

No. 640,812.

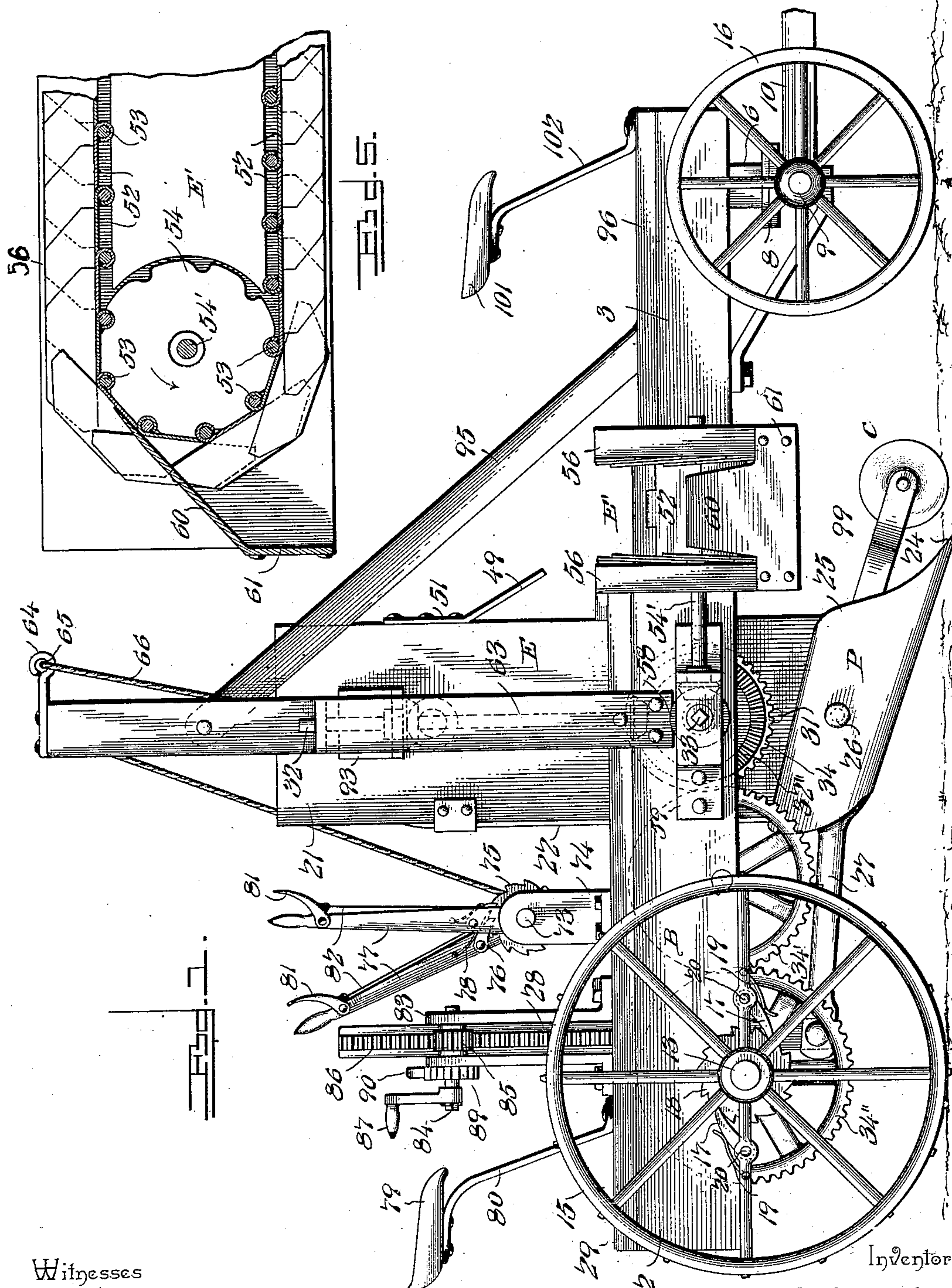
Patented Jan. 9, 1900.

M. A. RICHARDSON.
DITCHING MACHINE.

(Application filed Feb. 27, 1899.)

.(No Model.)

4 Sheets—Sheet 1.



Witnesses

C. F. Stewart,

Heath Sutherland

By *WVS* Attorneys.

M. A. Richardson

Chas. Snow Geo.

No. 640,812.

