N. H. NELSON.

DIGGING AND LOADING MACHINE.

APPLICATION FILED JAN. 6, 1908.

898,593.

Patented Sept. 15, 1908.

4 SHEETS—SHEET 1.

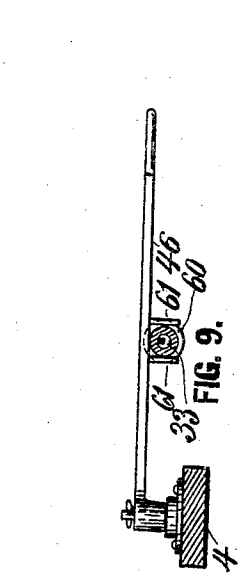


FIG. 9.

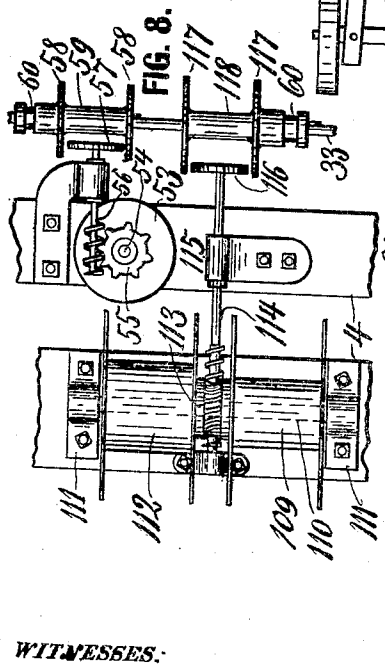


FIG. 8.

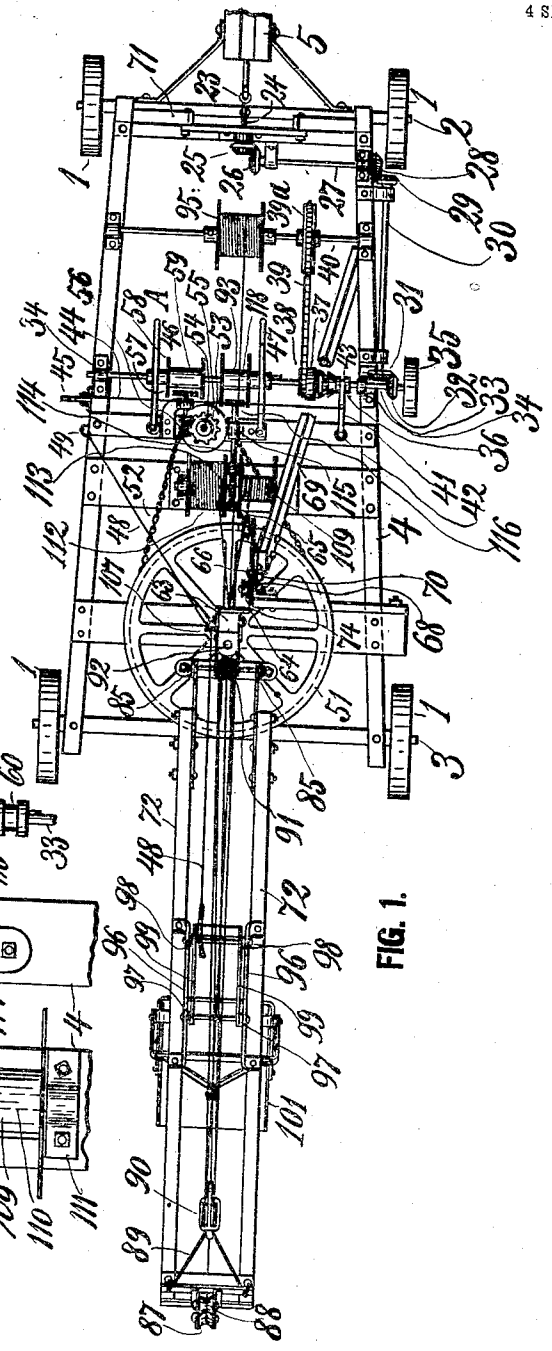


FIG. 1.

WITNESSES:

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M. M. Carlsen.

