

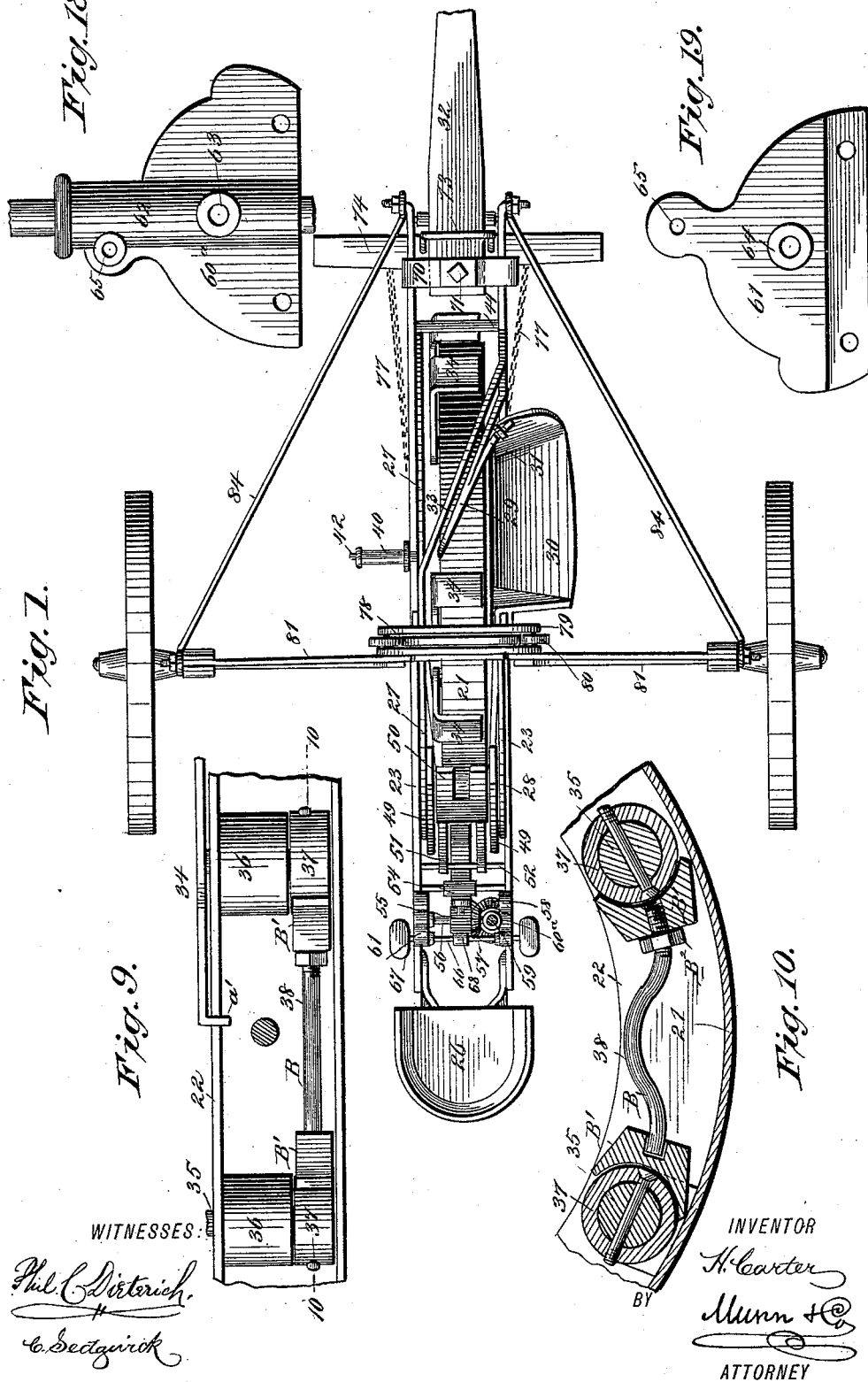
(No Model.)

4 Sheets—Sheet 1.

H. CARTER.
DITCHING AND EXCAVATING MACHINE.

N. 421,122.

Patented Feb. 11, 1890.



WITNESSES:

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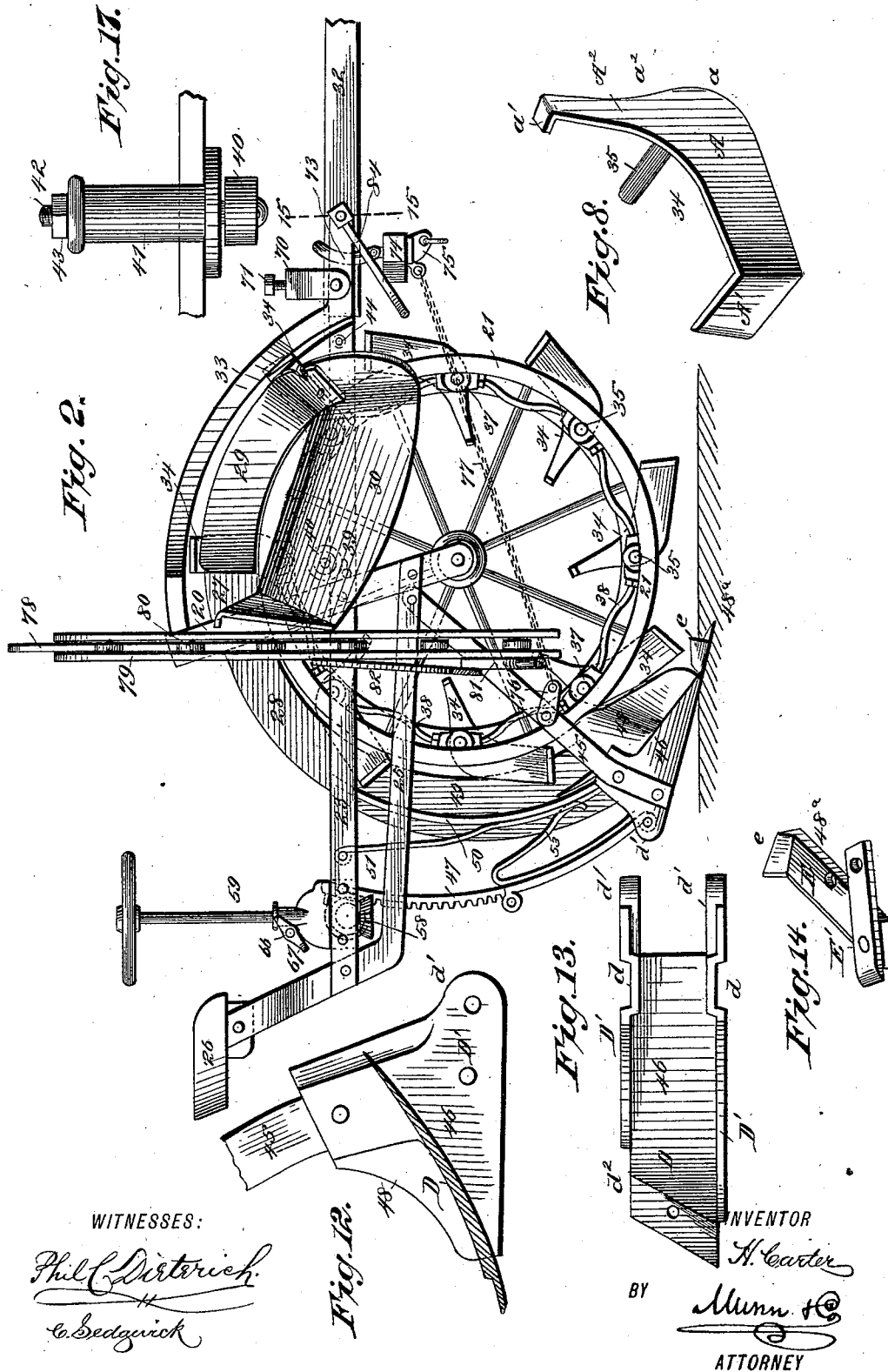
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4 Sheets—Sheet 2.

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Fig. 12.

Fig. 13.

Fig. 14.

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Fig. 3.

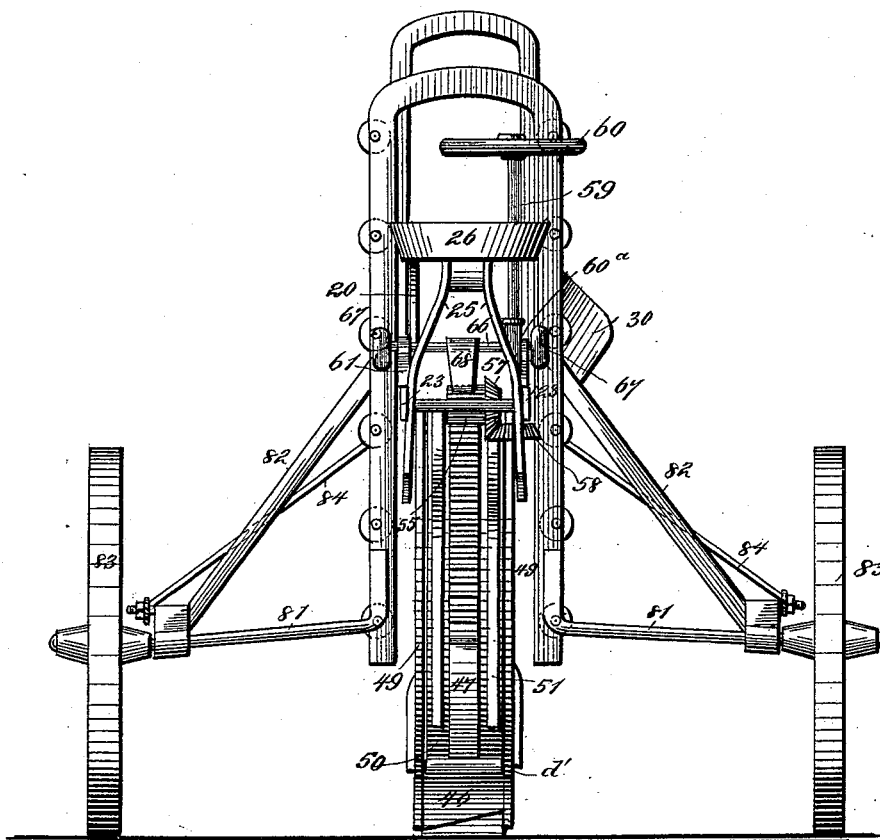


Fig. 5.