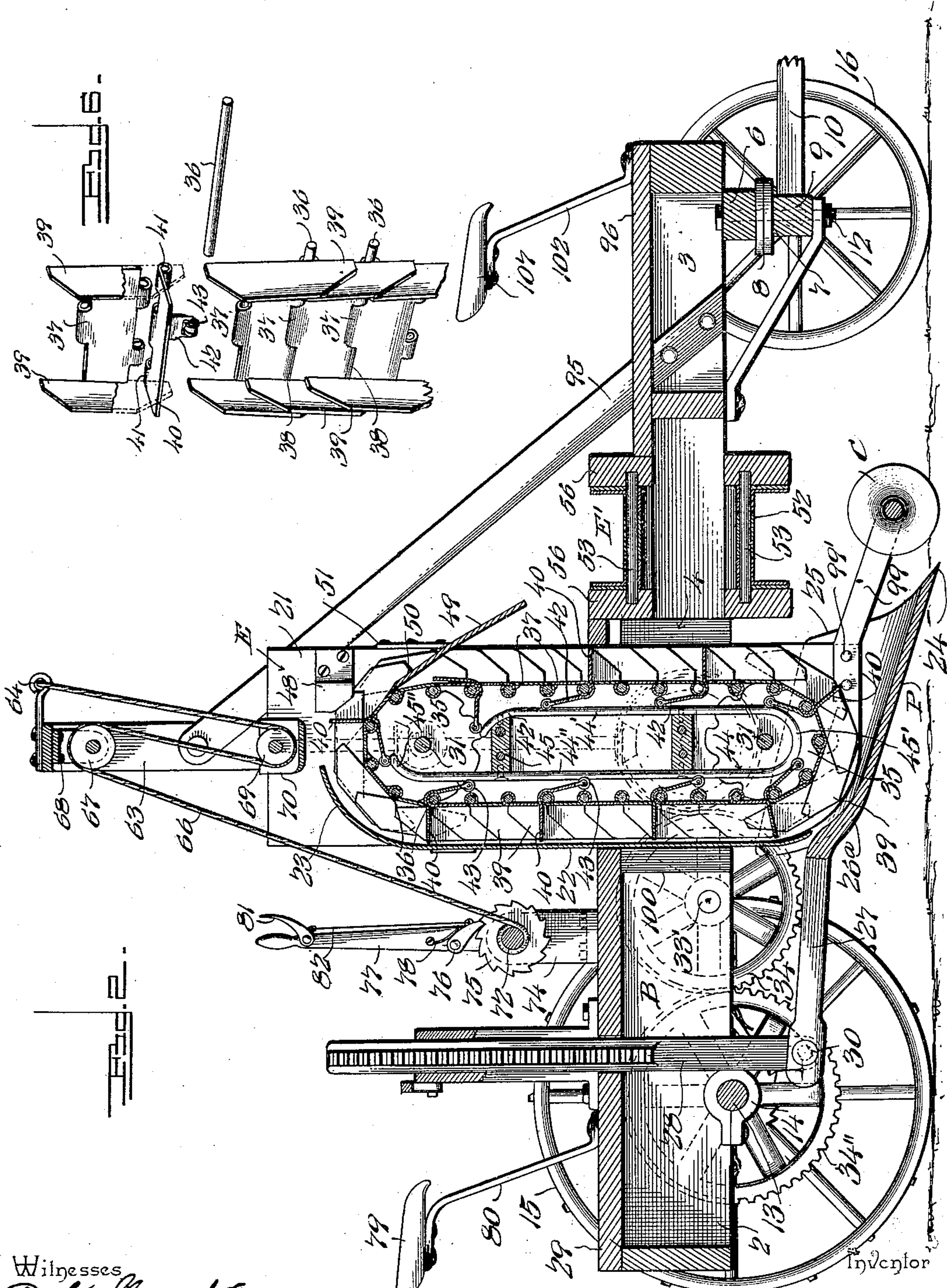
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4 Sheets—Sheet 2.



Witnesses
E. F. Stewart,
Nath. L. L. L.

By his Attorneys, M. A. Richardson
C. A. Snow & Co.

