(No Model.) 4 Sheets—Sheet 1.

J. COLGROVE.

POTATO HARVESTER.

No. 490,596. Patented Jan. 24, 1893.

Fig. 1.

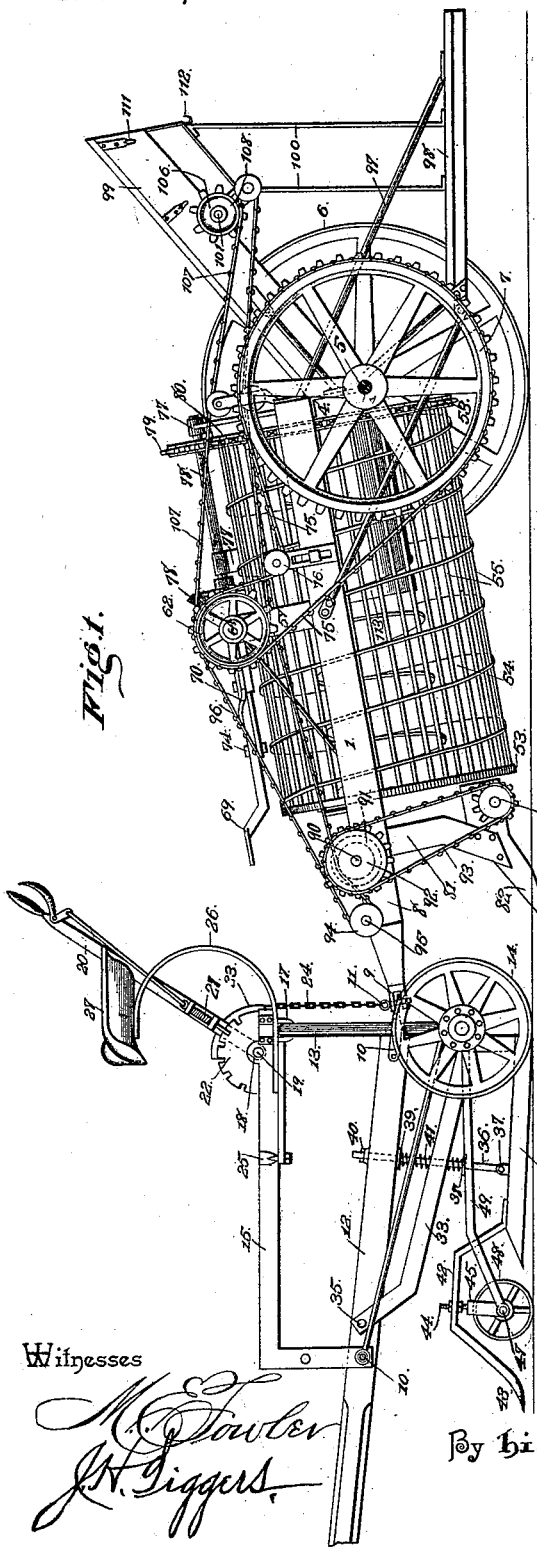
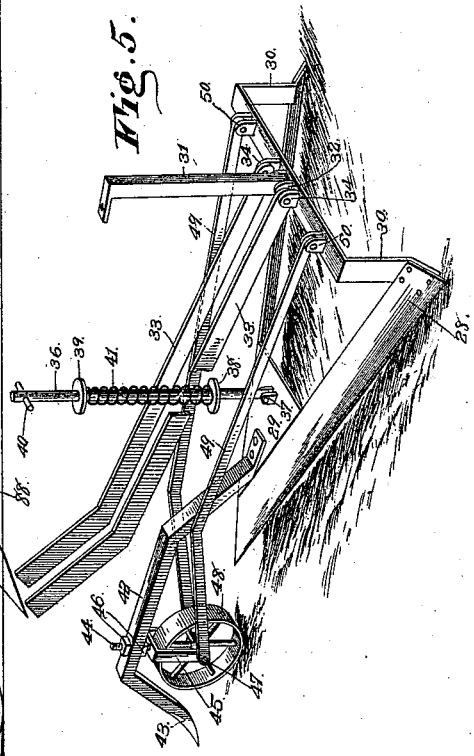


Fig. 5.



Witnesses

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(No Model.) 4 Sheets—Sheet 2.

