W. H. MATHER.

COMBINED DERRICK AND TRACTION ENGINE.

APPLICATION FILED FEB. 4, 1910.

974,410.

Patented Nov. 1, 1910.

3 SHEETS—SHEET 1.

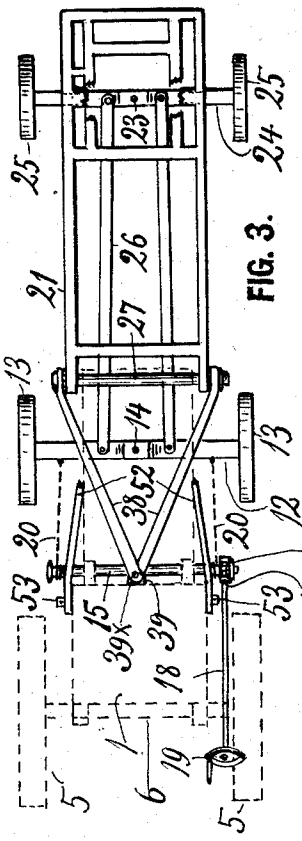


FIG. 3.

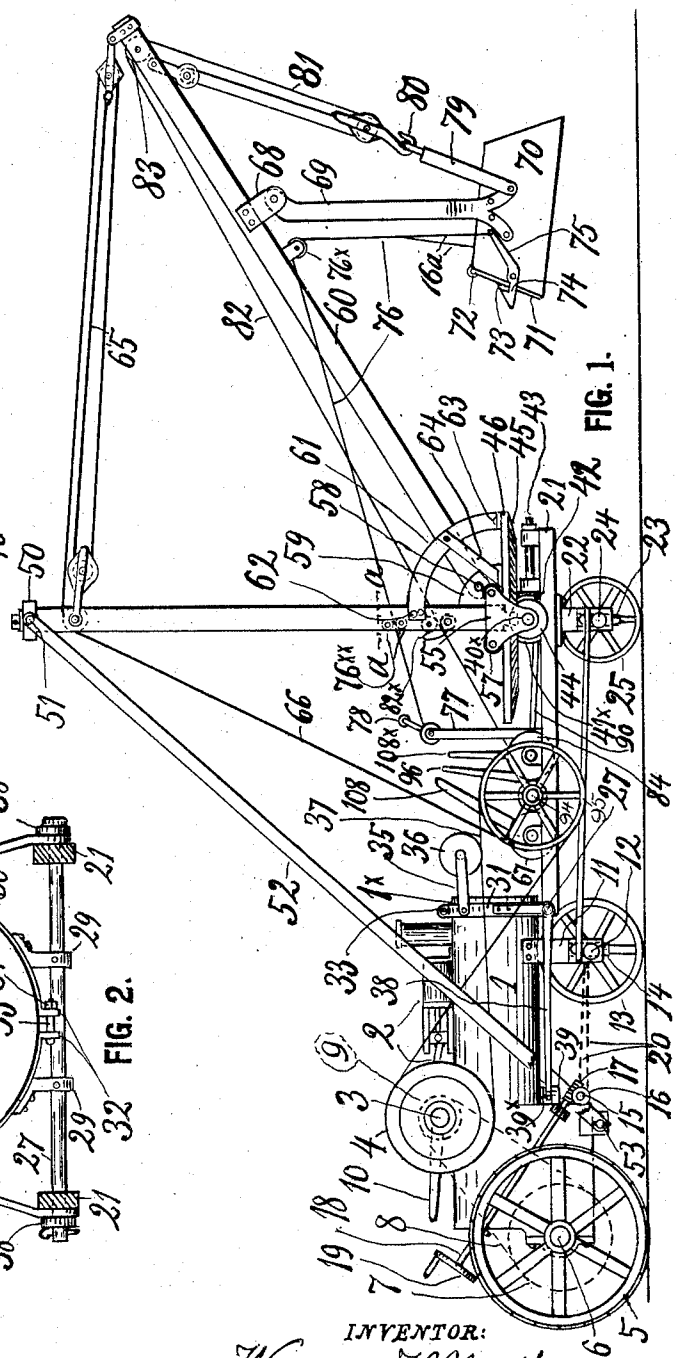


FIG. 1.