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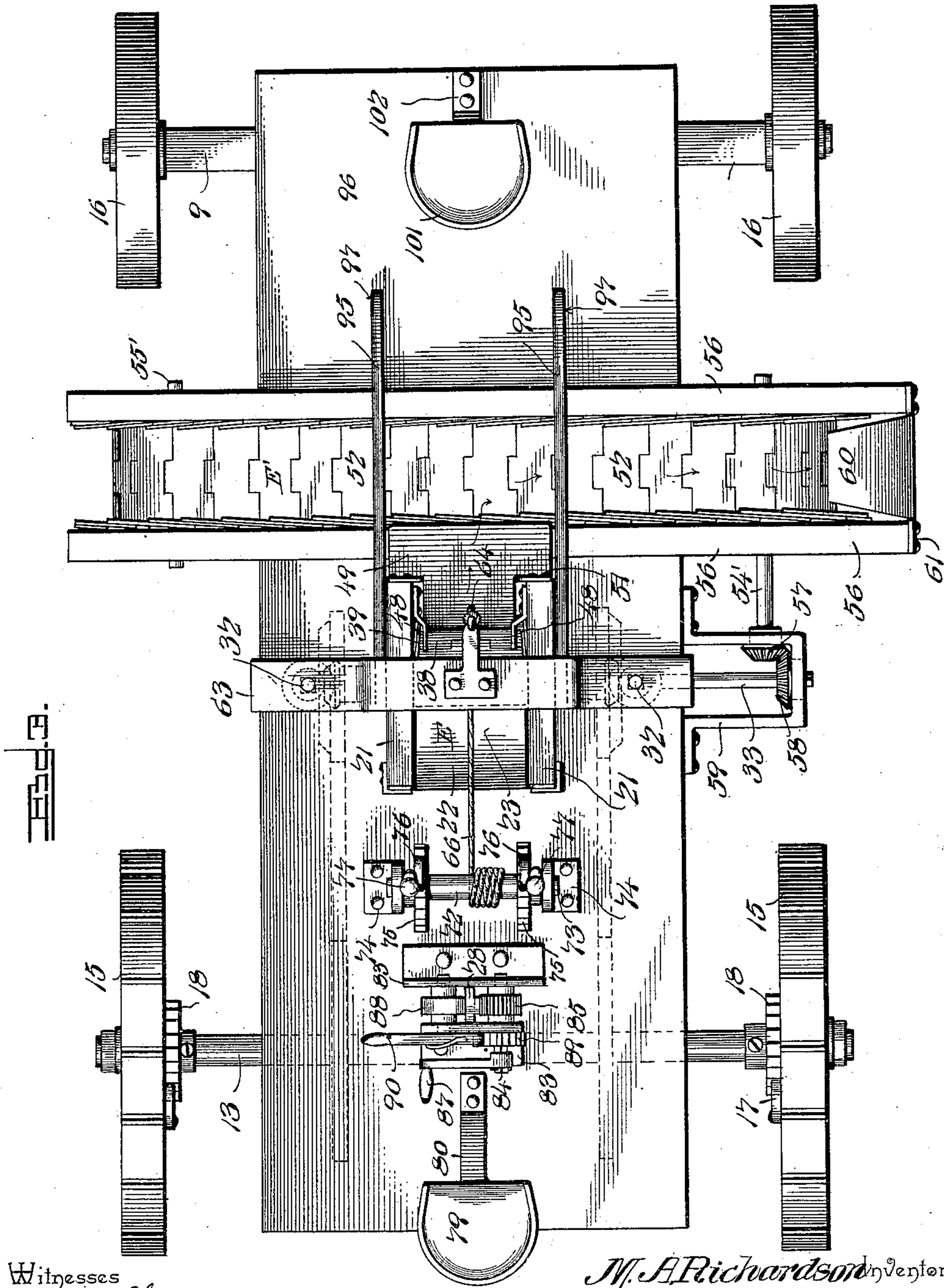
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4 Sheets—Sheet 3.



Witnesses

E. F. Stewart
Wm. L. Lathrop

By *W. D. S.* Attorneys,

M. A. Richardson Inventor.

C. A. Snow & Co.

No. 640,812.

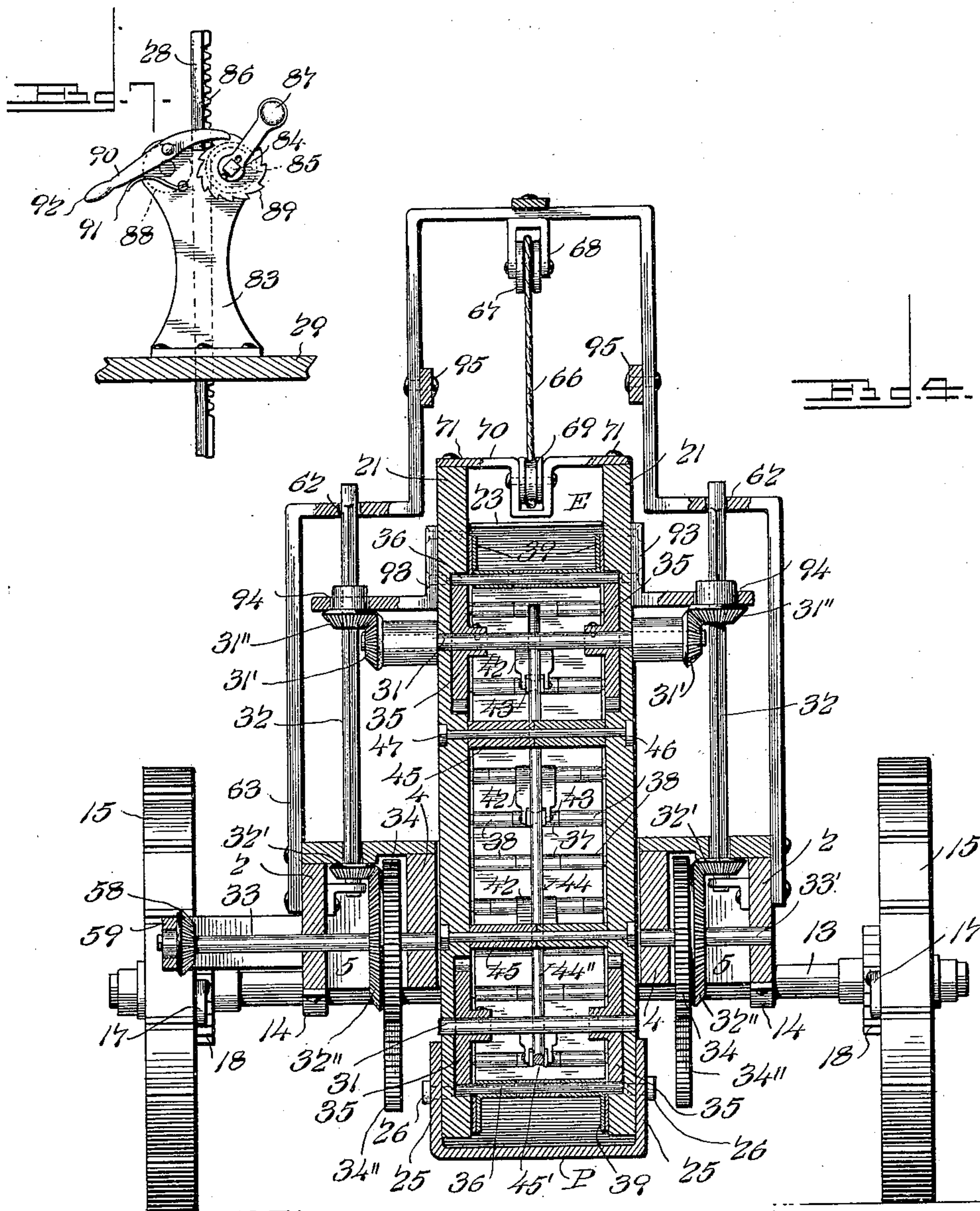
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(No Model.)