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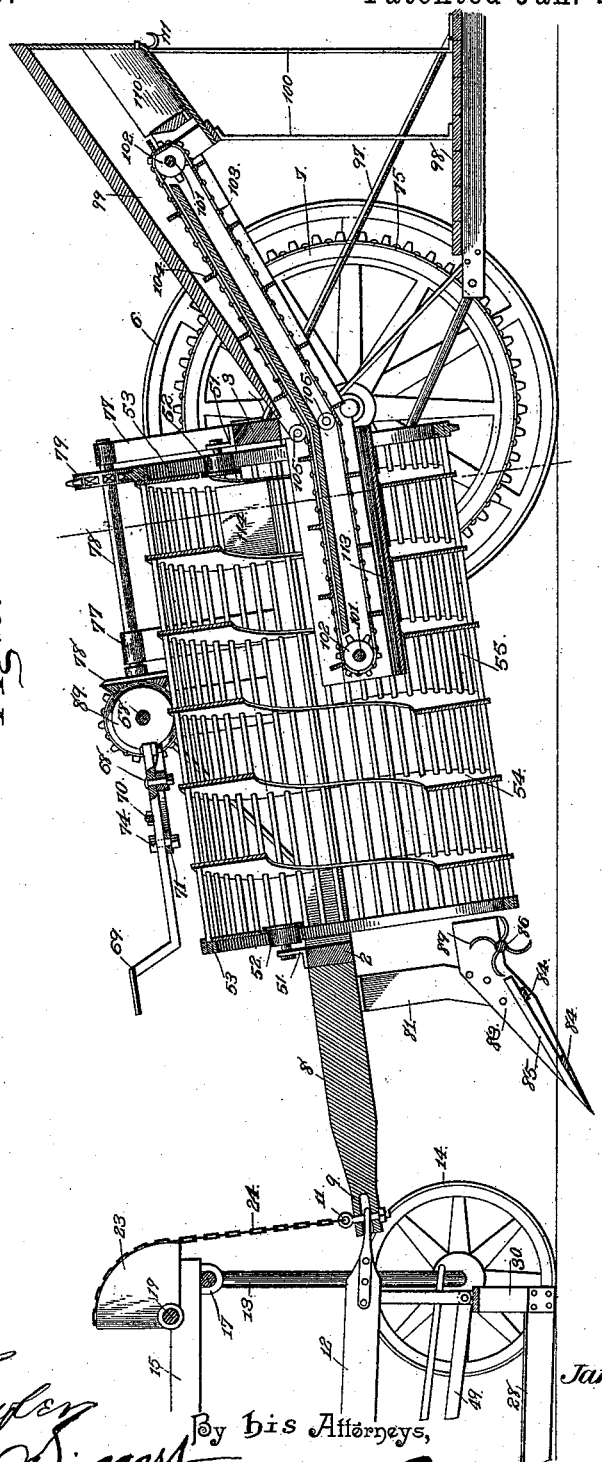

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

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POTATO HARVESTER.

