is to be understood that the main frame of the machine, thus constructed is built preferably of wooden beams, but if preferred, said frame may be built of metal bars, without departing from the essential spirit of my invention. Upon the cross bars or beams 6 is secured a horizontal platform 10, which corresponds approximately, in length and width, with the main frame, and upon which the driver or attendant may stand or be seated, as desired. From the front cross beam or bar 2 of the machine frame project forwardly two eye-bolts 11 to which are connected two rods 12; the said eye-bolts being located toward the right hand end of the front bar or beam 2, and said rods 12 being designed for connection to a suitable doubletree or whiffletree by means of which the draft animals are harnessed to the machine.

To the inner sides of the two left hand side-bars 1 are bolted, as at 13, or otherwise suitably secured, two metal guide-straps 14 through which passes the vertical standard 15 of the left hand carrying-wheel 16 of the machine; said wheel being journaled upon a stud or bolt 17 which projects laterally from the lower end of the said standard 15. To the upper end of this standard 15 is pivotally connected, as at 18, the front end of the lower arm 19 of an adjusting-lever 20; the arm 19 projecting forwardly at about right angles from the body-portion of the lever so that said lever is of approximately L-form. This lever 20 is pivoted, as at 21, at the point of juncture of the lower end of the lever with its arm 19, to the upper end of a short vertical standard 22 which projects upwardly from the upper left hand side bar or beam 1; and the upper part of the lever 20 engages a ratchet-segment 23 which is bolted, or otherwise secured, to the platform 10; the upper part of the lever working through a slot 24 which is

formed longitudinally in the corresponding side of the platform 10. It will thus be seen that by throwing the upper part of the lever 20 forward or backward, the corresponding side of the main frame will be correspondingly raised or lowered, respectively.

In the front end-portion of the lower right hand side bar or beam 1 is journaled the outer end of a crank-shaft 25, and this shaft extends horizontally inward through the corresponding ends of the lower intermediate beams 4, as shown, and for a purpose to be hereinafter more fully explained. At points between the right hand side-beam 1 and the adjacent intermediate beam 4, and directly opposite each other are two bolts or their equivalents, which are pivotally engaged by the front ends of two metal bars 26 which extend parallel with each other between the said side bars and intermediate bars. The rear ends of these bars 26 are rigidly connected together by a cross-bar 27, and into openings 28 which are formed through said bars 26, about midway of the length of the same, are inserted the ends of the spindle 29 of the companion carrying-wheel 30; said wheel being also located between the two bars 1 and 4 above referred to. Through the rear ends of the right hand side-bar 1 and of the adjacent intermediate bar 4, extends a horizontal rock-shaft 28^a which reaches across the rear end of the space inclosed by said side and intermediate bars. Midway of its length, this rock-shaft 28 is formed with a forwardly extending-rock-arm 29^a the front or outer end 30^a of which embraces the cross-bar 27 of the arms 26. At its outer end, the rock-shaft 28 carries an actuating lever 31 which extends upward to above the corresponding side of the platform 10, and the upper part of which engages a ratchet-segment 32 which is secured to the adjacent side of the platform 10. The arrangement is such that by throwing the upper part of the lever 31 forward or backward, the corresponding side of the main frame will be raised or lowered respectively. These operations of the levers 31 and 20 are for the purpose of regulating the depth of cut of the scoop or trough of the machine, as hereinafter described.