INVENTOR:

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BY HIS ATTORNEY:

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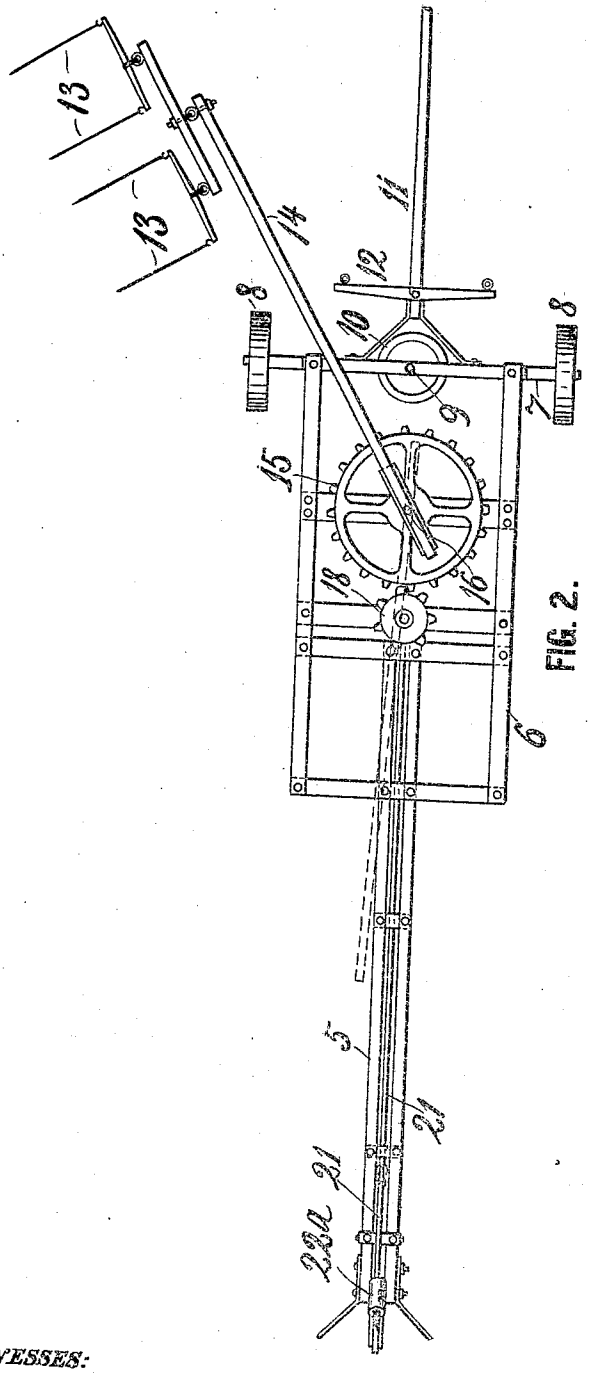


FIG. 2.

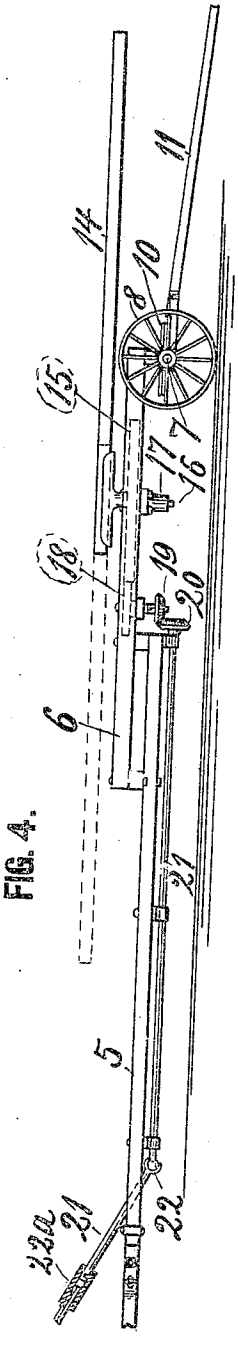


FIG. 4.