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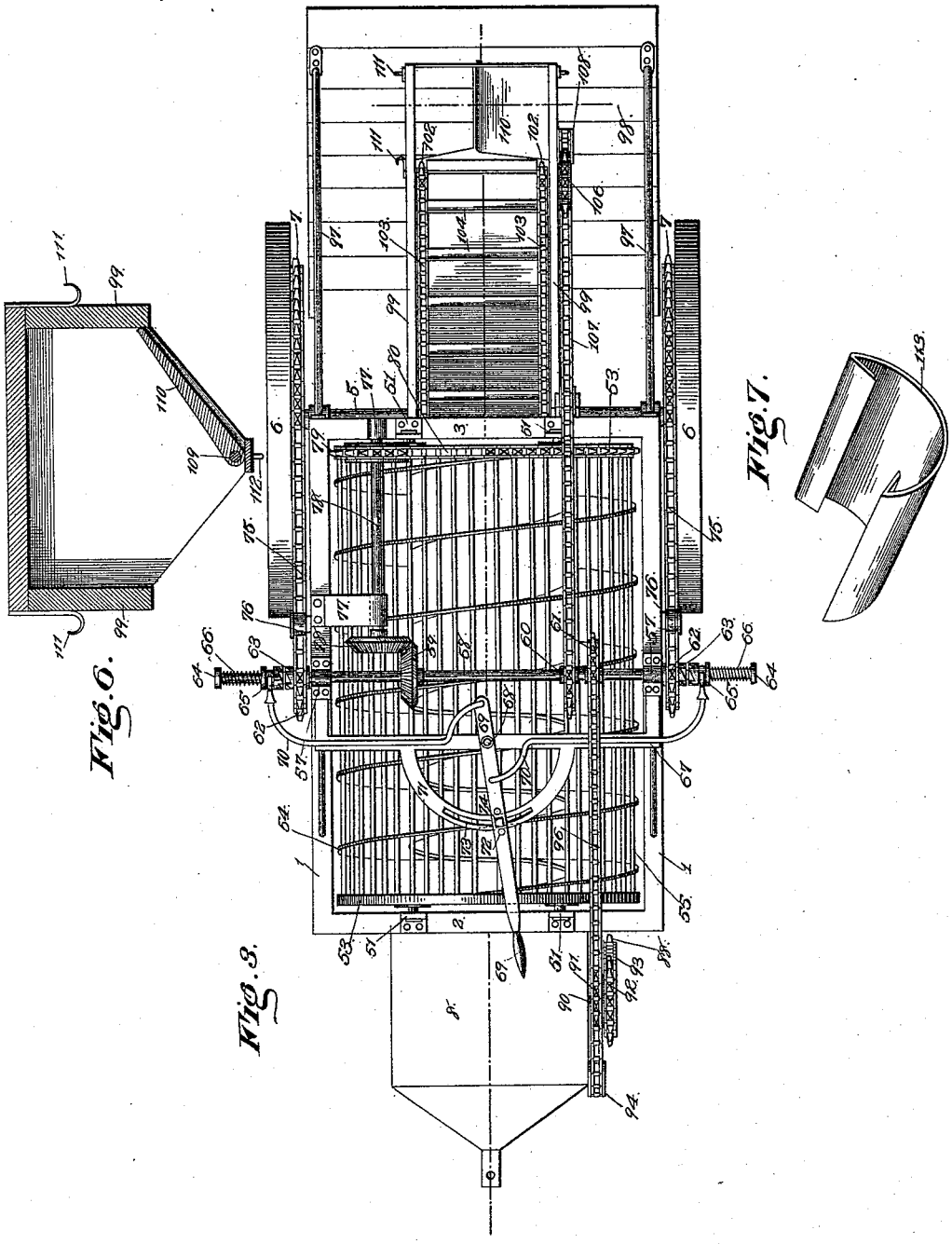

Fig. 6.

Fig. 3.

Fig. 7.

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POTATO HARVESTER.

No. 490,596. Patented Jan. 24, 1893.

Fig. 3.

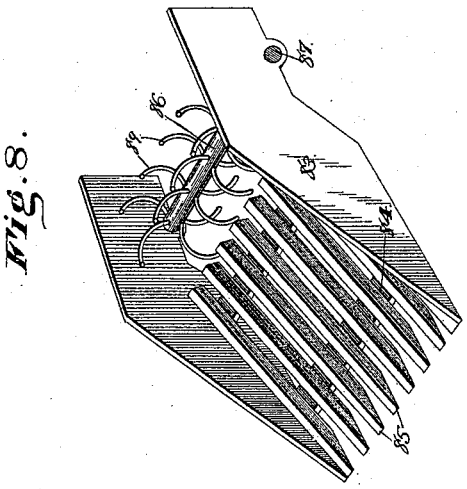
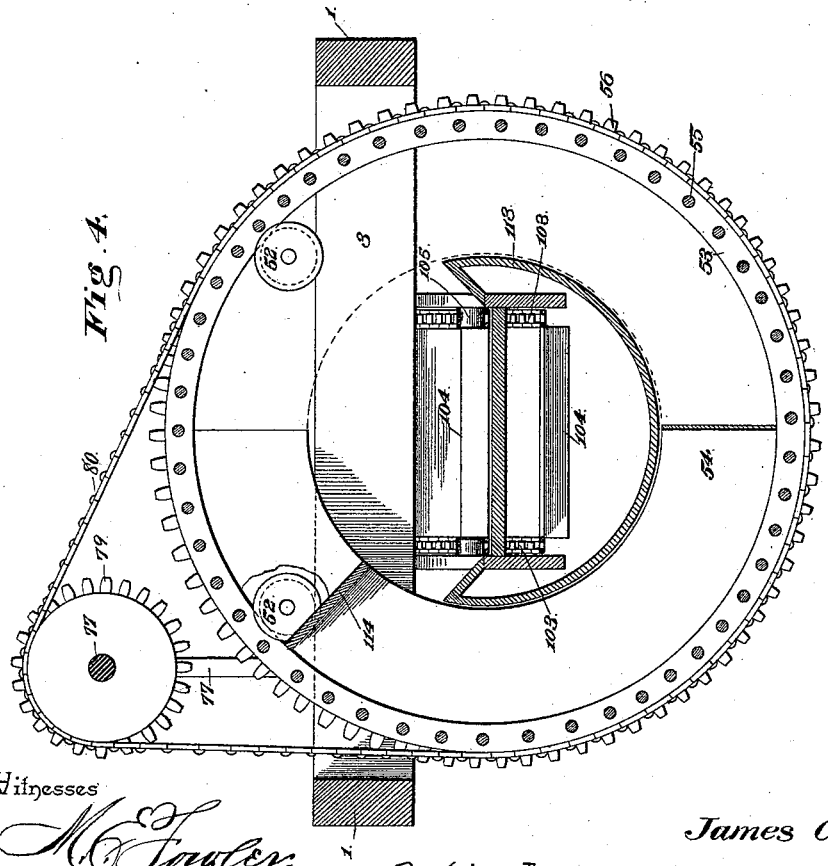