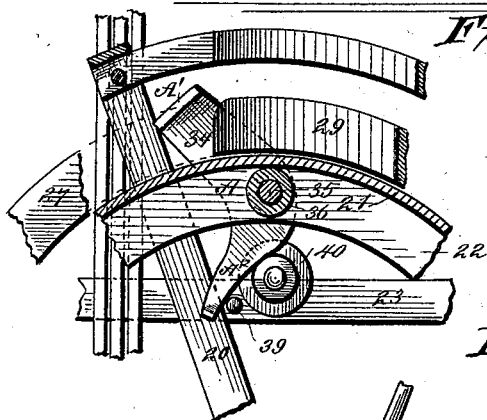


Fig. 6.

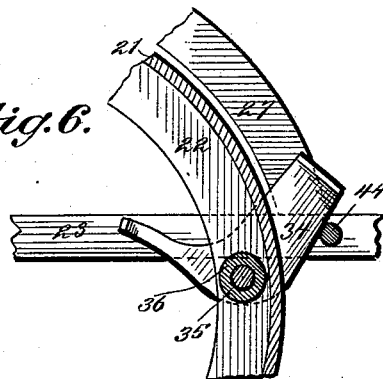
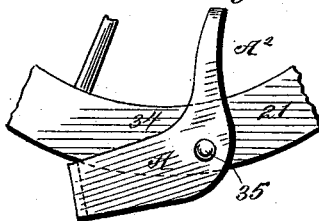


Fig. 7.



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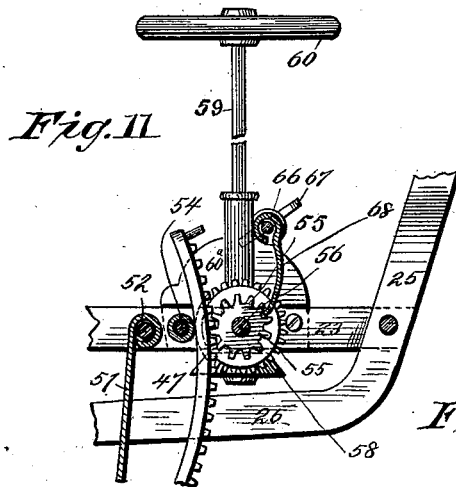
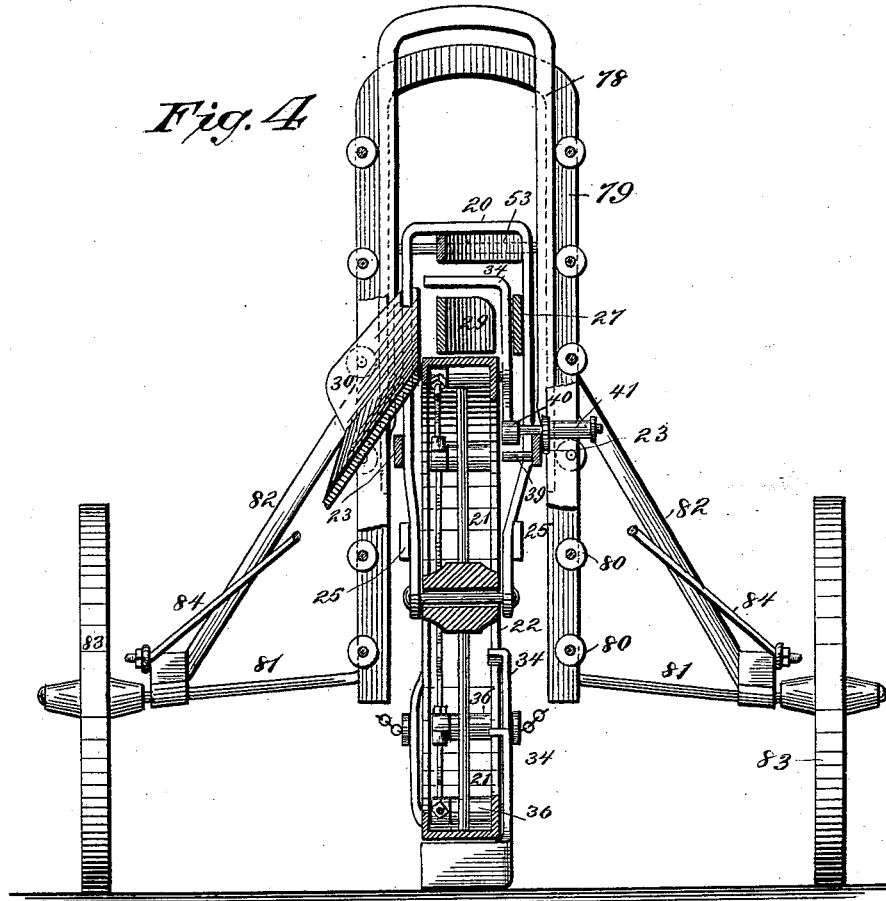
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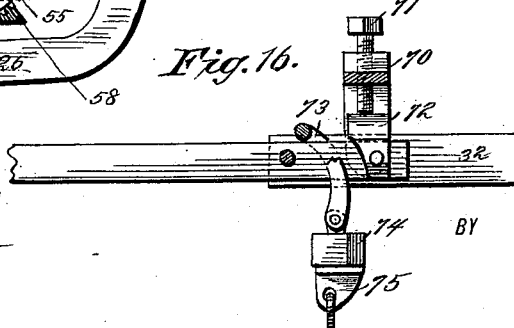
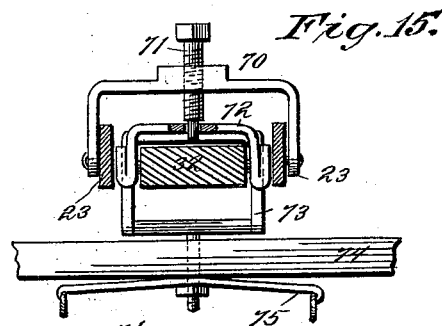
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UNITED STATES PATENT OFFICE.