33 designates the excavating trough or scoop of the machine. This trough or scoop is preferably of metal, but permissibly of wood, and is also of approximately U-form in cross-section; the top of the trough or scoop being left open. This trough or scoop is of such length as to extend from a point in advance of the transverse center of the machine rearward to and beyond the rear end of the main frame of the same; the said trough or scoop extending obliquely upward and rearward from its front to its rear end, as shown. The front portion of this scoop or trough is supported by a U-shaped hanger 34; the horizontal lower portion of this extending transversely across the upper side of the bottom of the trough or scoop, near the front end thereof, and being

bolted or otherwise securely fastened thereto. The two arms of this bracket extend obliquely upward and forward, and are bolted to the inner sides of the two pairs of intermediate frame-bars 4, as shown at 35. The rear end of this trough or scoop is supported by a rectangular bracket 36 the upper horizontal portion of which is bolted, as at 37 to the under side of the rear cross-bar 6 of the machine frame, and the lower horizontal portion of which extends transversely of the under side of the bottom of the trough, near the rear end thereof; this lower portion being bolted or otherwise suitably secured to the trough, and the arms or side portions of the bracket extending vertically downward from the cross-piece 6.

Upon the crank-shaft 25, at a point between the right hand side bar of the main frame and the adjacent right hand intermediate bar 4, is mounted a sprocket-pinion 38 over which runs a sprocket-chain 39; said chain extending rearwardly and running over a second sprocket-wheel 40 which is mounted upon the hub 41 of the carrying-wheel 30 of the machine. This hub 41 is prolonged outwardly so as to properly carry the sprocket wheel 40, and the said hub turns upon the spindle 29, while the wheel 40 turns with the hub. The crank-shaft 25 is formed, at a point between the two intermediate frame bars or beams 4, with two crank-sections 42 and 43, which extend radially opposite from each other, and to which are connected the front ends of two feeder-bars 44 and 45. These bars carry, at their front ends, suitable bearings 46 which embrace the cross-bars of the crank-sections 42 and 43, and which are bolted or otherwise suitably secured to the front ends of the feeder-bars. Near its rear end each of these feeder-bars carries a suitable bearing 47 which is bolted or otherwise suitably secured to the upper side of the feeder-bar, and which bearings embrace two crank-sections 48 and 49 of a crank-shaft 50. This crank-shaft 50 is journaled at its ends in suitable bearings 51 which are bolted or otherwise secured near the rear ends of the upper sides of the intermediate bars 4; said shaft extending horizontally across the space between said intermediate bars. That end of the rear crank-shaft 50 which projects beyond the left hand intermediate bar 4 carries a sprocket-wheel 52 over which extends a sprocket-chain 53 which leads forwardly and passes around a second sprocket-wheel 54 which is mounted upon the corresponding end of the front crank-shaft 25. Thus it will be seen that as the machine is drawn forward, rotary motion will be imparted through the sprocket-chain 39 to the front crank-shaft 25, and thence, through the sprocket-chain 53 to the rear crank-shaft; the crank-sections 42, and 43, and 48 and 49 revolving simultaneously so as to carry the feed-arms rearward after their down-strokes and forward after their up-strokes. The feeding-bars 44 and 45 are either of wood or of metal,

and each of said bars carries a number of pendent hangers 55, the upper ends of which are bolted, as at 56, to the feed-bars, and which are pendent from said bars. At their lower ends, the hangers 55 carry the shovels or blades 57, which are bolted or otherwise suitably secured to the hangers and which extend transversely within the trough or scoop 33; each of said blades being of a length equal to about one half of the width of the trough or scoop 33, and said blades moving over each other and successively rearwardly near the bottom of the trough or scoop. This action causes the blades to feed the earth rearward through the trough or scoop, and to discharge such earth through the rear end of said trough or scoop.

To the horizontal lower portion of the front scoop or trough supporting bracket 34 is secured, by any suitable number of bolts as 60, a blade or shoe 59 which extends across the front end of the bottom of the trough or scoop, and the front edge of which is brought to a suitable cutting-edge, as shown. It will thus be seen that as the machine is drawn forward, the knife 59 will cut a slice from the earth, and that such slice will pass rearward into the trough or scoop and there be fed by the blades 57, as above described.