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES COLGROVE, OF CLEAR WATER, MINNESOTA.

POTATO-HARVESTER.

SPECIFICATION forming part of Letters Patent No. 490,596, dated January 24, 1893.

Application filed June 14, 1892. Serial No. 436,710. (No model.)

To all whom it may concern:

Be it known that I, JAMES COLGROVE, a citizen of the United States, residing at Clear Water, in the county of Wright and State of Minnesota, have invented a new and useful Potato-Harvester, of which the following is a specification.

My invention relates to improvements in potato harvesters, and the objects of the invention are to provide a machine adapted to remove the tops of the potatoes, dig the same from the ground, knock the dirt therefrom by means of a series of agitating devices, to deposit them after being cleaned upon a suitable carrier, and from thence conduct them into bags or other waiting receptacles, all in one continuous unbroken operation.

Various other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings: Figure 1 is a side elevation of a potato digger constructed in accordance with my invention, the same being shown in operative position. Fig. 2 is a vertical longitudinal section of the machine, the same being in a similar position. Fig. 3 is a plan view of the machine, the top-severing mechanism and draft appliances being removed. Fig. 4 is a vertical transverse sectional view, taken through the cylinder and looking rearward. Fig. 5 is a detail in perspective of the top-severing mechanism. Fig. 6 is a transverse section through the rear or delivery end of the elevator. Fig. 7 is a detail in perspective of the curved wall or shield employed for forming the pocket at the rear end of the cylinder. Fig. 8 is a detail in perspective of the shovel.

Like numerals of reference indicate like parts in all the figures of the drawings.

In practicing my invention I employ a rectangular frame, which consists of the opposite longitudinal frame-bars 1, and the front and rear transverse frame-bars 2 and 3, respectively. Bearing-brackets 4 depend from the rear ends and at the corners of the rectangular frame, and in these is mounted a transverse axle 5, which axle, at its outer extremities, forms spindles and receives the rear ground-wheels 6, to the inner faces of which sprocket-wheels 7 are made secure or are mounted upon the axle rigidly with the ground-wheels so as to rotate in unison.

A platform 8 projects forward from the front cross-bar 2 of the frame and is reduced at its front end to provide a coupling 9, in which engages a clevis 10, the two being pivoted together by a king-bolt 11, having an eye at its upper end. The coupling 10 is made fast to a draft-pole 12, and has its rear end straddled by an inverted **U**-shaped arched axle 13, whose lower extremities are outwardly bent to form bearings for a pair of opposite ground-wheels 14. A pair of inverted **L**-shaped bars 15 have their front ends bolted at 16 to the opposite sides of the draft-pole 12, which they embrace, and have their rear ends connected by clips 17, to the opposite sides of the center of the arched axle 13. These bars 15, near their rear ends, have bearings 18, formed in their upper edges for the accommodation of a transverse rock-shaft 19, which shaft carries a hand-lever 20, at the side of which is located a reciprocating spring-pressed pawl 21. A toothed segmental locking-standard 22, is located at the side of the lever upon one of the bars 15, and its teeth are designed to engage the aforesaid reciprocating pawl for the purpose of locking the lever at a proper inclination. The shaft 19 at one side of the lever carries a grooved segmental head or arm 23, which arm moves with the shaft and lever, and this arm has secured to its periphery the upper end of a chain 24, whose lower end is connected to the eye of the king-bolt 11. By means of a clip 25, a seat-supporting spring-standard 26 is secured to one of the inverted **L**-shaped bars 15, and upon the upper end of the same, directly over the axle 13, a seat for the accommodation of the driver is located.