HENRY CARTER, OF ALBION, NEW YORK.

DITCHING AND EXCAVATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 421,122, dated February 11, 1890.

Application filed April 5, 1889. Serial No. 306,098. (No model.)

To all whom it may concern:

Be it known that I, HENRY CARTER, a subject of the Queen of Great Britain, residing at Albion, in the county of Orleans and State of New York, have invented a new and useful Improvement in Ditching and Excavating Machines, of which the following is a full, clear, and exact description.

My invention relates to an improvement in machines for cutting and clearing or excavating ditches or trenches, and more particularly to that class of ditchers which operate by means of a plow or share and having a large elevating-wheel fitted with scoops to lift and discharge the soil.

The object of the invention is to so improve the construction of the machine for which Letters Patent were granted to myself June 28, 1887, and numbered 365,580, that the machine will be more compact, effective in operation and durable, and capable of being manufactured at a less cost.

The invention consists in the novel construction and operation of the several parts, as will be hereinafter more fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the machine. Fig. 2 is a side elevation with one of the guide-wheels removed. Fig. 3 is a rear elevation. Fig. 4 is a vertical section taken near the center of the machine. Fig. 5 is a vertical section through a portion of the dumping shear-plate and elevating-wheel, illustrating a bucket being dumped. Fig. 6 is a similar view illustrating the mechanism for restoring the bucket to its normal position. Fig. 7 is a side elevation of a bucket and a partial side elevation of the wheel. Fig. 8 is a perspective view of a bucket detached. Fig. 9 is a plan view of a portion of the elevating or bucket wheel, illustrating the application to the bucket-spindles of a spring-brake adapted to retain the buckets normally in a receiving position. Fig. 10 is a longitudinal section on line 10 10 of Fig. 9. Fig. 11 is a sectional detail view illustrating the means employed for raising and lowering

the plowshare. Fig. 12 is a vertical section through the plowshare-support. Fig. 13 is a plan view of the support, and Fig. 14 is a perspective view of the plowshare detached. Fig. 15 is a transverse vertical section on line 15 15 of Fig. 2, and Fig. 16 is a partial side elevation of the tongue and a vertical section through the tongue-clevis and adjusting device. Fig. 17 is a plan view of the friction trip-roller and bearing for the same. Figs. 18 and 19 are side elevations of the standards in which the share-manipulating mechanism illustrated in Fig. 11 is journaled.

In carrying out the invention the frame of the machine consists of an essentially perpendicular arch 20, in the lower end of which the elevating or bucket wheel 21 is journaled, the periphery of the wheel at one or both sides being provided with an inwardly-extending flange 22 at a right angle to the tire. At or near the center of the arch, at each side, a beam or bar 23 is rigidly secured in any approved manner, which frame beams or bars extend horizontally in parallel lines forward and to the rear of the elevating or bucket wheel, as shown in Figs. 1 and 2.

Between the lower extremity of the arch 20 and the frame beams or bars 23 the inner ends of two lower frame bars or beams 25 are secured to said arch, and the said lower bars or beams 25 extend in nearly parallel lines rearward and upward to a contact with the extremity of the main horizontal frame beams or bars, being attached thereto, and upward to support and sustain a seat 26.

Upon one side of the machine—the left, for instance—a segmental plate 27 is secured at its ends to one of the main horizontal frame beams 23 in such manner that the said plate will conform to the curvature of the elevating or bucket wheel and extend independent of said wheel from its periphery a distance upward therefrom, practically constituting a fender. This fender is likewise secured to the inner face of the arch. Upon the opposite or right-hand side of the machine a short segmental fender-plate 28 is firmly fastened to the right-hand frame beam or bar 23 between its center and its rear extremity, and to the arch 20 between its center and its upper end, as best shown in Fig. 2.