61 designates a gear-pinion which is mounted upon the right hand end of the crank-shaft 25, and the teeth of which engage with the teeth of a similar beveled-gear pinion 62 which is mounted upon the front end of a counter-shaft 63. This counter-shaft 63 extends longitudinally at the right hand side of the machine-frame and its front end is journaled in a suitable bearing-bracket 64 which is bolted or otherwise suitably secured to the outer side of the right hand side-bars 1 of the machine-frame. The rear end of this counter-shaft is journaled in a suitable bearing-bracket 66 which is secured to the right hand end of the rear cross-bar 2^a of the machine-frame; the portion 65 of said bar projecting outward from the frame to receive the bracket 66. At its rear end, the counter-shaft 63 carries a sprocket-wheel 67 over which passes a sprocket-chain 68 which transmits motion to the delivery-mechanism of the machine, as hereinafter explained.

To the rear end of the machine-frame is secured a horizontal rearwardly extending pivot-bracket 69, this pivot bracket being of approximately L-form, and having an arm 76 depending at right angles from the outer end of the bracket—as shown, and for a purpose to be presently explained. The inner end of this bracket rests upon the upper side of rear cross bar 2^a near the end of the right hand intermediate bar 4, and is bolted in such position, as at 77. Near its front end, this horizontal bracket 69 is formed integrally with a short pendent arm 78 to the lower end of which are integrally united the inner ends of two bracket-arms 72 and 75. Midway between its upper and lower ends, the pendent

arm 78 is formed, at its front side with a short integral forwardly projecting arm 71, as shown. The arm 72 projects horizontally at right angles from the arm 78, and its width projects forwardly from said arm 78; the outer or left hand end of the arm 72 being formed with an upwardly extending portion 73 and the upper end of the latter being formed with an outwardly extending horizontal portion 74. The arm 75 projects horizontally rearward parallel with the bracket 69, and at its outer end said arm 75 is formed with a pendent arm 76^a which extends at right angles from the rear end of the arm 75. When the bracket is in position, the short horizontal arm 71 extends directly beneath the same bar 2^a, and is secured to the said bolt 77 as the arm 70. The arm 72 extends transversely beneath the rear ends of the lower intermediate bars 4, and its upward extension lies against the outer side of the left hand intermediate bar 4, and thence outward horizontally beneath the left hand cross-bar 2^a, to which it is bolted, as at 77^a, the said arm 72 extending also horizontally transversely beneath the rear part of the trough or scoop 33.

I will now proceed to describe the delivery mechanism of the machine. The framework of this delivery-mechanism is of oblong rectangular form, and is composed of two side bars or beams 80 which are either of wood or metal, as preferred and which are pivotally connected, as at 81 and 82, to the lower ends of the pendent arms 76 and 76^a of the pivot-bracket just described; the said pivotal connections 81 and 82 being near the left hand end of the frame. To this frame are connected the lower ends of a supporting-chain 84, the said lower ends of the chain being connected to the side-bars 80 of the delivery-frame by eye-bolts 83 which extend vertically through said side-bars about midway of the length of the latter. The upper ends of this chain are connected to the lower end of a chain 84^a the upper end of which is connected to the rear end of an adjusting-lever 85. This adjusting-lever 85 extends obliquely across the main frame of the machine, from its rear right hand corner to its front left hand corner, and said lever is pivoted, as at 86, in the upper end of a standard 87 which is secured vertically upon the rear right hand corner of the platform 10. The front end of the lever 85 engages one or another of the teeth of a vertical ratchet-segment 87 which extends upward from the front left hand corner of the platform 10, and which is strengthened by a suitable brace 88. The arrangement is such that by depressing the front end of the lever 85, the right hand end of the delivery-frame will be raised, and by raising the front end of the lever 85, the left hand end of the delivery frame will be lowered; the engagement of the lever 85 with the ratchet-segment 87 retaining said lever and the delivery-frame in any desired position of adjustment. The left hand ends of the side