As best shown in Fig. 5, I employ a **V**-shaped top-clearer or cutter-shear, and the same consists of a pair of blades 28, which converge toward their front ends and are inclined in opposite directions. These blades terminate at their outer edges in sharp cutting edges, and at their meeting angle are connected by an intermediate frog 29. At their rear extremities the blades are connected by an inverted **U**-shaped arch 30, and rising from the center of the arch is a standard 31, the upper extremity of which is secured to the under

side of the draft pole. The lower end of this standard, it will be observed, is pivoted at 32, to the arch 30, between a pair of ears that rise from the arch. Braces 33 have their rear ends pivoted between ears at 34 to the arch and extend forward and upward and are pivoted at 35 to the opposite sides of the pole 12.

From the frog 29 rises a vertical rod 36, the lower end of which is pivoted at 37 to the frog. A fixed head 38 is secured to the rod near its lower end, and a loose washer 39 is mounted on the rod above the head. The upper end of the rod passes through an opening formed in the pole 12, and is provided above the pole with a stop 40 for preventing the withdrawal of the rod therefrom. Located upon the rod between the head and washer, upon which latter the pole rests, is a coiled spring 41, which serves to bear upon the head 38, and hence depress the front end of the V-shaped cutter in a yielding manner, so that being pivoted to the lower end of the standard 31, the front end of the cutter is free to ride over obstructions that may lie in its path, or to conform to the heights of the hills over which it glides. A finger-bar 42 is secured at its rear end to the frog 29, extends forward from the same, and has its front portion downwardly bent and curved to form a finger or divider 43. In the bar 42, just in rear of the finger 43, there is secured the upper end or shank 44, of an inverted U-shaped frame 45. The shank is threaded in an opening in the bar 42, and may be vertically adjusted therein and be locked at any point of its adjustment by a pair of clamping-nuts 46. The lower end of the frame is provided with a transverse axle 47 for the accommodation of a flat-rim wheel 48, and connected to the opposite ends of said axle is a pair of rearwardly-disposed bars 49, the rear extremities of which are pivoted at 50 between a pair of ears rising from the arch at each side of the center thereof.

In bearings 51, rising from the opposite sides of the center of the front and rear cross-bars 2 and 3, are journaled stub-shafts carrying at their inner ends flanged pulleys or rollers 52, best shown in Fig. 4, and upon these pulleys are mounted for rotation internal rings 53, of metal and forming chines for the opposite ends of a cylinder. Between the chines a spiral partition 54 is located, and passing through the spiral partition near the outer edge of the same and the chines or rings is a series of annularly-arranged though longitudinally-disposed rods 55, spaced apart as shown, the chines, rods, and partition combining to form a cylinder. The rear chine is provided with sprocket-teeth 56, the office of which will appear hereinafter.

In opposite bearing-standards 57, rising from the longitudinal side-bars 1 of the frame, is journaled a transverse shaft 58, that extends across and above the before-described cylinder. A bevel gear-wheel 59 is located upon the shaft at one side of the center thereof, as best shown in Figs. 2 and 6, and at the opposite side of the center a pair of sprocket-wheels 60 and 61 are located, said sprocket-wheels and gear-wheel being fast upon and moving with the shaft. Just outside the bearings 57 loose sprocket-wheels 62 are located upon the shaft, and the same are provided at their outer sides with toothed hubs 63. Stops or heads 64 are at the extremities of the shaft, and splined upon the shaft between the stops 64 and toothed hubs 63 of the loose sprocket-wheels, is a pair of clutch-sleeves 65, designed to be normally pressed into contact with the toothed hubs 63, by means of coiled springs 66, interposed between the heads 64 and the aforesaid sleeves. A transverse rest-bar 67 extends from the standards forwardly and has pivoted at its center by a bolt 68, a lever 69. At opposite sides of the pivot 68 are loosely connected the inner ends of a pair of oppositely-disposed shifting-rods 70, whose outer ends terminate in yokes for loosely engaging the grooves of the before mentioned clutch-sleeves. A curved bar or plate 71 extends forwardly from the cross-bar 67 and supports the lever 69, whose front end, it will be understood, extends within easy reaching distance of the driver when mounted upon the seat. A keeper 72, of U shape, embraces the curved plate and has its ends connected to the lever, so that the lever is adapted to move upon the plate. The plate is provided with slots 73, with which is designed to engage a catch 74, so that the lever may be set at a desired point upon the plate 71, and thus spread or draw inward the extremities of the shifting-rods 70, so as to throw the clutch-sleeves out of or into engagement with the toothed hubs of the loose sprocket-wheels 62, and thus liberate or lock the same for movement upon the transverse shaft in a manner as will be obvious. These sprocket-wheels 62 are connected with the large sprocket-wheels 7, by means of sprocket-chains 75, at opposite sides of the machine, and for the purpose of maintaining them sufficiently tight, belt-tighteners 76, of ordinary construction, are located upon the bars 1 of the frame.