Upon the right-hand side of the machine

one end of a curved fender-plate 29 is firmly attached to the main frame beam or bar 23, horizontally aligning the equivalent end of the left-hand fender 27. The other end of the right-hand curved fender 29 is carried diagonally over and above the elevating-wheel in direction of the rear of the machine, practically to a contact with the inner face of the left-hand fender 27, as best shown in Figs. 1 and 2.

The object of the curved fender 29 is to conduct the dirt carried upward by the elevating-wheel to one side of the ditch and act as a dumping or shear plate. To this end a chute 30 is hinged to the yoke 20, and the fender and said chute are capable of vertical movement.

The hinge attachment of the chute is effected by projecting an arm 31 from the outer face of the fender beyond the edge of the elevating-wheel, as shown in Fig. 2, and carrying one end of the chute to a pivotal contact with the forward face of said arm, the other end of the chute being notched to receive the forward edge of the fender. By reason of this hinged connection of the chute with the frame of the machine the elevating-wheel may work effectually in a very deep ditch, and should the chute strike the bank it will automatically accommodate itself thereto and continue to effectively deliver the dirt a proper distance from the edge of the ditch. When the machine is withdrawn from the ditch, the chute drops to its normal position.

The tongue 32 is hinged or pivoted between the forward ends of the main side bars 23 of the frame, and a guard-rail 33 is secured to the left-hand member of the arch 20 at its stop, which guard-rail, extending over and following the curved line of the fender 29, is attached to the forward extremity of the corresponding portion of the right-hand frame bar or beam 23, as shown in Fig. 2. A space intervenes the guard-rail and the upper edge of the fender 29, through which the buckets of the elevating-wheel travel.

A series of buckets 34 (illustrated in detail in Fig. 8) are pivoted to or journaled in the left-hand flange 22 of the elevating-wheel, the said buckets being ordinarily arranged around the entire periphery of the wheel about twelve to fourteen inches apart. The buckets consist of a body portion A, preferably rectangular in cross-section, from one end of which a blade A' is projected at a right angle outward, the under or bottom edge of the blade and the corresponding edge of the body being preferably beveled to constitute a cutting-edge. The end of the body opposite to that carrying the blade A' is ordinarily rounded off at its bottom edge, as shown at a in Fig. 8, and carried essentially perpendicularly upward to form a wing or arm A² of less width than the body.

The upper extremity of the arm or wing A² is bent horizontally inward parallel with the blade, whereby a lug a' is produced, and the

outer edge of the arm or wing is curved, as best shown at a^2 in Fig. 8, by producing a concavity at or near its center. The construction of the bucket is completed by attaching a pintle or post 35 to one face of the body near its curved end, which pintle extends horizontally outward parallel with the blade A'.

At proper intervals upon the inner face of the periphery of the elevating-wheel bearings 36 are secured, preferably tubular, for the reception of the posts or pintles of the buckets, as shown in Figs. 9 and 10. The bearings 36 abut at one end against the left-hand elevating-wheel-flange, but do not extend entirely across the periphery of the wheel, being stopped slightly beyond its center, as shown in Fig. 9. The pintles of the buckets are passed through suitable apertures in the said left-hand-wheel flange into the several bearings 36 and project beyond the latter, having secured upon their projecting ends sleeves 37, as shown in Fig. 10, preferably provided with a roughened exterior surface.

When the buckets are attached to the elevating-wheel and are in position for entering the earth, the upper edge of the blade bears against the outer peripheral surface of the wheel, and the arms or wings extend upward in direction of the rear of the machine, as best illustrated in Fig. 2.

The revolution of the buckets is controlled by spring-brakes 38, (best illustrated in Fig. 10,) one brake being adapted to exert tension upon two opposed bucket pintles or shafts. The brake consists of a spring-bar B, of suitable length, curved upward at its center, and two brake-shoes B', in the backs of which the respective ends of the spring-bar are inserted, the front face of the shoes being concaved for contact with the bucket-sleeves 37, and when said sleeves are roughened the concave face of the shoes is treated in similar manner. One end of the spring-bar B of the brake is threaded and provided with a lock-nut B², whereby more or less tension may be extended upon the pintles or shafts of the buckets to cause them to revolve tightly or loosely in their bearings, as occasion may demand. The sleeves 37 not only serve to provide an increased contact-surface for the brake-shoes, but also retain the bucket pintles or shafts in their bearings.

From the inner face of the left-hand frame side bar 23, preferably directly forward of the yoke 20, a pin 39 is horizontally projected, and forward of and above the pin a friction-roller 40 is journaled upon the upper edge of said side bar, as best shown in Fig. 5. The friction-roller 40 is properly journaled in a horizontal bearing-sleeve 41, secured to the frame side bar 23 and projecting a distance outward therefrom, as shown in Fig. 17, the shaft or spindle 42 of the wheel being made to extend beyond the outer face of the sleeve, which projecting end is threaded and provided with a lock-nut 43. This long bearing

of the friction-roller considerably lessens the friction, and thereby renders the shaft or spindle less liable to wear.