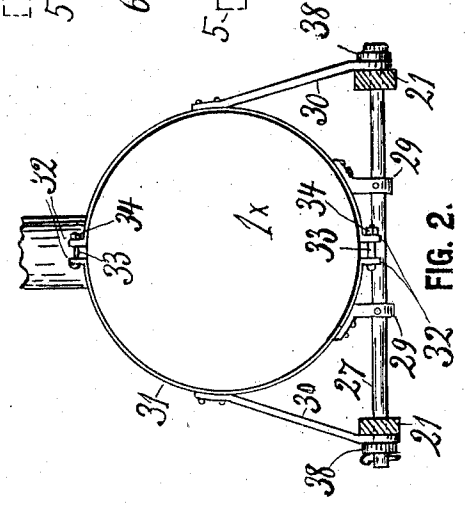


FIG. 2.

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A. E. Carlsen.

INVENTOR:

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BY his ATTORNEY:

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THE NORRIS PETERS CO., WASHINGTON, D. C.

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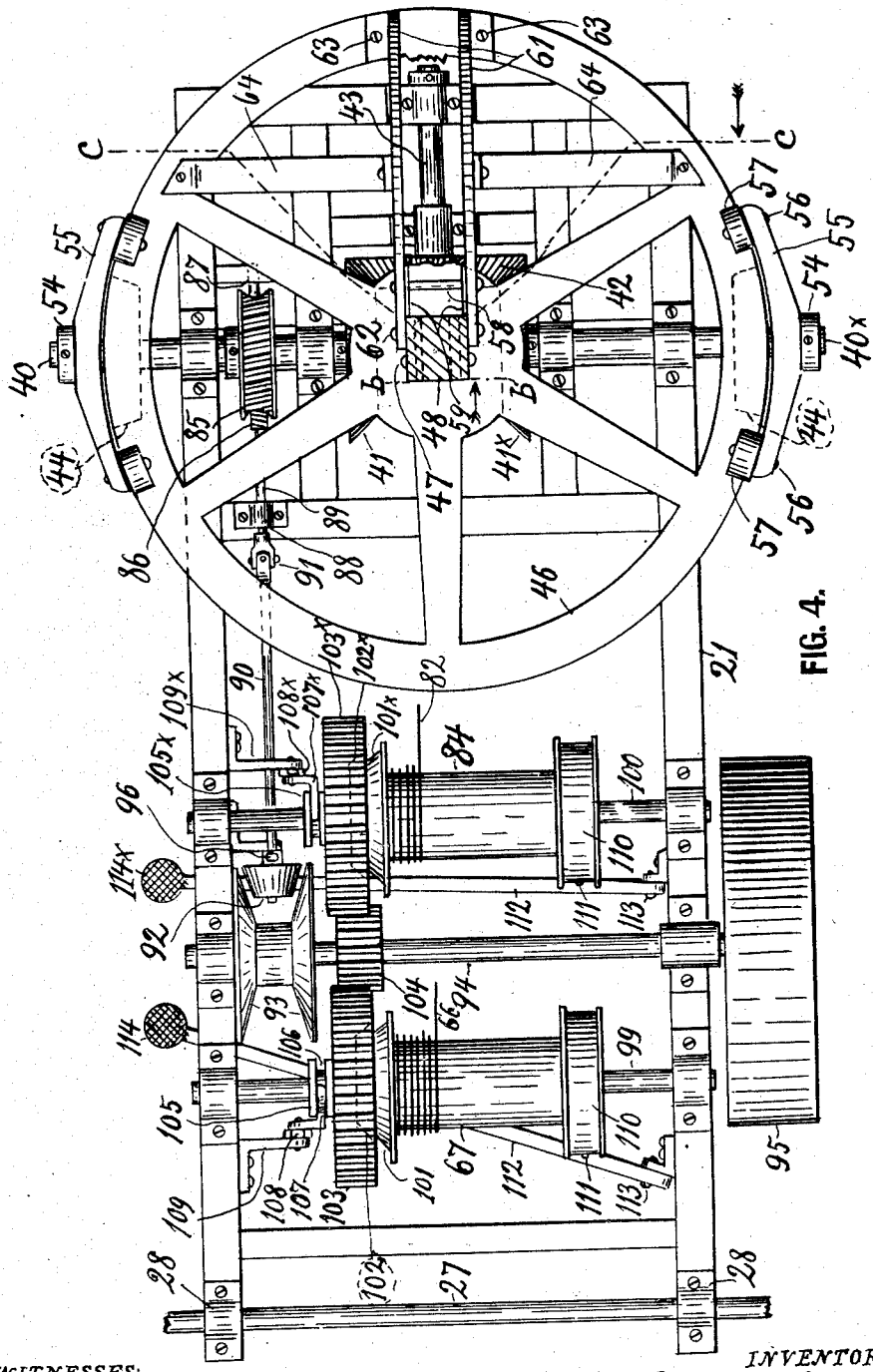