bars 80 of the delivery-frame are connected together rigidly by a stationary cross-piece, 89 while the right hand or outer ends of said side bars are connected rigidly together by a stationary cross-piece 90. Near the left hand end of the delivery frame is located a horizontal cross-shaft 91 the ends of which are journaled in stationary bearings 92 which are bolted or otherwise secured upon the side bars 80 near the rear ends thereof. At its front end this shaft 91 carries a sprocket-wheel 93 over which runs the sprocket-chain 68 from the sprocket-wheel 67 which is on the rear end of the countershaft 63; the rotation of the countershaft 63 producing, through the sprocket-chain 68, rotation of the shaft 91, for a purpose to be hereinafter explained. Between the two side bars 80, the shaft 91 carries two sprocket-wheels 94 over which run two sprocket-chains 95. The front ends of the side-bars 80 of this delivery-frame are formed with two longitudinal slots 95^a in which work the movable bearing-blocks 96 of the outer shaft 97 of the delivery-mechanism. These bearing-blocks are designed to be set toward or away from the outer ends of the slots 95 and are retained in any desired position of adjustment by retaining pins 98 which are inserted vertically downward through one or another of a number of openings 99 which are formed through the upper sides of the side-bars 80; the said pins entering the bearing-blocks 96. At points between the side-bars 80, this front shaft 97 carries two sprocket-wheels 100, over which run the sprocket-chains 95 before referred to. These sprocket-chains carry a flexible belt 101, which is of leather, canvas, or other suitable material, and which is provided at intervals with transverse cleats 103. These cleats extend across the outer surface of the belt 101 and are secured thereto by rivets 104, or bolts, or equivalent means, and the extremities of said cleats are secured to ears 102 which are formed upon the inner sides of the links of the sprocket-chains 95.

Above the side-bars 80 of the delivery-frame are mounted two parallel longitudinal T-bars 106, the left hand or inner ends of which are connected by a stationary cross-piece 107 which latter is bolted, at 107^a or otherwise suitably secured to the cross-piece 89 of the main delivery-frame which is bolted as at 108 to the side bars 80. The right hand or outer ends of the two T-bars 106 are connected together rigidly above the cross-bar 90 which is secured to side bars 80 by vertically extending bolts 110 by a stationary cross-piece 111, suitable bolts 112 passing through the ends of the cross-piece and into the ends of the T-pieces, as shown. The under side of the cross-piece 111 is formed with three pendent studs or bolts 113 which are preferably formed integrally with said cross-piece and which extend downward through the cross-piece 90, and upon the externally screw-threaded lower ends of which are screwed retaining-nuts 114 which abut against the under side of the cross-

piece 90. Midway of its length, the stationary cross-piece 111 is formed on its outer side with a vertical rib 115 in the center of which is formed a socket 116, for a purpose to be hereinafter explained. The outer side of the stationary cross-piece 111 is formed, near its ends with two vertical guide-ribs 115^a, also for a purpose to be hereinafter explained. From the upper and lower ends of this rib 115 project horizontally outward two guide pins or studs 117, the purpose of which will also be hereinafter explained. Through the cross-piece 111, at each side of the middle rib 115, are formed two vertical openings or slots 118 through which pass the two side-belts of the delivery-mechanism, as also hereinafter explained.