Bearing-standards 77 rise from one of the bars 1, and the rear cross-bar 3 of the frame, and in them is journaled a longitudinally-disposed short shaft 78, whose front end extends beyond the front bearing 77, and is there provided with a bevel gear wheel 78, and near its rear bevel a sprocket-wheel 79 is mounted on the shaft 78, the said sprocket-wheel being connected to the toothed chine at the rear end of the cylinder by a sprocket-chain 80.

In hangers 81, depending from the framework in front of the cylinder, is a shovel 82, and said shovel, as best illustrated in Fig. 8, consists of opposite side-pieces 83, the front ends of which are reduced to form points, a pair of cross-bars 84 and a series of spaced-apart longitudinally-disposed bars or tines 85, the front extremities of which are beveled, the said bars being mounted upon the cross-bars 84. A shaft 86 is journaled in bearings

87, and at its outer end, at one side of the shovel, is provided with a small sprocket-wheel 88, and between its bearings with a series of curved radiating arms or spokes 89. Upon a stub-shaft 90, extending from the platform 8, an inner sprocket-wheel 91, and an outer sprocket-wheel 92, are mounted, said outer sprocket-wheel being connected by a chain 93 with the sprocket 88. A pulley 94 is journaled upon a stub-shaft 95 in front of the shaft 90, and a sprocket-chain 96 passes over the sprocket-wheel 61 of the shaft 58, around the pulley 94, and has its under side engaging with the inner sprocket-wheel 91 of the shaft 90, so that the movement conveyed from the ground-wheels to the shaft 88 is reversed, as will be obvious.

Hangers 97 depend from the rear portion of the frame and support a platform 98, for the accommodation of the attendant, and also for the purpose of supporting the bags or other receptacles in which the potatoes are directed.

99 designates the opposite sides of a carrier-frame, and the same is supported above the platform by supporting rods 100. Upper and lower transverse shafts 101 are journaled transversely in the opposite side-walls of the elevator case, and upon each of said shafts a pair of sprocket-wheels 102, is mounted. The upper and lower sprocket-wheels of the two shafts are connected by pairs of endless sprocket-chains 103, the links of which are at intervals connected by transverse bars which are L-shaped in cross-section and designated as 104. Pulleys 105 serve to maintain the chains at an angle agreeing with the disposition of the side-walls of the casing, such angle being formed for the purpose of disposing the front end of the elevator casing into the rear end of the cylinder. A sprocket-wheel 106 is located upon the outer end of the upper shaft 101, and a sprocket-chain 107 passes under and has its upper side engaging with the sprocket-wheel 106, passes around a pulley 108, in rear of the sprocket-wheel, and over the sprocket-wheel 60, before-mentioned as being mounted upon the transverse shaft 58, so that the motion of the shaft 101 is reversed to give proper motion to the elevator or carrier.

The elevator casing is provided with opposite openings or discharges, best shown in Fig. 6 of the drawings, and below the same there is pivoted at a point between the openings, as indicated at 109, a vibrating cutoff 110. This cutoff is adapted to be thrown or swung to either side of its pivot and to close either of the openings. When in position for closing one opening, as will be understood, the remaining opening is unclosed or open and free to permit of the discharge of the potatoes. Opposite pairs of bag-holding hooks 111 are located at the sides of the carrier case, and a central pair of hooks 112 is located at the center of the case, the object being to always have a bag or receptacle ready to receive the discharged potatoes, which I accomplish by providing the two dischargers, whereby when one bag is being tied and removed another may be opposite the remaining discharge, which is open, and become filled, and in this way no time is lost in removing or setting the bags in position.

113 designates a curved guard or plate of semicircular shape, whose upper edges are inwardly turned and secured to that portion of the casing of the elevator or carrier which is located in the rear end of the cylinder. This guard is formed upon a circle concentric with the inner periphery of the spiral partition, and lying close to the same. Between the last two spirals or convolutes of this partition, a transverse partition 114 is located, and the same forms a stop for the course of the potatoes, so that they are caught and elevated to be subsequently dropped upon the lower end of the carrier, and thus be conducted by the latter to the points of discharge.