FIG. 4.

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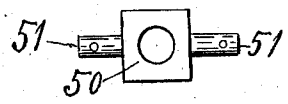


FIG. 5.

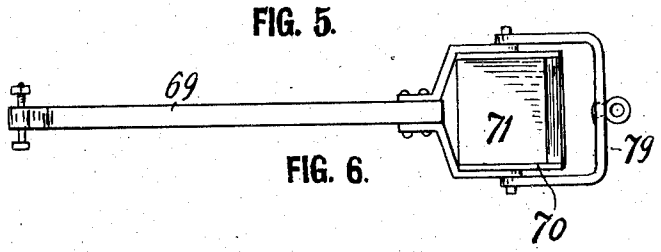


FIG. 6.

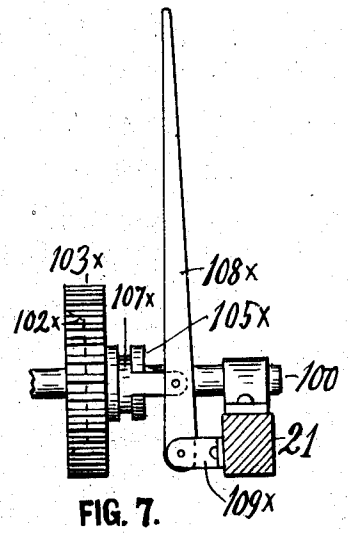


FIG. 7.

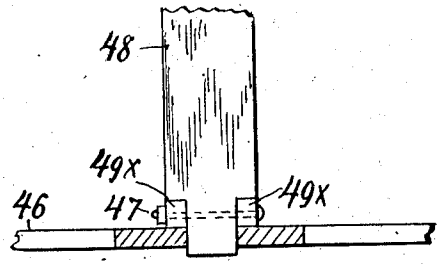


FIG. 9.

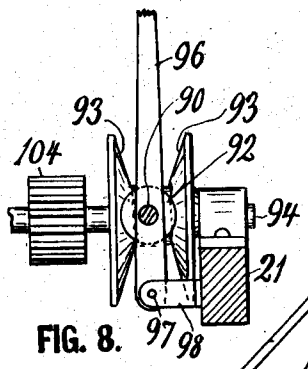


FIG. 8.

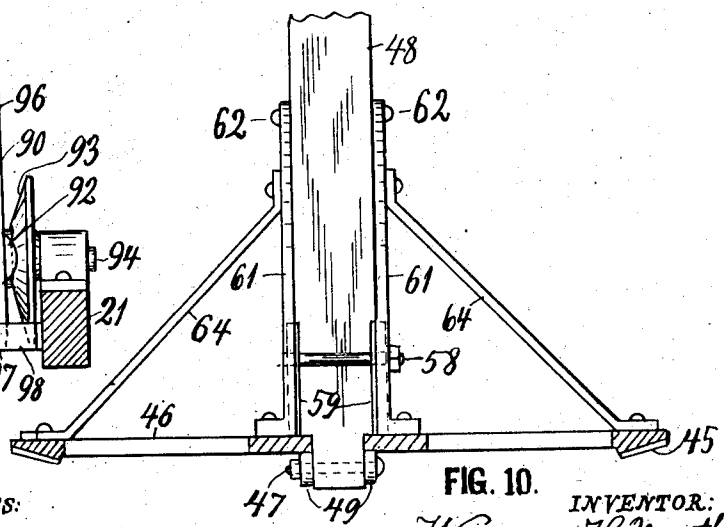


FIG. 10.