119 designates a movable or adjustable cross-piece which is mounted upon the right hand ends of the side-bars 80 of the frame. At its inner side, midway of the length of the same, is formed a vertical recess 120 which receives the middle or guide-rib 115 of the cross-piece 111, and through the cross-piece 119, from the outer to the inner side of the same, extends a horizontal channel 121. Through this channel extends an adjusting-screw 122, the inner end of the stem of which enters the socket 116 in the rim 115 of the cross-piece 111. In the middle of the cross-piece 119 are formed two horizontal parallel channels 117^a which are located the one above the other and which receive the guide-pins 117 of the cross-piece 111. The inner side of the cross-piece 119 is formed with four recesses 123, which are located in pairs at the ends of the cross-piece, and which receive the guide-ribs 115^a, before referred to. The two ends of the movable cross-piece 119 are recessed, as at 124 and within these recesses are mounted two vertical rollers 125; the ends of the vertical shafts 126 of said rollers being journaled in the upper and lower sides of the ends of said cross-piece. Between the ends of the cross-piece 107, and 89 at the opposite end of the side bars 80, are mounted two vertical rollers 127 each of which is placed in alignment with one of the outer rollers 125, just described. Around each pair of rollers 125 and 127, at each side of the frame of the delivery-mechanism, extends a continuous flexible belt or band 128 of leather, canvas, or other suitable material, the said bands thus extending horizontally at each side of the belt 101, and being provided at intervals with cleats 129, which extend transversely of the outer sides of the belts, and which are secured to said belts by rivets 130 or equivalent means. It is to be observed that the cleats 129 are placed upon the belts 128 at such intervals that the lower end of each of said cleats engages the front side of the end of one of the cleats 103; the arrangement being such that as the upper part or strand of the belt 101 moves from the inner to the outer end of the delivery-frame, the engagement of the cleats 103 with the cleats 129 shall cause the

inner parts or strands of the side belts 128 to move in the same direction. It will thus be seen that the earth discharged at the rear end of the trough or scoop 33 will fall upon the belt 101, and will be carried by said belt and the belts 128, to the outer end of the delivery-frame and discharged from said frame.

From the above description it will be seen that I have produced an excavating and grading machine which is simple, strong, durable and inexpensive in construction, and of light draft, and which is adapted for use in a great variety of work. Also one which is capable of all necessary adjustments for insuring the required depth of cut and height of delivery; the said adjustments being readily and easily accomplished.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. An earth excavating and grading machine, comprising a suitable wheeled frame, a revoluble power double crank shaft geared to one of the wheels of the frame, a revoluble double crank shaft mounted in the rear end of the frame, a trough or scoop supported longitudinally of the frame, and extending obliquely upward and rearwardly therein, and a pair of parallel bars pivotally supported by the crank-shaft sections, and adapted to move successively in the scoop, substantially as described.

2. An earth excavating and grading machine, comprising a suitable horizontally arranged frame-work, a pivoted hanger supported within said frame-work and vertically adjustable, a carrying wheel mounted upon the spindle or cross bar of the said hanger, a carrying wheel also supported at the opposite side of the machine, and vertically adjustable thereto, a front power crank-shaft mounted upon the machine frame, and a rear crank-shaft also mounted upon the machine frame, sprocket wheels carried by said shafts, and chains connecting said sprocket wheels, a longitudinal scoop or trough mounted in the machine frame and extending obliquely upwardly and rearwardly therein, and a pair of longitudinally reciprocating feeder bars connected to the cranks of said shafts and carrying feeder blades working longitudinally in said trough or scoop, substantially as described.

3. An earth excavating and grading machine, comprising a suitable horizontally arranged frame-work, a pivoted U-shaped hanger supported within said frame-work, and a carrying wheel mounted upon the spindle or cross bar of said hanger, and a vertically arranged lever, mounted on the frame-work and engaging a rack bar and having a crank arm at its lower end engaging the cross bar of the hanger, and a carrying wheel at the opposite side of the frame-work mounted vertically adjustable thereto, and a vertically arranged lever, engaging a rack-bar at its upper end and having a crank arm at its lower

end pivotally connected to a vertical bar secured to the carrying wheel, substantially as described.

4. An earth excavating and grading-machine, comprising a vehicle-frame having a platform mounted upon its top and raised above the same, a rack-frame mounted at each side of the platform, vertically adjustable carrying-wheels mounted beneath the
10 frame, and pivoted adjusting-levers mounted

at each side of the frame and engaging through intermediate mechanism described the axles of said carrying-wheels and also engaging the said rack-frames, substantially as set forth.

In testimony whereof I affix my signature in 15 the presence of two witnesses.

JOHN ELLIOTT.

Witnesses:

WILLIAM C. TAYLOR,
GEO. S. YOUNG.