4 Sheets—Sheet 4.



Witnesses

E. F. Stewart
Heath Luthers

M. A. Richardson Inventor

By *W. S.* Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

MARSHAL A. RICHARDSON, OF WINDSOR, ILLINOIS.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 640,812, dated January 9, 1900.

Application filed February 27, 1899. Serial No. 707,049. (No model.)

To all whom it may concern:

Be it known that I, MARSHAL A. RICHARDSON, a citizen of the United States, residing at Windsor, in the county of Shelby and State of Illinois, have invented a new and useful Ditching-Machine, of which the following is a specification.

This invention relates to ditching-machines; and the object of the invention is to provide a simple, compact, and easily-operable apparatus of this character which can be driven by horse, steam, or other motive power and which can form ditches of different depths. In the present case the plow or analogous ditching member is adjustable relative to the body of the vehicle, and means are provided for disposing of the dirt loosened up by the plow, such means including two transversely-disposed conveyers, one of which is vertical and the other of which is horizontal. The vertical conveyer or elevator serves to carry the dirt from the plow and to discharge the same upon the horizontal elevator, which empties it into a road or otherwise disposes of it. The vertical elevator is preferably adjustable, and its casing supports the plow, whereby both of these members can be simultaneously adjusted, in addition to which the plow has an independent adjustment for regulating the depth of entrance of its point into the ground. It will be evident, therefore, that while the plow is carried by the casing of the vertically-disposed elevator it has an adjustment independently of that of the elevator, and the means which regulate the positions of the elevator and of the plow are within convenient reach of the machine attendant.

With these ends in view the invention consists in the novel combination of elements and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of a ditching-machine constructed in accordance with my invention. Fig. 2 is a longitudinal central section of the same. Fig. 3 is a top plan

view. Fig. 4 is a transverse section taken through the elevator-casing. Fig. 5 is a sectional detail of the discharge end of the secondary elevator. Fig. 6 is a front perspective view of a fragment of the primary or hoisting conveyer disjointed for the purpose of more clearly disclosing the construction thereof. Fig. 7 is a detail in rear elevation of a portion of the mechanism for adjusting the plow.

Like characters denote like and corresponding parts in each of the several figures of the drawings.

The body of the vehicle is designated by B, and it constitutes a main frame for sustaining the principal operating parts of the ditching mechanism, and it includes in its construction side beams, as 2, against the inner front portions of which the shorter beams 3 extend, the two parts being secured together in some convenient manner. An auxiliary frame is shown at 4, it being rectangular in shape and having a guideway, hereinafter more particularly described, through which the longitudinally-adjustable vertically-disposed elevator is slidable, and this auxiliary frame is open at its rear end and between the side pieces thereof, and between said side pieces and the main beams 2 the spacing-blocks 5 are disposed, the latter being located at the back end of the body B. To the under side of the beams 2 and 3 the bolster 6 is secured and is connected with the axle-block 7 through the usual fifth-wheel 8, the axle being denoted by 9 and being connected with the body of the vehicle by the hounds 10, which are united at the front end and are adapted to receive the king-bolt 12, and the rear ends of said hounds are secured to the beams 3.

The rear axle of the vehicle is designated by 13, and it is sustained by bearings, as 14, secured to the opposite side pieces of the internal and auxiliary frame 4, and is provided with traction-wheels, as 15, having the usual widened tires. The front axle 9 is provided with wheels 16, adapted to turn thereon.