WITNESSES:

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BY his ATTORNEY:

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UNITED STATES PATENT OFFICE.

WILLIAM H. MATHER, OF LARAMIE, WYOMING.

COMBINED DERRICK AND TRACTION-ENGINE.

974,410. Specification of Letters Patent. Patented Nov. 1, 1910.

Application filed February 4, 1910. Serial No. 542,157.

To all whom it may concern:

Be it known that I, WILLIAM H. MATHER, a citizen of the United States, residing at Laramie, in the county of Albany and State of Wyoming, have invented a new and useful Combination Derrick and Traction-Engine, of which the following is a specification.

My invention relates to attachments for traction engines, and consists of a shoveling and hoisting derrick detachably combined with and operated by an ordinary traction-engine, in such a manner that much of the cost of building an independent steam shovel or derrick is saved; the derrick is also constructed with various improvements which promote its cheapness and efficiency and makes it especially adapted as an attachment to traction-engines. The entire structure may also be regarded as a single machine with detachable motor.

In the accompanying drawings Figure 1 is a side elevation of a traction-engine and my improved derrick operatively connected therewith, the ground wheels at one side being removed from the derrick axle and from the steering axle supporting the adjacent end of the boiler. Fig. 2 is an enlarged right hand end view of the boiler in Fig. 1 and certain parts secured thereto. Fig. 3 is a top or plan view of the main frame of the derrick and the axle and supporting wheels of it and of the adjacent end of the boiler and the steering means of the entire structure, the boiler and traction wheels are indicated in dotted outlines only. Fig. 4 is an enlarged top or plan view of the derrick frame and its main mechanisms, the mast being intersected at line *a*—*a* in Fig. 1. Fig. 5 is a detail top view of a collar by which braces are secured to the top of the mast of the derrick. Fig. 6 is a detail front view of the shoveling scoop and its arm and a rear side view of the bail operating the scoop. Fig. 7 is a right side elevation of the lever 108ˣ in Fig. 4 and some adjacent parts, said view also fairly represents the arrangement of lever 108 and some parts adjacent thereto in said Fig. 4. Fig. 8 is a right side elevation of the lever 96 in Fig. 4 and the parts adjacent thereto. Fig. 9 is a section on line *b*—*b* of the turn-table in Fig. 4, showing how the mast is mounted therein. Fig. 10 is a section on line C—C in Fig. 4 of the turn-table but with the segments 61 and their braces 64 intact.

Referring to the drawings by reference numerals, 1 designates the boiler, 2 the engine mounted thereon and having its main shaft 3 provided with a pulley 4, which usually serves also as a fly-wheel.

The boiler is supported by traction wheels 5, on an axle 6 and said wheels are operatively connected with the engine shaft by any suitable means, in the present instance I have indicated in dotted lines a sprocket 7 and link-belt 8 driven by a smaller sprocket 9 which is placed on the engine shaft and coupled thereto by a suitable coupling member (not shown) controlled by a hand lever 10, so that the traction wheels may be stopped and started while the engine is running. The rear end of the boiler is supported by the usual truck 11, axle 12 and steering wheels 13, said axle 12 is pivotally engaged at the middle by a stud 14 (see also Fig. 3) so as to swing horizontally in steering. Underneath the boiler, at the rear of its fire-box is mounted a shaft 15 having affixed on it a worm gear 16, which is turned by a worm screw 17, whose shaft 18 is turned by a hand wheel 19 arranged near the front end of the boiler. Near each end of the shaft 15 is wound one end of a chain 20 (see Fig. 3) whose other end is attached to the nearest end of the axle 12, one chain being wound in opposite direction to the other on shaft 15 it follows that reverse turning of the hand wheel 19 will swing the axle in horizontal plane and thus steer the traction engine when it is in traveling motion.

21 is the main frame of the derrick and has its front end supported on a truck 22 swivel jointed at 23 to an axle 24, whose ends are supported by the ground wheels 25; said axle 24 is connected with axle 12 by forwardly converging rods 26, so that the two axles will be operated in unison by the one steering device already described, and when so operated the axle 24 will swing more than axle 12 in the proportion of lateral movement each axle makes over the ground.