The operation of the invention is as follows: Through the medium of the lever 20, the lower end of the cylinder, the supporting main frame, and the draft pole together with the top-clearing devices carried thereby, are all lowered to position, as shown in Fig. 1, and through the medium of the lever 69, in the manner heretofore described, the clutch-sleeves 65 are thrown into position for engaging the hubs of the sprocket-wheels 62, so that motion from the axle 5, through the sprocket-chains 75, is conveyed to the transverse shaft 58, and in the manner heretofore described conducted to the several mechanisms. The dividing finger 43 serves to divide the tops, forcing a portion to the right and a portion to the left, and forming a path for the roller or wheel 48 to enter and travel upon. This roller flattens down the vines or tops and is closely followed by the V-shaped cutter, whose converged end enters between the divided tops and, by reason of the disposition given the blades, their outer edges serve to shear against the tops, and thus sever them. The tops are swept to one side out of the path of the shovel, so that only the potatoes are elevated from the ground and scooped up by the shovel. The incoming potatoes serve to force in a steady stream the potatoes in advance over and upon the revolving arms of the transverse shaft 88, so that they, together with what dirt may have adhered to them, are deposited into the cylinder, where the potatoes and dirt are caught by the spiral partition and conducted to the rear portion of the cylinder. When the potatoes reach the rear portion of the cylinder, they are caught in the manner heretofore described and delivered upon the moving carrier or elevator, up which they travel and are delivered into the receptacles placed under the discharges thereof.

From the foregoing description, in connection with the accompanying drawings, it will be seen that I have provided a machine not complicated, that may be produced at a reason-

able cost, that is of light draft, and capable of completely harvesting potatoes, in which operation I include the dividing of the potato-tops, a rolling of the same, whereby they are prepared to be acted upon close to their roots, by the shear-like cutter following thereafter, the digging of the potatoes, the tumbling and cleaning of the same, and a subsequent elevation and delivery thereof.

Having described my invention, what I claim is:

1. In a potato digger, the combination with the digging and cleaning mechanism, of a V-shaped cutter comprising converging blades, laterally disposed, inclined and means for yieldingly pressing the cutter upon the ground, substantially as specified.

2. In a potato digger, the combination with the digging and cleaning mechanism, of a pair of converged laterally disposed inclined cutting-blades, means for yieldingly pressing the blades upon the ground, and means for raising and lowering the blades and digging mechanism, substantially as specified.

3. In a potato digger, the combination with the digging and cleaning mechanism, of a pair of converging blades located in front of the same, a dividing finger located in front of the blades, and a roller located in the path of the finger, substantially as specified.

4. In a potato digger, the combination with the digging mechanism and the framework for supporting the same, of a draft-pole connected to the framework, an axle provided with ground-wheels, loose connections between the axle and draft-pole, a pair of converging cutters located below the pole, a dividing finger-bar extending from the cutters, hinge-connections between the pole and cutters, a lever, a rock-shaft for the same, means for locking the lever, a segmental arm upon the rock-shaft, and a chain connecting the segmental arm with the loose connection between the draft-pole and framework, substantially as specified.

5. In a potato digger, the combination with the digging devices, the framework for the same, and the draft-pole loosely connected to the front end of the framework, of a V-shaped cutter located below the draft-pole, a rod loosely hinged to the cutter and having its upper end extended through a hole in the pole and provided with a stop, a head on the rod below the pole and near the cutter, a loose washer on the rod below the pole, and a coiled spring upon the rod and interposed between the head and washer, substantially as specified.

6. In a potato digger, the combination with the main frame, the digging and cleaning devices carried thereby, and the draft-pole loosely coupled to the front end of the frame, of the inverted U-shaped axle arranged over the rear end of the pole and provided with ground-wheels, the opposite angle-bars loosely connected to the axle and to the draft-pole between its ends, the brace-rods pivotally connected at their front ends to the pole and at their rear ends to the axle, a rock-shaft journaled on the L-shaped bars, a toothed locking standard at one side of the shaft, a segmental arm mounted on the shaft, a chain connected to the arm and to the loose connection between the frame and pole, a hand-lever mounted on the shaft, and a spring-pressed pawl mounted on the hand-lever for engaging the teeth of the locking-standard, substantially as specified.

7. In a potato digger, the combination with the framework, the digging and cleaning mechanism, the pole loosely connected to the front end of the framework, the inverted U-shaped axle having ground-wheels, the opposite inverted L-shaped bars pivotally connected to the pole at their front ends and at their rear ends clipped to the axle, a lever supported by the bars, connections between the lever, and connection of the pole and frame, of the brace-rods pivotally connected to the pole and at their rear ends to the axle, the V-shaped cutter below the pole, the yoke connecting the rear extremities of the cutter, the bars pivotally connected to the yoke and to the pole, the standard pivoted to the yoke and rigidly secured to the pole, the forwardly-disposed bars pivoted to the yoke, an axle connected to the front ends of the same, a wide rim wheel mounted on the axle, a frame for the same, and a bar extending forwardly from the V-shaped cutter, perforated to receive the shank of the same, and bent in front of the same to form a declining separating finger, substantially as specified.