The rear axle is in the nature of a main or primary driving-shaft, and it serves, when the machine is moved forward, to furnish the necessary power for operating the two conveyers,

which dispose of the dirt dug up by the plow and by a colter, which is usually employed in connection therewith. The traction-wheels 15 are loose upon the shaft or axle 13, and they carry pawls, as 17, conveniently pivoted to the spokes thereof and which coöperate with the ratchet-wheels 18, keyed or otherwise fixed to the ends of the axle or shaft 13. Each pawl is held in engagement with the teeth of the coacting ratchet by a bowed spring 19, and the free ends of these springs bear against the pawls at places between their points and pivots for the purpose of holding the same in engagement with the ratchet-teeth. The opposite ends of the springs are bent at right angles and extend through openings formed in the spokes of the wheels, and they extend through eyes or loops, as 20, secured to the spokes of the wheels at points about midway of the fixed and free ends of the springs. From this description it will be seen that the vehicle can be moved rearward without operating the main axle or driving-shaft 13; but when the apparatus is advanced the pawls by engaging the ratchets as the wheels turn serve to rotate the ratchets, whereby the axle or shaft 13 and the other parts of the machine will be simultaneously driven.

The invention includes in its scope a dirt-elevator, as E, which includes in its construction a casing consisting of the side boards or plates 21, which sustain the two shafts of the elevator, and the back plate 22, the lower edges of said three casing parts being in horizontal alinement, while the back plate 22, which connects the side boards 21, is forwardly curved, as at 23, at its upper end to overhang the elevator E and prevent dirt, &c., from being thrown rearwardly into the face of the driver or upon any of the regulating devices under his control.

The plow is designated by P, and it has a sharpened point 24, adapted to penetrate into the earth for the purpose of digging up the same, and the dirt being pushed upon the upper surface of the plow, where it is taken up by the vertical elevator E. The plow is preferably carried by the elevator-casing, and it has side wings or flanges, as 25, through which the pivots 26 extend, said pivots being seated in suitable openings formed near the lower ends of the side boards 21 of the elevator-casing, and said plow is provided at its rear end with the upturned guard portion 26^a, to which the shank or arm 27 is secured, said arm being bifurcated at its rear end to receive the vertical or upright lifting-bar 28, which extends through the rear platform 29, secured to the upper side of the body B, at the rear end thereof. The lifting-bar 28 and the shank or arm 27 are connected by the pivot 30. From the construction described it will be evident that by lifting the bar 28 the point 24 of the plow can be lowered and by depressing said lifting-bar the plow-point

can be raised. It is apparent that any means may be provided for operating the lifting-bar 28; but I prefer to employ the mechanism hereinafter described for this purpose.

The shafts of the elevator E are designated by 31, and the upper one is extended beyond the elevator-casing and is provided at its ends with bevel-gears 31', which mesh with the bevel-gears 31'' on the upper ends of the vertical squared shafts 32, which shafts 32 are provided at their lower ends with bevel-gears 32', meshing with bevel-gears 32'', carried, respectively, by the shafts 33 and 33'. The shafts 33 and 33' are provided with parallel gears 34, meshing with the idle gears 34', which in turn mesh with the master-gears 34'', secured to the rear axle 13. The gearing described serves when the machine is moved forward to operate the elevator E for raising the dirt from the plow, and I prefer to employ the same, although it is evident that other mechanism can be provided for this purpose, as the invention is not limited in this respect to such driving connections.

The elevator-shafts 31 carry the sprocket-wheels 35, each shaft being provided with two wheels, located near the opposite ends thereof, and the peripheral sockets in said sprocket-wheels are adapted to receive the pivots 36, which connect the blades or floats of the elevator E, every alternate blade having an ear 37 disposed between the ears 38 upon the preceding blade or float, and through these ears or bearing-sleeves the pivots 36 extend, whereby a belt having a continuous surface is formed. The blades of the elevator E are provided at their ends with flanges or offsets 39, bent at right angles thereto, and the flanges of each blade overlap those of the preceding blade and are overlapped by the flanges of the succeeding blade, whereby continuous side walls are provided, which serve as guards. It will be understood that the pivots of the elevator extend beyond the blades thereof, and to permit their free motion the side boards of the casing are chambered.

The lifting-elevator includes in its construction the carrying-blades 40, which are adapted to take up the earth from the plow P, and these blades are located at regular intervals around the elevator and have ears or bearing-sleeves 41, which are adapted to aline with the ears 37 and 38 and are adapted to receive certain of the pivots, and these blades 40 are adapted to oscillate between the side walls of the elevator, composed of the flanges or offsets 39. The lifting-blades 40 are provided with inwardly-extending arms 42, carrying antifriction-rolls 43, peripherally grooved and adapted to travel against the longitudinal cam 44. The cam 44 is secured midway between the side boards 21, between the blocks 45, through which the stay-bolts 46 extend, said bolts passing through said side boards, embraced at their outer ends by the nuts 47, which serve to hold the parts in assembled re-