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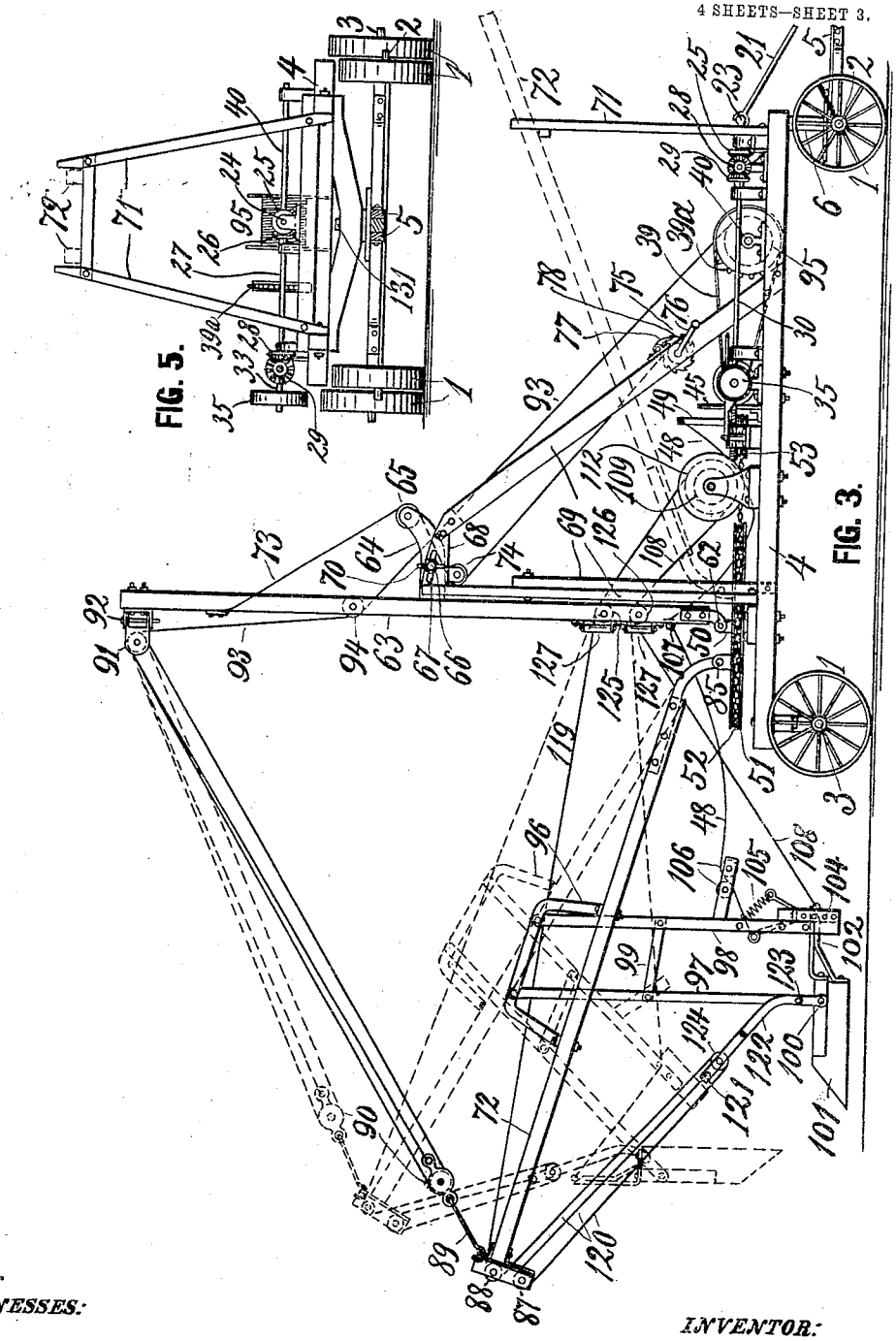


FIG. 5.

FIG. 3.

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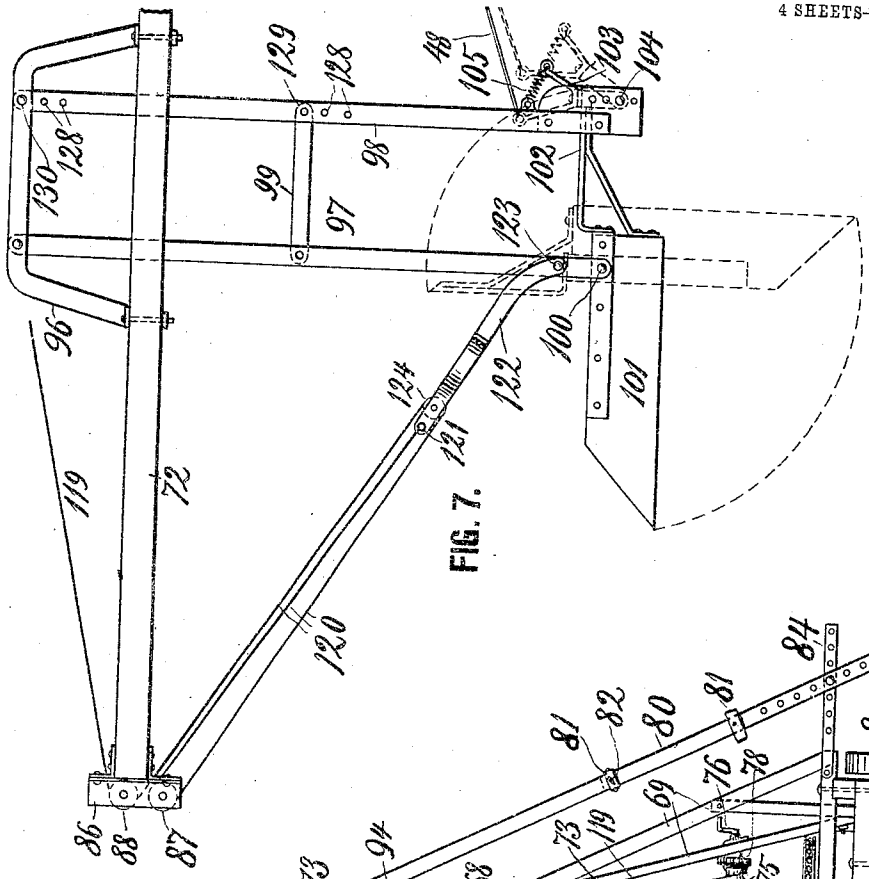


FIG. 7.