Between the forward end of the right-hand fender 27 and the dumping or shear plate 29 a pipe-roller 44 is journaled. In the action of the elevating-wheel after the buckets have received their load they are carried upward by the said wheel until the curved edge of the bucket wing or arm A² is brought in contact with the pin 39, whereupon as the elevating-wheel moves forward the blade of the bucket is elevated, the said arm or wing traveling over the friction-roller 40 until when opposite the rear end of the delivery-chute, where the bucket-blade is at its greatest height, the load carried thereby is impinged upon the shear-plate 29, from whence it falls upon the delivery-chute.

The lug a' limits the upward throw of the buckets, and the curve in the wing or arm of said buckets permits the blade to be carried very near the delivery-chute before the load is dumped. This movement of the buckets is illustrated in Figs. 5 and 7. The blades of the buckets in their forward and downward travel pass between the shear-plate 29 and the upper guard-rail, the latter serving somewhat to clean them, and also to guide large clots of dirt down to the chute. When the blades strike the pipe-roller 44, they are restored to their normal or receiving position, and in this position pass downward to take another load.

The plow-standards 45 are projected rearward and downward from the yoke 20, being pivoted thereto, or to a block secured to the yoke, one at each side of the elevating-wheel, and the shoe 46 of the plowshare, to which the lower ends of the said standards are attached, is preferably cast in one piece, as shown in Figs. 12 and 13.

The plow-shoe consists of a curved inclined base-wall D, held between two side pieces D', having vertical recesses d' produced in their outer faces, in which the lower end of the plow-standards are inserted, as shown in Fig. 2. The side pieces D' have a rear extension d', between which the lower end of a segmental rack 47 is pivoted, the said rack having its teeth produced upon its outer face. The rack is projected upward through the side bars of the frame to the rear of the elevating-wheel, and is operated to raise and lower the plow-shoe in a manner hereinafter set forth. The right-hand side piece of the plow-shoe is provided with a mold-board 48, to aid in packing the dirt in the buckets as they pass over the shoe in their upward movement, which mold-board is best shown in Figs. 2 and 14. The lower end of the base-wall D of the plow-shoe projects beyond the side pieces, and is provided upon its upper face at this point with a diagonal recess d², the lower extremity of said wall being also diagonal, as shown in Fig. 13. In this recess the plowshare 48^a is secured. (Illus-

trated in detail in Fig. 14.) As a matter of economy and cheapness, the plowshare 48^a is made in two pieces E and E'. The section E, being the main portion or body of the share, is secured in the recess d² by a bolt, rivet, or equivalent fastening device, and is provided with an upturned end e, located upon the side of the shoe carrying the mold-board, as shown in Fig. 2. The second section E' is the point and is secured to the main section at one end, its cutting-edge being projected beyond the cutting-edge of the main section, and the shank to the rear for attachment to and contact with the plow-shoe.

A throat is formed at the rear of the machine to retain the material lifted by the buckets in the same when in a horizontal position. The throat consists of two side pieces 49, curved to the radius of the elevating-wheel and secured to the plow-standards at one end, the upper ends of the side pieces 49 meeting the fenders 27 and 28, as best shown in Fig. 2, in which one side piece is omitted to illustrate more clearly the construction of the throat. The back of the throat consists of a curved preferably longitudinally-slotted plate 50, extending downward to the rear of and a free contact with the shoe of the plowshare. This back plate is suspended by two spring-hangers 51, secured to its rear at the bottom—one at each side—the upper ends of said spring-hangers being firmly attached to a bar 52, held transversely in the main side bars of the frame. The back plate 50 of the throat is further acted upon by a spring 53, secured to the forward face of the rack-bar 47.

It will be observed from the foregoing description that the back of the throat is spring-actuated, rendering it capable of yielding to permit the upward passage of large bowlders and similar articles. It will be further observed that as the plow is capable of telescoping upon the spring-back of the throat ample clearance is obtained when needed for the passage of stones, and the plow-shoe in its movement effectually cleans the throat.

The smooth or forward face of the rack 47, utilized in raising or lowering the plow, is made to engage with a friction-roller 54, journaled in the frame at the rear of the elevating-wheel, and the forward or toothed face is made to mesh with a pinion 55, fast to a shaft 56, also journaled in the frame, which shaft also carries a bevel-gear 57, meshing with a horizontal beveled pinion 58, secured to the lower extremity of a perpendicular shaft 59, provided at its upper end with a hand-wheel 60, convenient to the driver's seat. The shafts 56 and 59 are journaled in perpendicular opposed hangers 60^a and 61, of peculiar construction. (Illustrated in detail in Figs. 18 and 19.) The hangers are secured to the frame of the machine, the hanger 60^a being provided with a vertical integral sleeve 62 upon its inner face, in which the perpendicular shaft 59 is journaled, and a collar 63, integral with the sleeve in which one end of the shaft 56 has a