The rear end of the derrick frame is provided with a transverse bar 27, which may pass through the side bars of the frame as in Figs. 1 and 2 or through bearings 28 secured on the frame as in Fig. 4. Said bar

27 is supported in brackets 29 and braces 30 provided on a band 31, which is detachably secured about the smoke box 1ˣ of the boiler, by having one or more lugs 32 provided with openings and drawn forcibly toward each other by a bolt 33 inserted through them and provided with a nut 34. On said band is pivotally mounted an arm 35 carrying a heavy pulley 36, which serves to tighten a belt 37 driven by the engine pulley 4, as will presently be fully described. The ends of the bar 27 are secured by two braces 38 to a lug 39 and bolt 39ˣ provided at the rear end of the fire-box below the boiler; these braces keep the derrick frame in linear position to the boiler or entire traction-engine.

Directly above the axle 24 are journaled upon the frame 21 in transverse alinement two shafts 40 and 40ˣ, whose inner ends are each provided with a miter gear 41 and 41ˣ, both meshing with a miter gear 42 which is fixed on a short idle shaft 43 journaled in longitudinal central position on the frame, so that when shaft 40 is turned in either direction, shaft 40ˣ will turn in the opposite direction. Near the outer ends of each shaft 40 and 40ˣ is fixed a bevel gear 44 upon which rests and meshes the toothed face 45 of a turn table 46, in the middle of which is secured by a bolt 47 the lower end of a mast 48, the bolt being passed through the mast and through lugs provided either at the under side of the table as at 49 in Fig. 10 or at the upper side as at 49ˣ in Fig. 9. The upper end of the mast is journaled in a collar 50 having trunnions 51 (see Fig. 5) on which is retained by pins or other suitable means the upper ends of two brace-rods 52, whose lower ends are secured on studs 53 provided at opposite sides of the fire box of the boiler.

At the outer end of each shaft 40 and 40ˣ is journaled and retained by a collar 53 (see Fig. 4) the lower corner of an almost triangular casting 55, whose upper corners are provided with studs 56, on each of which rotates a roller 57, rolling upon the top edge of the turn table, which is thereby held down in proper meshing contact with the gears 44 even when the weight of the derrick boom tends to displace it.

At the front side of the mast, near the base thereof are provided two cheek plates 59, with a bolt 58 passed through them and through the intermediate lower end of a boom 60, said boom is guided by two segmental side guards 61, which are secured with their upper ends to the mast at 62 and their lower ends to the turn table at 63; said guards are reinforced by braces 64 extending from them to the turn table.

The outer end of the boom 60 is raised and lowered by a block-and-fall 65 connecting it with the upper end of the mast, and whose fall run 66 is secured to and wound on a drum 67. From lugs 68 near the upper portion of the boom is pivotally suspended the arm 69 of a scoop 70, which is rigidly fixed to the arm and at its rear end is provided with a dumping door 71 hinged at 72 and provided with two fingers like 73, each of which is normally engaged by a hook 74 of a dumping lever 75, that is pivoted one lever at each side of the scoop and operated in one direction by their own weight and in the other or unlocking direction by a hand rope 76 having branches 76ª attached to said levers; said rope is guided by a sheave 76ˣ mounted on the boom and sheaves 76ˣˣ in the mast to the place where the operator stands, and it may there be attached to a post 77 or a windlass 78 mounted thereon. Near the front end of the scoop is trunnioned the ends of a bail 79, the middle of which is engaged by a hook 80 of a block-and-fall 81 suspended from the outer end of the boom and having its fall arm 82 passed over a sheave 83 in the boom and thence between guiding sheaves 82ˣ in the mast to a rope drum 84, which will presently be more fully described.

On the shaft 40 is fixed a worm-gear 85, which is turned by a worm-screw 86 journaled at 87 and 88 to the frame and having its shaft made in two sections 89 and 90, which are joined together by a universal joint 91.