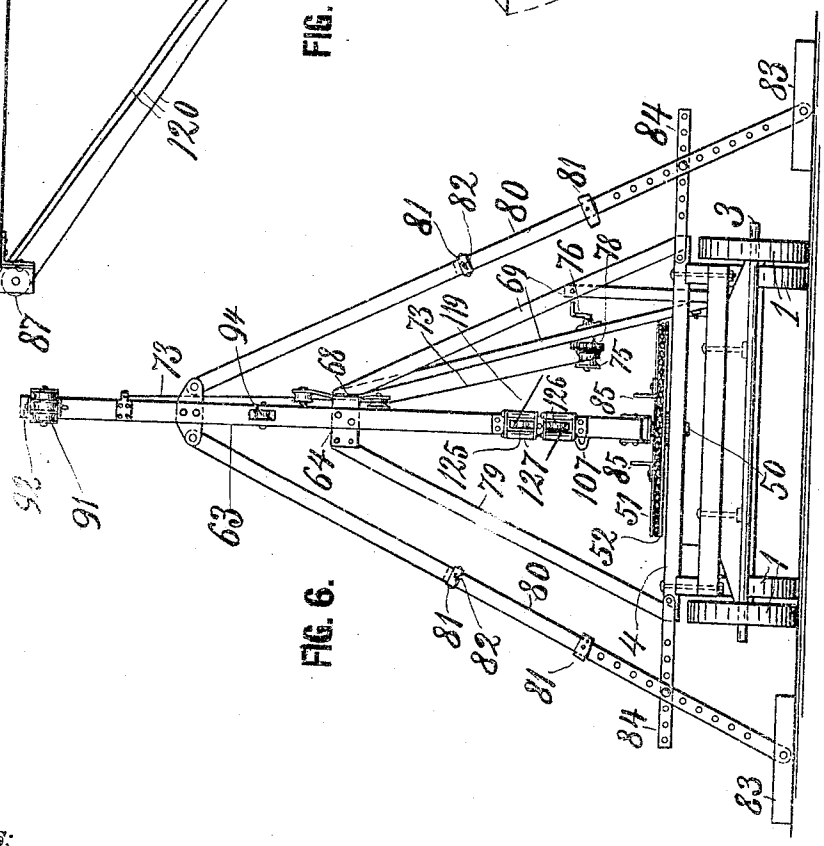


FIG. 6.

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UNITED STATES PATENT OFFICE.

NELS H. NELSON, OF WILLMAR, MINNESOTA.

DIGGING AND LOADING MACHINE.

No. 898,593. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed January 6, 1908. Serial No. 409,387.

To all whom it may concern:

Be it known that I, NELS H. NELSON, a citizen of the United States, residing at Willmar, in the county of Kandiyohi and State of Minnesota, have invented new and useful Digging and Loading Machines, of which the following is a specification.

This invention relates to machines for digging, hoisting and loading earth, manure, gravel and other substances, and also for loading and for stacking hay.

The principal objects are to provide a cheap, simple but efficient machine for said purposes and to so construct the same that it may be drawn by horses or other draft animals and readily operated by said animals when in use, but may also be operated by an engine or other motive power where such is available.

The machine comprises a main frame supported on four wheels and a second frame connected thereto and supported on two wheels. On the second frame is mounted a horse-power which drives the machine proper mounted on the main frame.

In the accompanying drawings, Figure 1 is a plan or top view of the main frame and the machinery mounted thereon, except the windlass by which the mast is raised, and certain parts of the upstanding frame. Fig. 2 is a continuation of the right hand end of Fig. 1 and constitutes a top view of the second frame with horse-power mechanism and the draft pole for the whole machine. Fig. 3 is a side elevation of Fig. 1. Fig. 4 is a continuation of Fig. 3 and thus a side elevation of Fig. 2. Fig. 5 is a front or right hand end elevation of Fig. 3 with many parts omitted. Fig. 6 is a rear end elevation of the machine with many parts omitted and with some mast braces added. Fig. 7 is an enlargement of the left end portion of Fig. 3. Fig. 8 is an enlargement of certain parts near the middle of Fig. 1. Fig. 9 is a detail partly sectional view almost in line with either of the levers 46, 47 in Fig. 1.