bearing, the other end of this shaft having a bearing in a similar collar 64, formed upon the hanger 61, as shown in Fig. 19. The two hangers are also provided with collars or apertures 65 at their upper end to journal a treadle-shaft 66, the treadles 67 whereof are secured to the extremities of the shaft for engagement by the driver's feet. Upon this treadle-shaft a pawl 68 is fixed, capable of contact with the pinion meshing with the rack 47, as shown in Figs. 1 and 11. The tongue 32 is pivoted between the forward ends of the main side bars 23 of the frame, and upon said side bars a bail 70 is secured, through which a threaded bolt 71 is passed, having a reduced lower end adapted to enter an aperture in a second bail 72, fast to the inner end of the tongue, at its upper face. Thus it will be observed that by raising or lowering the bolt 71 the tongue may be raised or lowered and the line of draft thereby changed. This construction is fully illustrated in Figs. 15 and 16. A curved essentially rectangular clevis 73 is entered over the tongue directly in front of the bail 72, which retains it upon the tongue, and to the bottom bar of the clevis, at its center, the whiffletree 74 is pivoted. Beneath the whiffletree an evener 75 is fulcrumed, and the ends of the evener are attached to links 76, pivoted at one end to the plow-standards, below their center, by chains 77, whereby it will be seen that the draft is directly upon the plow. By providing the tongue with a clevis, as above described, the tongue may be made much shorter, and the clevis is free to slide back and forth. A perpendicular arch or clevis 78 is fulcrumed, at or near the center of its members, upon the frame-arch 20, at or near the top of the latter.

The machine is guided in its work in a ditch, and yet permitted to have ample vertical movement or incline to the front or the rear, by means of an essentially U-shaped carriage 79, grooved to slide over the pivoted arch or clevis 78 and provided with friction-rollers 80 in the groove for contact with the edges of the clevis to relieve friction, as illustrated in Figs. 3 and 4. From the lower end of each member of the carriage an axle 81 is projected, which is preferably given a slight downward inclination and braced by stay-rods 82 in any approved manner. Each axle is provided with a wheel 83, adapted to travel upon the surface of the ground, and when the carriage is applied to the machine the axles at their intersection with the stay-rods 82 are connected with the forward ends of the side bars 23 of the frame by detachable rods 84.

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

1. In a ditcher, the combination, with an elevating-wheel provided with a series of buckets journaled thereon, of a brake consisting of a spring-rod provided with a brake-shoe at each end capable of contact with the pintles or

shafts of two opposed buckets, substantially as shown and described.

2. In a ditcher, the combination, with an elevating-wheel provided with a series of bearings upon its inner periphery extending partially from side to side, and buckets provided with a pintle or shaft journaled in said bearings, of a sleeve secured to each bucket-pintle and a brake consisting of a spring-rod, and a brake-shoe secured at each end of said rod, capable of contact with the sleeves of opposed bucket-pintles, substantially as shown and described.

3. In a ditcher, the combination, with an elevating-wheel provided with a series of bearings upon its inner face extending partially from side to side, and buckets provided with a pintle or shaft journaled in said bearings, of a sleeve secured upon one end of each bucket-pintle, and a brake consisting of a curved spring-bar threaded at one end, a brake-shoe attached to each end of said rod, capable of contact with the sleeves of opposed bucket-pintles, and a lock-nut screwed upon one end of the rod, substantially as shown and described, and for the purpose specified.

4. In a ditcher, the combination, with an elevating-wheel and a series of buckets journaled thereon, comprising a body having a blade extending at one end at a right angle outward, and an arm or wing vertically projected from the opposite end of the body, provided with a concaved outer edge and terminating in a horizontal stop-lug, of a brake consisting of a spring-bar, a brake-shoe at each end of the bar, and means, substantially as described, for forcing the brake-shoes apart, as and for the purpose specified.

5. In a ditching-machine, the combination, with the elevating-wheel, of a series of buckets journaled thereon, comprising a body, a blade extending at a right angle from one end of the same in contact with the wheel-periphery, a vertical arm projected upward from the opposite end of the body provided with a curved outer edge, a stop-lug extending from the top of the arm, and a pintle attached to the body near one end, substantially as shown and described.

6. In a ditcher, the combination, with a frame, an elevating-wheel journaled in the frame, and a series of angled buckets journaled upon the elevating-wheel, the vertical member whereof is provided with a rear curved edge and a stop-lug integral with its top, of a delivery-spout hinged to the frame, a trip-pin secured to the frame, and a friction-roller above said pin, both adapted for contact with the curved member of the buckets, substantially as shown and described, whereby the load is delivered from the buckets to the chute when the former is near the latter, as set forth.

7. In a ditcher, the combination, with a frame, an elevating-wheel journaled in the frame, a series of angled buckets journaled upon the elevating-wheel, the vertical mem-

ber whereof is provided with a rear curved edge and a stop-lug, and a spring-brake contacting with two opposed bucket-pintles, of a trip-pin secured to the frame and a friction-roller above said pin, both adapted for contact with the curved member of the bucket, and a delivery-chute hinged to the frame above the stop-pin and roller, substantially as shown and described.