8. In a potato digger, the combination with the framework, the digging and cleaning mechanism, and the draft-pole connected to the framework, of a V-shaped cutter supported below and by the draft-pole, a bar extending forward from the cutter and bent at its front end to form a depending dividing finger, said bar being provided in rear of its finger with a threaded perforation, an inverted U-shaped frame located under the bar and having an upwardly-disposed threaded shank, opposite clamping-nuts above and below the bar, and a flat rim wheel having its axle journaled in the frame below the bar and adapted to travel in the path of the finger, substantially as specified.

9. In a potato digger, the combination with the framework, the open cylinder mounted therein, and means for rotating the cylinder, of a shovel at the front end of the cylinder, a conveyer at the rear end, means for moving the conveyer, a spiral partition located in and moving with the cylinder, and a transverse partition inserted between the last two spirals of the partition, substantially as specified.

10. In a potato digger, the combination with the framework, the cleaning cylinder journaled therein, and means for rotating the cylinder, of a platform in rear of the frame, standards rising therefrom, an endless carrier and its case supported upon the standards,

the front end of the carrier extending into the cylinder, means for directing the potatoes from the cylinder to the lower end of the carrier, opposite openings at the opposite sides and at the rear end of the casing, a vibrating door or cutoff pivoted below the center of the casing and adapted to close either opening, a central pair of hooks below the openings, and opposite side pairs at the opposite sides of the openings, substantially as specified.

11. In a potato digger, the combination with the rectangular frame, the cylinder mounted for rotation therein, means for rotating the cylinder, and a spiral partition located in the cylinder and provided between its last two spirals with a transverse partition, of an endless carrier having its front end extending into the rear end of the cylinder, the semicircular guard embracing the under side of the carrier frame and concentrically curved with relation to the spiral partition, and means for operating the carrier, substantially as specified.

12. In a potato digger, the combination with the rectangular frame, the bearing-standard, the axle, the ground wheels mounted thereon, the sprocket-wheels carried by the axle, the rotatable cylinder having peripheral sprocket-teeth, of standards rising from the main frame, a transverse shaft journaled in the standards and terminating at its ends in heads, clutch sleeves splined on the shaft near the heads, springs for normally pressing inward upon the clutch-sleeves, loose sprocket-wheels mounted on the shaft and having toothed hubs to be engaged by the clutch-sleeves, chains connecting the sprocket-wheels with those of the axle, a pair of longitudinally opposite bearings, a short longitudinal shaft journaled therein, a sprocket-wheel on said shaft, a sprocket-chain passing around the same and the teeth of the cylinder, and intermeshing beveled gears mounted on the front end of the longitudinal shaft, and an intermediate point of the transverse shaft, and means for shifting said clutches, substantially as specified.

13. In a potato digger, the combination with the main frame, the axle, the ground-wheels, the sprocket-wheels mounted on the axle, the rotatable cylinder, the inclined carrier in rear of the same and extending into the cylinder, the shovel at the front end of the cylinder, the transverse shaft journaled in the sides of the shovel and provided with arms, the sprocket-wheel on the shaft, the pair of upper sprockets, the pulley in front of the same, of the transverse shaft arranged above the cylinder, sprocket-wheels thereon, sprocket-chains connecting the same with the wheels of the axle, the clutch-sleeves for engaging the toothed hubs of the sprocket-wheels, a pair of rods extending inwardly from the clutch-sleeves, a transverse bar in front of the transverse shaft above the cylinder, a lever pivoted between its ends upon the bar and connected at opposite sides of its fulcrum to the sleeve-operating rods, means for locking the lever, a pair of fixed sprockets mounted on the transverse shaft, chains passed about the sprockets, one of which extends in rear and under the sprocket-wheel of the carrier and over a pulley in rear of the same, and the other of which passes forward and over the inner sprocket-wheel of the pair above the shovel and around the pulley in front of the same, and a short sprocket-chain around the outer sprocket-wheel of the pair and around the sprocket-wheel of the shovel, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JAMES COLGROVE.

Witnesses:
W. W. WEBSTER,
WALLACE WEBSTER.