Referring to the drawings by reference numerals, 1, 1 designate wheels with axles 2 and 3 upon which is mounted the main frame 4 of the machine.

5 is a reach extending from the front axle 2 to the second frame 6 to which it is firmly secured. Said second frame is supported by said reach and by an axle 7 and two wheels 8. The axle 7 swings horizontally on a king bolt 9, passed through it and through the fifth-wheel 10 and the front bar of the frame.

11 is a draft pole attached to the axle 7 and provided with a double-tree 12 to which two horses are hitched for transportation of the machine. After arriving at the place of operation the same horses are hitched to the tugs 13 (shown in Fig. 2), by which a sweep 14 of the horsepower is operated. Said horsepower is mounted on the frame 6 and consists mainly of a large gear wheel 15 fixed on a central shaft 16 revolving in a bearing 17 fixed to the frame, and a pinion 18 driven by the large gear. The shaft of the pinion is suitably journaled to the frame and has secured at its lower end a miter gear 19, which drives another miter gear 20. The latter gear is fixed on and drives a shaft 21, which in the drawing is journaled below the reach 5 but may as well be journaled between the two parallel bars of which the reach for purpose of strength is composed. In either case the reach is made and placed as low as possible and the shaft is concealed or covered by it so as to make it as convenient as possible for the horses to step over them in traveling around the power frame.

The rear end of the shaft 21 is by means of universal joints 22, 23 brought upward and connected to a short shaft 24 journaled upon the front end of the main frame and fixed in a bevel gear 25, which drives a bevel gear 26 and thereby shaft 27, bevel gears 28, 29, shaft 30 and a bevel gear 31 fixed on the latter shaft. The gear 31 drives another bevel-gear 32 which is fixed on a shaft 33 journaled in bearings 34 across the main frame and may be driven by the horse power and gearing just described, or by a pulley 35 fixed on the shaft and adapted to receive a belt (not shown) from any available source of power.

22ª is a sliding joint on the shaft 21 to allow raising and falling of the front wheels of the main frame.

On the shaft 33 is slidingly keyed one member 36 of a friction clutch, whose other member 37 is revoluble on the shaft and has affixed to it a sprocket 38, driving a link belt 39 and thereby a larger sprocket 39ª fixed on a shaft 40, which is also journaled across the frame and is started by throwing the slidable clutch member into contact with the member 37. This is done by a shifter 41 pivoted at 42 to the frame and engaging in a groove

43 of the slidable member, and a rod 44 extending from the shifter to a hand-lever 45 placed within convenient reach of the operator, who usually stands on the ground within the main frame at or near the place marked A in Fig. 1, and from there controls the digging, hoisting and dumping devices of the machine by means of said lever and the two levers 46, 47 and a hand cord 48, fixed to a holding post 49, as will presently be more fully described.

Near the rear end of the main frame is revolubly mounted on a stud 50 a turn-table 51 having a peripheric groove with a jack-chain belt 52 engaged therein. A loop of the chain is engaged by a smaller grooved wheel 53, which is journaled on a stud 54 and has affixed to it a worm-wheel 55, turned by a worm-screw 56 having at one end fixed a friction pulley 57, adapted to be engaged alternately by one of the friction flanges 58 of a drum 59, which, as best shown in Fig. 9, is keyed to slide on the shaft 33 and is provided in its hub with a groove 60 engaged by the fingers 61 of the lever or shifter 46, so that by holding said lever in one direction the table will be turned to one side and by holding it in the opposite direction the table will turn the other way, and by holding or leaving the lever between the ends of its stroke the table will stand still, as the flanges of the friction drum cannot then engage the friction pulley.

Pivoted at 62 to the stud of the turn-table, to fold forwardly therefrom, is a mast 63, which has a metallic bracket 64 with a rope-guiding sheave 65 and a bolt 66. Said bolt is passed through a segmental slot 67 in a metallic plate 68, which forms the upper end of a permanently upstanding frame 69 fixed on the main frame (as best shown in Figs. 3 and 6). The bolt is provided with a nut 70 by which the bracket 64 is firmly secured to the plate after the bolt has been moved to such a position in the slot as will bring the mast into vertical position whether the ground be level or not.