lation. The entering end of the cam 43 is located at a point just in advance of the lower sprocket-wheels 35, while the leaving end of said cam is located at a point above the upper shaft 31, and the operation is such that the entering in of the cam will serve to engage in the grooves of the antifriction-rolls 43 as the elevator operates, thereby to throw the blades 40 outwardly at substantially right angles to the elevator, whereby said blades can carry the earth upwardly, and the edges of the blades as they travel up the rear run of the elevator are located in proximity to the casing-plate 22, and the rear end of the cam is such that it holds the blades 40 in proper position, whereby such blades can sustain the dirt thereon. The cam is located in the space between the upper and lower sprocket-wheels, and it has the vertical front and rear portions 44' and 44'', connected by the curved lower portion 45', which is disposed below the lower sprocket-shaft 31, and the rear vertical portion 44'' of said cam is curved at its upper end, as at 45'', to extend over the top shaft 31 for the purpose of properly holding the blades until the dirt is discharged therefrom.

As the blades 40 travel over the upper side of the conveyer they strike the shifting device 48, disposed in their path and consisting of a plate secured to the upper side of one of the side boards 21 and adapted to engage the said blades for the purpose of maintaining them in proper position relatively to the elevator.

In connection with the elevator I provide a combined scraper and chute 49, having the scraping portion 50 extending into the space between the flanges 39 and the edge of which is straight and is adapted to strike the extreme inner portion of the dirt-carrying faces of the blades 40 and to scrape all of such dirt-carrying faces as said blades advance with the elevator. The dirt of course is discharged onto the combined scraper and chute, from whence it can pass to the secondary elevator E'. The part 49 is provided with vertical ears or lugs 51, secured in some convenient manner to the forward edges of the side boards 21.

The secondary or horizontal elevator E' is adapted to receive dirt from the chute-plate 49 and to dispose of the same at the side of the road, and it includes in its construction a series of blades, as 52, constructed like the blades of the primary elevator and connected together by pivots or journals 53, which travel around the sprockets 54 on the shaft 54' and also around the wheels 55 on the shaft 55', said shafts being supported between the side boards 56 of the casing, which have openings to receive the framework or body of the vehicle. The shaft 54' extends beyond the casing and is provided with a bevel-gear 57, meshing with the bevel-gear 58, secured to the shaft 33. The shaft 55' and the transversely-disposed shaft 33 are sustained at their outer ends by the double U-shaped bracket or bearing 59, secured to the body of the machine and also to

one of the side boards 56. It will be evident by reason of the connections described that the elevators E and E' will be simultaneously operated as the vehicle moves forward, the dirt being taken up by the plow P and carried therefrom by the primary elevator E and discharged from the latter onto the chute-plate 49, from whence it falls onto the secondary or horizontal elevator E', to be discharged by the latter into the road.

A hood or guard 60 is disposed at the discharge end of the secondary elevator E', and it consists of a plate disposed between the side boards 56 and having offsets 61 fastened to the front edges of said side boards and serving to control the delivery of the dirt and preventing it from being thrown too far forward by the momentum of the elevator.

The upper ends of the squared shafts 32 have journal portions 62, fitting in openings formed in the horizontal portions of the open upright or standard 63, the legs of which are secured to the outer sides of the body B. The topmost horizontal portion of this standard is provided with a projection or hook 64, adapted to receive the loop or eye 65 at one end of the winding cable or chain 66. The winding cable 66 passes over the guide pulley or roller 67, supported between the branches of the inverted-U-shaped hanger or bearing 68, secured to the under side of the upper portion of the standard and under the pulley or roller 69, supported between the branches of the U-shaped bearing 70, which has lateral ears 71, bent over and secured to the upper portions of the side boards 21. The opposite end of this cable is wound upon the drum or cylinder 72, secured to the shaft 73, supported by the vertical portion of the substantially L-shaped uprights 74. The ratchet-wheels 75 are mounted to turn with the shaft and drum, and they cooperate with the pawls 76, pivoted to the hand-levers 77, which are loosely fulcrumed upon the drum-shaft 73. The pawls 76 are held in engagement with the teeth of the ratchet by the substantially rectangular springs 78, secured at their rear ends to the hand-levers 77, adjacent to the pivots of the pawls, and the free ends of said springs bearing against the pawls near their points or working ends.

The upper ends of the hand-levers are located within reach of an operator who occupies the seat 79, connected with the spring 80, which in turn is fastened to the upper side of the platform 29. It will be evident that by moving the levers 77 forward the pawls 76 thereon serve to rotate the ratchet-wheels 75, and thereby the drum 72, whereby the cable or chain 66 will be wound on said drum for the purpose of raising the primary elevator E. By disengaging the pawls from their ratchets the elevator can descend by reason of its weight, and when in the proper position it can be locked by throwing the pawls into engagement with the ratchets. The pawls are disengaged from the ratchet by means of aux-

iliary levers 81, carried by the main or hand levers 77, and these auxiliary levers are substantially inverted-Y shape, one branch of each Y being pivoted to the levers and the other branches thereof being jointed to the connecting-rods 82, which are attached at their lower ends to the pawls 76. By operating the auxiliary levers 81 the pawls can be raised out of engagement with the cooperating ratchets for the purpose of hoisting or permitting the lowering of the elevator. To hoist the elevator, one of the levers 77 will be advanced, whereby the pawl thereof will serve to engage and rotate the ratchet 75, and consequently the drum 72, backward movement of said drum being prevented by the other pawl, which is in engagement with the other ratchet, and this operation will be subsequently repeated with respect to the other hand-lever when the hand-lever that is first operated has been returned to its initial position. As the levers move rearward the pawls of course run idly over the teeth of the ratchets.