8. In a ditching-machine, the combination, with the frame and the elevating-wheel, of the segmental fender-plates secured to the frame, a diagonal fender-plate crossing the upper part of the wheel to conduct the material raised by the elevator to one side of the machine, and a vertically-swinging chute hinged to the frame and the diagonal fender, substantially as set forth.

9. In a ditching-machine, the combination, with the frame, the elevating-wheel, and a series of buckets pivoted in the wheel, of the segmental fender-plates between which the buckets pass, a diagonal fender-plate crossing the wheel to remove the material from the buckets and direct it to the side of the machine, the tripping devices for operating the buckets when they reach the diagonal fender, and the chute pivoted at its inner end to the frame and diagonal fender, substantially as set forth.

10. The combination, with the elevating-wheel of a ditching-machine and a series of angled buckets pivoted thereon, of brake-shoes contacting with the pintles of opposed buckets and a spring-bar connecting said shoes, substantially as shown and described.

11. In a ditcher, the combination, with a frame, an elevating-wheel journaled therein, and buckets journaled upon said wheel, of a trip-pin and friction-roller adapted to engage with the buckets, said friction-wheel being provided with a long spindle held to revolve in an extended sleeve projected from the frame, substantially as shown and described.

12. In a ditcher, the combination, with the frame, of a long sleeve horizontally secured to the frame, a spindle journaled in said sleeve, and a friction trip-pulley secured to said spindle, substantially as shown and described, and for the purpose specified.

13. In a ditcher, the combination, with a frame, an elevating-wheel journaled in the frame, and a series of angled buckets journaled upon the said elevating-wheel, of a trip-pin and friction-roller secured to the frame adapted for contact with the outer edge of the vertical member of the buckets to dump the latter, and a horizontal roller journaled in the frame adapted for contact with the outer edge of the vertical member of the buckets to restore the same to their normal position, substantially as set forth.

14. In a ditcher, the combination, with a frame, an elevating-wheel journaled in said frame, and buckets journaled upon the wheel, of a throat constituting a portion of the frame at the rear of the wheel and provided

with a spring-back independent of its sides, substantially as shown and described.

15. In a ditcher, the combination, with a frame, an elevating-wheel journaled in said frame, buckets journaled on said wheel, and a throat formed at the rear of the wheel having a spring-back, of plow-standards pivoted to the frame and a shoe secured to said standards capable of telescoping upon the spring-back of the throat, substantially as shown and described.

16. In a ditcher, the combination, with a frame, an elevating-wheel journaled in said frame, angled buckets journaled in said wheel, means, substantially as shown and described, for tripping and readjusting the buckets, and a throat formed at the rear of the elevating-wheel having a spring-back, of plow-standards pivoted to the frame, a shoe grooved to receive said standards capable of telescoping upon the spring-back of the throat, a two-piece plowshare attached to the shoe, and means, substantially as shown and described, for raising and lowering the said plow-shoe, as and for the purpose specified.

17. In a ditching-machine, the combination, with the frame, of the standard 60^a, secured thereto and formed on its inner side with the vertical sleeve-bearing 62, and the transverse aperture or bearing 63 in the sleeve, and the opposed bearing 61, having a bearing 64 in line with the bearing 63 of the standard 60^a, and the vertical and transverse plow-adjusting shafts journaled in the sleeve and opposed bearings, respectively, and geared together, substantially as set forth.

18. In a ditching-machine, the combination, with the frame and the plow having an adjusting-rack, of the opposed standards 60^a 61, the transverse aligned bearings 63 64 and 65 65 in said two standards and the vertical sleeve 62 on the standard 60^a, the vertical shaft journaled in the sleeve, the transverse shaft journaled in the bearings 63 64 and geared to the vertical shaft and to the rack, and a shaft journaled in the bearings 65 65 and provided with a pawl engaging the rack-pinion, substantially as set forth.

19. In a ditcher, the combination, with the frame and a bail secured transversely of the frame, of a tongue pivoted in the frame beneath the bail, a bail secured to the tongue beneath the frame-bail, and a set-screw passed through the frame-bail to a contact with the tongue-bail, substantially as shown and described, whereby the tongue may be raised or lowered, as set forth.

20. In a ditcher, the combination, with the frame and a tongue pivoted in the same, of a clevis held to slide upon the tongue and a whiffletree attached to the said clevis, substantially as shown and described.

21. In a ditcher, the combination, with a frame, plow-standards pivoted to the central arch of the frame, and a tongue pivoted in the forward end of the frame, of a clevis having curved sides held to slide upon the tongue,

a whiffletree attached to the clevis, an evener attached to the whiffletree, and chains connecting the evener and plow-standards, substantially as specified.

- 5 22. In a ditcher, the combination, with a frame having a central yoke and a U-shaped bail fulcrumed upon said yoke, of a grooved U-shaped carriage provided with friction-
10 axles projected from said yoke, and drive or guide wheels held to revolve upon the axles,

substantially as shown and described, whereby the machine is guided by the carriage and drive wheels upon the ground, the elevating-wheel of the machine permitted to sink to any desired depth, and the frame of the machine is given vertical movement, when desired, as set forth. 15

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