For the purpose of folding the mast during transportation of the machine and raising it again, the main frame is provided upon its front end with a crutch 71 for the mast to rest on after the derrick beam 72 is swung around and placed thereon, as in dotted lines in Figs. 3 and 5. There is also near the top of the mast fixed one end of a rope 73, which passes forwardly over the sheave 65, thence rearwardly over a sheave 74 on the frame plate 68 and thence down to a windlass 75 mounted on the frame 69 and having a hand crank 76 turning the rope-drum of the windlass.

77 is a pawl engaging a ratchet wheel 78 of the windless to hold it in any position.

It will be understood that the bight of the rope passing over the sheave 65 becomes longer as the mast folds and shorter as the mast is raised by it; and that whatsoever be its length it supports the mast in all positions from the time the bolt 66 is removed for folding until it is replaced again after the raising of the mast is completed.

In Fig. 6 is shown that the mast is not only braced to the main frame by the upright permanent frame 69, but also by a side brace 79, which is removable in order to allow the derrick beam 72 to swing around to the crutch 71. The mast and main frame are firmly braced against side strain and side leaning by long side braces 80, which are extensible by being made in sections having collars 81 with set screws 82 holding the overlapping ends of the sections together. These braces are provided with pivoted shoe pieces 83 to support them on the ground and are prevented from spreading by adjustable links 84 holding them to the main frame.

The derrick beam 72 is pivotally supported at 85 by two lugs upon the turntable, and comprises two parallel members united at the outer ends by metallic parts 86, which carry two rope-guiding sheaves 87, 88 and a pivotally attached clevis 89. To the latter is attached the running block 90 of a block-and-fall having its standing block 91 pivoted at 92 to swing horizontally from the top of the mast, and the fall 93 of the rope passed through an aperture in the mast, where it is guided by a sheave 94 and passes thence to a rope drum 95, fixed on the shaft 40, whose operating and controlling means have already been described, so it will be understood that by manipulating the clutch lever 45 the derrick beam and its load may be raised and lowered.

At or near the middle of the beam 72 is fixed upon its upper side an upwardly arched metallic frame 96, from the upper part of which is pivotally suspended two skeleton pendants or hangers 97, 98, which are connected together by one or more links 99. In the lower end of pendant 97 is trunnioned at 100 a shovel 101, which is scoop-shaped or fork-shaped according to the work it is to do.

The handle portion 102 of the scoop engages normally in an aperture in a latch 103 (best shown in Fig. 7), which is pivoted at 104 in the pendant 98 and is normally held upright by a spring 105; but when the scoop is to be tripped so as to discharge its load by the weight of same the latch is pulled out of engagement with the scoop by the tripping cord 48, which extends from the latch to the post 49 and is guided on its way by sheaves 106 on the pendant and a guide 107 on the mast.

The scoop or fork, as the case may be, is brought into engaging position with the matter it is to operate on by pulling on the cord or cable 108, which connects the pendant 98 with a winding drum 109 (see Figs. 1 and 8), which is fixed on a shaft 110 journaled in

bearings 111. On said shaft is also fixed another drum 112 and a worm-gear 113, which turn both drums when rotated by a worm-screw 114, which is journaled at 115 and provided with a friction pulley 116, adapted to be rotated alternately in opposite directions by the flanges or disks 117 of a drum 118 slidably keyed on the shaft 33 and is moved by the shifter lever 47, which, as shown in Fig. 9, is provided with fingers 61 engaging in an annular groove 60 in the hub of the drum, the same as already described about lever 46 and drum 59.

The function of the drum 112 is to load the scoop by forcing it into the material that is to fill it. This is done by winding upon the drum the fall part 119 of a cable or rope 120, which is secured at 121 to the bail 122, pivoted at 123 near the scoop, to the pendant 97. The rope is passed thence over the sheave 87, thence over a sheave 124 in the bail, thence over sheave 88, and thence over a sheave 125 in an aperture in the mast and to said drum. The rope 108 is guided by a sheave 126 in the mast; and both of said ropes are guided by side rollers 127 mounted on the mast. Said two ropes 108 and 119 being wound in opposite directions on their respective drums, and the drums being of various diameters according to the lengths of the ropes, it will be understood that the one rope is unwound as fast as the other is wound upon the drum, and thus the pendants or scoop-supporting frame and the scoop with it are operated with ease and precision by manipulation of the lever 47. And when the scoop is thus filled and partly elevated by swinging its supporting frame to an inclined position, as shown in dotted lines in Fig. 3 it may be further elevated, where so required, by elevating the beam by lever 45. The scoop and beam are then swung sidewise to the dumping ground or wagon, as the case may be, by the lever 46, and then the tripping rope 48 is pulled. As soon as the scoop is emptied it tilts back by its own weight into position to be engaged by the latch as soon as the tripping cord is released.