The levers when in their primary position rest against the forward of the two L-shaped bearing-plates 83, which support between them the shaft 84, to which the pinion 85 is secured, said pinion meshing with the rack 86, fixed to the outer surface of the lifting-bar 28. The bearing-plates 83 are secured to the upper side of the platform 29. The pinion-shaft 84 carries the crank 87, located near the operator's seat 79 and by which the shaft 84, and consequently the pinion 85, can be rotated to either raise or lower the lifting-bar 28 for the purpose of adjusting the plow P. The lifting-bar is guided in its vertical reciprocations by the roller 88, traveling in contact therewith and rotatively supported between the bearing-plates 83. As a means for locking the lifting-bar 28, and consequently the plow P, in their adjusted positions I provide pawl-and-ratchet mechanism, including the ratchet 89 and the pawl 90. The ratchet 89 is secured to the pinion-shaft 84, said shaft being preferably square where it is embraced by the ratchet. The point of the pawl is held in engagement with the ratchet by the spring 91, the coiled end of which is secured to one of the bearing-plates 83 and the free end of which is bent in substantial U shape to straddle the operating or rearwardly-extending arm 92 of the pawl. By pressing this operating-arm 92 the point and the pawl will be lifted clear of the ratchet, whereby the shaft 84 can be turned to permit the lowering of the lifting-bar 28, and consequently adjust the plow. When the pawl is released, it is immediately thrown into engagement with the ratchet by the action of the spring 91, thereby to firmly lock the parts.

For the purpose of holding the two pairs of cooperating bevel-gears 31' and 31" in mesh I provide stop devices which are adapted to engage the gears 31", whereby the latter will be held positively in mesh with their com-

panions in the different adjustments of the primary elevator, and these stop devices consist of the substantially L-shaped brackets 93, the vertical portions of which are secured to the outer faces of the side boards 21 and the horizontal portions of which have circular openings 94, through which the hubs of the bevel-gears 31 pass, so that said horizontal portions of the brackets can engage the upper faces of the two bevel-gears 31" to hold them in proper relation with their mates, it being understood that the squared shafts 32 are not raised and lowered with the elevator.

A pair of braces are shown at 95, these being diagonally disposed and the upper ends thereof being secured to the inside of the upright or standard 63 and the lower ends of said braces being secured to the short beams 3, thereby strengthening the support for the elevator and connected parts. The driver's platform is denoted by 96, and it is fastened to the upper side of the body B, near the front end thereof, and is notched or recessed, as at 97, to receive the lower ends of the diagonal braces 95.

In connection with the plow P, I provide a rolling colter c, which serves to loosen up the earth so as to aid the plow, and this colter is secured to the carrier 99, which in turn is fastened, as at 99', to the lower ends of the side boards 21, and it being understood that the colter is elevated and lowered with the primary elevator E.

A series of guide-blocks 100 is secured between the opposite longitudinal side members of the auxiliary frame, and they are substantially right-angular in cross-section and constitute guides for receiving the side boards 21 of the elevator-casing, whereby the elevator will be maintained in the proper vertical position as it is raised and lowered.

The driver's seat is denoted by 101, and it is secured to the spring 102, the lower end of which is fastened to the platform 96.

Changes in the form, proportion, size, and the minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having thus described the invention, what I claim is—

1. In a ditching-machine, the combination with an elevator, of a plow having side wings or flanges pivotally connected with the elevator, and means independent of the elevator movably connected to and adapted to turn the plow upon its pivotal support, substantially as and for the purpose described.

2. In a ditching-machine, the combination with an adjustable elevator and a plow having side flanges or wings pivotally connected with the elevator at an intermediate point and simultaneously elevated and turned upon its pivotal support when adjusting the elevator, of means independent of the elevator movably attached to and adapted for adjusting the plow to compensate for the variation of

pitch of the plow due to the vertical adjustment of the elevator, substantially as described.

3. In a ditching-machine, the combination with an elevator and means for adjusting the elevator vertically, of a plow having side flanges or wings pivoted at an intermediate point to the said elevator, a bar or analogous support pivotally connected with the plow remote from its pivotal connection with the elevator, and means for adjusting the said bar vertically, as and for the purpose set forth.

4. In a ditching-machine, the combination with a casing open at its lower end and provided with an elevator, of a plow closing the lower end of the casing and attached thereto and having upturned side walls embracing the sides of the said casing and having its rear end curved upwardly to conform to the path of travel of the lower end portion of the elevator, substantially as and for the purpose described.