In Fig. 7 is best shown how the pendant 98 may have several holes 128 for the pivots 129, and 130, so that the pendant may be adjusted upward and thus hold the scoop with its front end in such downwardly tilted position as may be required in excavating in hard ground, and for other purposes.

The frame 96 fixed upon the beam enables the pendants to be longer and thus work to better advantage than if shortened by suspending them directly from the beam. On the other hand the frame 96 is cheaper than an arrangement by which the pendants might be made movable up and down in the beam during operation.

In Fig. 5, 131 is a king bolt on which the front axle 2 swings and thus permits the horse-power frame to turn to either side according as the pole 11 and wheels 8 are operated.

From the above description it will be seen that my machine is a cheap and complete one for the purposes stated, as it carries with it its own horse power ready for operation as soon as the horses have drawn the machine to the place where the work is to be done.

Having thus described my invention, what I claim is:

1. In a machine of the kind described, the combination with a wheel-supported main frame, of an upstanding frame fixed thereon and having near its top a plate with a segmental slot therein, a mast pivotally mounted near one end of the main frame and adapted to stand plumb up and also to be folded upon the main frame, a bracket fixed on the mast, a removable bolt passed through the bracket and said slot in the plate and a nut on the bolt for clamping the bracket and the plate together.

2. In a machine of the kind described, the combination with a wheel-supported main frame, of a stud fixed vertically in the frame, a turn-table rotatable on the stud, a mast pivotally secured with its lower end to said stud to enable it to be folded and raised at said pivot joint, and means for raising and folding the mast, means for supporting it in an inclined position and means for holding it in upright position.

3. In a machine of the kind described, the combination with a wheel-supported frame, of a stud projecting upward therefrom, a turn-table revoluble on the stud, a mast foldably supported on the stud above the turn-table and means for holding the mast upright; a derrick beam pivotally mounted on the turn-table and having near its middle an upward extension, two skeleton pendants link-connected together and pivotally suspended from said upward extension, a scoop or fork trunnioned in the lower end of one of the pendants and having a handle extending into the other pendant, a spring-held latch pivoted in said other pendant and adapted to engage the handle and hold the scoop in operative position, means for tripping said latch, means for operating the scoop and means for elevating the beam substantially as set forth.

4. In a machine of the kind described, the combination with a mast and a derrick beam adjacent thereto, of two substantially parallel pendants suspended from the beam at different distances from its end, a link connecting the two pendants to insure their parallel position, a scoop or the like means trunnioned in the lower end of the pendant nearest the outer end of the beam, a latching and tripping mechanism in the other pendant for holding the scoop in operative position and trip it when it is to unload itself, a bail pivoted to the scoop-supporting pendant, a

sheave in the bail, sheaves in the free end of the beam, a rope secured with one end to the bail and extending back and forth over said sheaves so as to pull the scoop toward the end of the beam with increased force, and a winding mechanism on the machine connected with the other end of the rope, and means for raising and lowering the beam.

5. In a machine of the kind described, the combination with a wheel-supported portable device having parts for digging, hoisting and loading or the like, of a wheel-supported horse-power device secured thereto and operatively connected with the working parts of the machine.

6. In a machine of the kind described, the combination with a main supporting frame, a derrick mounted thereon, two rear wheels and two front wheels supporting the frame; an axle in the front wheels and pivotally secured at its middle to the frame to swing horizontally below the same, a reach braced to and extending forwardly from the axle, a horse-power having the rear end of its frame secured to the front end of the reach, a horizontally swiveling axle supporting the front end of the horse-power frame, a draft pole fixed to said axle of the horse-power frame, a sweep mounted on the latter frame, a speed increasing train of gear wheels mounted in the frame and operated by the sweep; a shaft line extending from said gearing to the main supporting frame, shafts and gears forming operative connection from said shaft line to the working parts of the derrick, the said shaft line being supported by journals along the reach and shielded by the latter where the horses operating the sweep traverse the reach, and means for controlling the operative connection with the working parts of the derrick.

7. In a machine of the kind described, the combination with a main supporting frame, a derrick mounted thereon, two rear wheels and two front wheels supporting the frame; an axle in the front wheels and pivotally secured at its middle to the frame to swing horizontally below the same, a reach braced to and extending forwardly from the axle, a horse-power having the rear end of its frame secured to the front end of the reach, a horizontally swiveling axle supporting the front end of the horse-power frame, a draft pole fixed to said axle of the horse-power frame, a sweep mounted on the latter frame, a speed-increasing train of gear wheels mounted in the frame and operated by the sweep; a shaft line extending from said gearing to the main supporting frame, shafts and gears forming operative connection from said shaft line to the working parts of the derrick, the said shaft line being supported by journals along the reach and shielded by the latter where the horses operating the sweep traverse the reach, and means for controlling the operative connection with the working parts of the derrick, said shaft line having two universal joints and one sliding joint for the purposes set forth.

8. In a machine of the kind described, the combination with a derrick beam and a depending swinging frame suspended from the beam, and a tilting scoop or the like carried by the swinging frame, of a shaft and two rope drums united and mounted thereon, a rope or cable wound on one of the drums in one direction and having connection with the scoop-supporting frame to pull the scoop rearwardly into working position, another rope wound in the opposite direction on the other drum and having connection with the scoop-supporting frame to force the scoop forward into the matter it is to be filled with, means for rotating the drums and means for readily reversing the rotary motion of the drum.

9. In a machine of the kind described, the combination with a derrick beam and a depending frame suspended from the beam, and a tilting scoop or the like carried by the swinging frame, of a shaft and two rope drums united and mounted thereon, a rope or cable wound on one of the drums in one direction and having connection with the scoop-supporting frame to pull the scoop rearwardly into working position, another rope wound in the opposite direction on the other drum and having connection with the scoop-supporting frame to force the scoop forward into the matter it is to be filled with, means for rotating the drums and means for readily reversing the rotary motion of the drums, said means comprising a worm gear on the drum shaft and having a fixed relation to the drums, a worm-screw engaging the worm-gear, a friction pulley fixed on the worm-screw, a driven shaft, a drum slidably keyed thereon and having near its ends friction disks adapted to engage alternately at diametrically opposite parts of the face of the friction pulley, and a shifter for sliding the friction drum on the driven shaft.

10. In a machine of the kind described, the combination with a turn-table and a derrick beam supported thereon, of a chain engaging the periphery of the turn-table, or a groove in the said periphery, a comparatively small chain wheel engaging a bight of the chain, a worm gear fixed to the chain wheel, a friction pulley fixed on the worm-screw, a driven shaft, a drum slidably keyed thereon and having two friction disks adapted to be brought alternately one at a time against diametrically opposite points of the friction pulley, and a shifter engaging the drum for sliding it on the driven shaft.

11. In a machine of the kind described, the combination with the shaft 33 of means for driving it by either belt or horse power, the two friction drums slidably keyed thereon,

shifters for sliding the drums, two worm screws each with a friction pulley adapted to be driven alternately in opposite direction by one of the drums, a worm gear operated by each worm screw, a chain wheel and chain belt operated by one of the worm wheels and serving to oscillate the turn-table of the derrick part of the machine, a double or two rope drums driven by the other worm gear and serving to operate ropes whereby the scoop or fork of the machine is operated backward and forward.

12. In a machine of the kind described, the combination with the shaft 33 of means for driving it by either belt or horse power, the two friction drums slidably keyed thereon, shifters for sliding the drums, two worm screws each with a friction pulley adapted to be driven alternately in opposite direction by one of the drums, a worm gear operated by each worm screw, a chain wheel and chain belt operated by one of the worm wheels and serving to oscillate the turn-table of the derrick part of the machine, a double or two rope drums driven by the other worm gear and serving to operate ropes whereby the scoop or fork of the machine is operated backward and forward; the shaft 40 and rope drum 95 fixed thereon, by which the hoisting rope of the derrick beam is operated, the sprocket wheel 39[a] fixed on said shaft, a sprocket pinion loose on the driven shaft 33, a link belt connecting the two sprockets, a friction clutch adjacent to the sprocket pinion to cause the pinion to rotate with the shaft when so desired, a shifter for throwing the friction clutch into and out of active position, and means for operating the shifter from the place the operator occupies while operating the shifters of the friction drums.

13. In a machine of the kind described, the combination with a non-rotatable mast, of a turn table journaled on the supporting base of the mast, a derrick beam mounted on the table near one side of the mast and at the opposite side of the mast rope drums for operating the working ropes of the derrick, sheaves mounted on the mast for guiding the said ropes as to their height, and rollers mounted on the mast to guide at the sides of the ropes to keep them in line with said sheaves and prevent chafing of the ropes against the mast.

14. In a machine of the kind described, the combination with a derrick beam, of two pendants pivotally suspended therefrom some distance apart on the beam, one or more links pivotally connecting the pendants to keep them in parallel position, a scoop or fork trunnioned in the lower end of one of the pendants and a latch in the other pendant for holding the scoop in active position and for tripping it when it is to be emptied; one of said pendants being vertically adjustable on the beam and on the link or links mentioned, so as to thereby change the normal angle of the scoop relatively to the pendants, and means for swinging the pendants so as to operate the scoop thereby.

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

NELS H. NELSON.

Witnesses:
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ANDREW NORDLOEF.