5. In a ditching-machine, the combination with an elevator and a plow, of independent means for adjusting the elevator and plow, and a colter to act jointly with the plow and attached to and movable with the elevator independently of said plow, substantially as described.

6. In a ditching-machine, the combination with an elevator, means for adjusting the elevator vertically, and a colter located in advance of the elevator and attached thereto and movable vertically therewith, of a plow pivotally connected with the elevator and located in the rear of the said colter, and means independent of the elevator for turning the plow upon its pivotal connection with the elevator, substantially as set forth.

7. In a ditching-machine, the combination of a vertically-adjustable elevator and a plow having side flanges or wings pivotally attached to the lower end of the elevator, the said side flanges or wings being at an elevation above the lower extremity of said elevator, a vertically-arranged rack-bar pivotally connected with an arm of the plow, a guide for directing the rack-bar in its vertical movements, a shaft provided with a pinion intermeshing with the teeth of the rack-bar for moving it vertically, and means for holding the shaft in an adjusted position, substantially as described.

8. In a ditching-machine, the combination with an elevator and its casing the latter being supported for adjustable movement, of a plow, means for adjusting the plow, a standard having a hook, a winding cable connected with said hook, a winding-drum adapted to receive said cable, a guide for the cable connected with the casing, and means for turning said drum, substantially as described.

9. In a ditching-machine, the combination with an elevator and its casing the latter being supported for adjustable movement, of a plow, means for adjusting the plow, a standard having a hook, a winding cable connected

with said hook, a winding-drum adapted to receive said cable, a guide for the cable connected with the casing, a shaft carrying said drum, a ratchet on said shaft, a main or hand lever loosely carried by the shaft, an auxiliary lever carried by said main or hand lever, and a pawl connected with said auxiliary lever and adapted to engage said ratchet, substantially as described.

10. In a ditching-machine, the combination with an adjustable elevator and its casing, of a plow, a standard having a hook, a winding cable connected with said hook and also with said casing, a winding-drum adapted to receive said cable, a shaft supporting said drum, ratchets carried at opposite ends of the shaft and rotative with the drum, hand-levers loosely carried by the shaft and provided with pawls adapted to engage the ratchets, and means on said hand-levers for operating the pawls, substantially as described.

11. In a ditching-machine, the combination with an adjustable elevator and its casing the latter being longitudinally adjustable, a plow connected with the casing, independent mechanisms for adjusting the casing and plow, a second elevator in position to receive dirt from the first-mentioned elevator, and a hood located at the discharge end of the second elevator and adapted to control the discharge of dirt, substantially as described.

12. In a ditching-machine, the combination with a primary elevator and its casing including two side boards, of a plow, a second elevator in position to receive dirt from the first-mentioned elevator, and a combined scraper and chute operating in connection with the primary elevator, and serving to scrape the dirt from the blades of said primary elevator and to direct the same onto the secondary elevator, substantially as described.

13. In a ditching-machine, the combination with a primary elevator and its casing including two side boards, of a plow, a second elevator in position to receive dirt from the first-mentioned elevator, and a combined scraper and chute operating in connection with the primary elevator, and serving to scrape the dirt from the blades of said primary elevator and to direct the same onto the secondary elevator, a series of blades on the primary elevator having inwardly-extending arms and adapted to lift the dirt from the plow, and a cam secured between the walls of the casing and adapted to engage said inwardly-extending arms, substantially as described.

14. In a ditching-machine, the combination with a primary elevator and its casing including two side boards, of a plow, a second elevator in position to receive dirt from the first-mentioned elevator, and a combined scraper and chute operating in connection with the primary elevator, and serving to scrape the dirt from the blades of said primary elevator and to direct the same onto

the secondary elevator, a series of blades on the primary elevator having inwardly-extending arms and adapted to lift the dirt from the plow, a cam secured between the walls of the casing and adapted to engage said inwardly-extending arms, a combined scraper and chute operable in connection with the primary elevator, and a shifting device for the blades of the latter located to the rear of said combined scraper and chute, substantially as described.

15. In a ditching-machine, the combination with means for loosening and lifting the dirt, of an elevator supported at its upper and lower ends upon sprocket-shafts, and a cam comprising front and rear vertical portions, and a lower curved portion, the latter extending beneath the lower sprocket-shaft, and the rear vertical portion extending over the upper sprocket-shaft and the front vertical portion terminating a distance below the upper sprocket-shaft, substantially as described.

16. In a ditching-machine in combination with means for loosening and lifting the earth, an elevator comprising a connected series of blades having inwardly-extending arms, upper and lower sprocket-shafts supporting the elevator, and a cam comprising a lower curved portion extending beneath the lower sprocket-shaft, a front vertical portion terminating a distance below the upper sprocket-shaft and curving rearwardly and a rear vertical portion having its upper end curving over said upper sprocket-shaft, substantially as set forth.

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

M. A. RICHARDSON.

Witnesses:

U. A. NOBLE,
R. M. HILL.