The shaft 98—90 and the drums 67 and 84 are operated and controlled as follows: On the shaft section 90 is fixed a small friction wheel 92 adapted to be rotated in either direction when held in contact with either of two friction disks 93, which are fixed on a shaft 94 having a pulley 95 driven by the belt 37 from the engine. In Fig. 8 is best shown how the shaft 90 is engaged by a hand lever 96, whose lower end is pivoted at 97 to a bracket 98 fixed on the frame, so that motion of the upper end of the lever will bring the wheel 92 against either of the friction disks. At opposite sides of shaft 94 are journaled two shafts 99 and 100. On shaft 99 is secured the drum 67 of which one end is formed with a friction cone 101 adapted to fit in a conic cavity 102 of a gear wheel 103, which is loose on the shaft and meshes with a gear pinion 104 fixed on shaft 94. The gear 103 is provided with a hub 105 having an annular groove 106, in which engages a fork 107 pivotally carried by a hand lever 108 pivotally mounted on a bracket 109 fixed on the frame. On the shaft 100 is likewise fixed the drum 84 having cone 101ˣ to be engaged frictionally by cavity 102ˣ in gear 103ˣ, whose grooved hub 105ˣ is engaged by fork 107ˣ, carried by hand lever 108ˣ, which is pivotally mounted on a bracket 109ˣ secured on the frame 21, as best shown in Fig. 7,

which view gives a fair idea also of lever 108 and its connections.

One end of each drum 84 and 67 is embraced by a brake band 110 having at 111 operative connection with a pedal 112 which is pivoted with one end at 113 and having its other end projected beyond the frame and formed with a foot plate 114 or 114×.

As to the operation of the machine, the connections, steering and general operation are already understood from the description above given, still it may be further stated in detail that when the scoop 70 is to be used for digging, ditching, loading or hoisting, the engine after having moved the machine to the work is by means of lever 10 thrown out of gear with the traction wheels, and after belt 37 is put in the position shown, the operator takes position near the pedals 114, 114× and manipulates the lever 96, for turning the turn table and boom into the desired position by means of the worm screw 86; he then lowers the boom by operation of the brake pedal 114 and drum 67. The scoop being brought into engagement with the material that is to fill it, the block-and-fall 81 is employed to pull the scoop forward so as to thereby fill it; this is done by so applying hand lever 108× that gear 103× engages the cone 101× of the drum 84; when the scoop has thus been more or less filled and brought to a sufficient incline upward with its front end to cause the load to slide out at the rear end, the door 71 is unlocked by pulling the rope 76; the latter pulling is however not done until the table has been turned with the scoop over the proper dumping place, which turning is done by manipulation of lever 96. The drums are by the pedals 114, 114× held still or permitted to unwind their cables gradually as may be required. If the traction engine is to be separated from the derrick and used for other purposes it may be detached from the derrick by detaching rods 26 from axle 12 and either by opening the bearings 28 in Fig. 4 and detaching the braces 52 in Figs. 1 and 3 from the studs 53 on the boiler, or by detaching said braces 52, removing bolt 39× at the rear end of the fire box and loosening the upper bolt 33 in band 31 and thus slip the latter off from the smoke box. When thus detached, the end of the derrick frame nearest to the boiler may be supported on a suitable prop (not shown) to hold the frame at the proper elevation for attachment again to the boiler.

When the entire machine is moving upon an uneven road or other ground the uneven rising and falling of any of the three pairs of ground wheels is permitted by means of four joints formed, one at the studs 53 on the boiler, the second at the trunnions 51 at the top of the mast, the third one at the pivot bar 27 and the fourth at the journal boxes in the lower corners of the castings 55 on the shafts 40 and 40×, the latter joint allowing the turn table and mast to tip backward and forward all that is necessary for driving and using the machine on ground of all ordinary unevenness.

What I claim is:—

1. The combination with a traction engine having traction wheels and a supporting axle pivoted at its middle and a supporting and steering wheel at each end, and manually operated means for swinging the axle on its pivot, of a derrick having one end of its main frame detachably connected to and supported by the traction engine, an axle supporting the other end of the frame and having at each end journaled a supporting and steering wheel, the middle of the axle being pivotally connected to the frame, two rods pivotally connecting said axle with the axle of the steering wheels of the engine, whereby all the steering wheels are steered in unison, means for transmitting power from said engine to the working parts of the derrick and means for disengaging the traction wheels from the engine proper when the derrick is in operation.

2. The combination with a traction engine having traction wheels and a supporting axle pivoted at its middle and a supporting and steering wheel at each end, and manually operated means for swinging the axle on its pivot, of a derrick having one end of its main frame detachably connected to and supported by the traction engine, an axle supporting the other end of the frame and having at each end journaled a supporting and steering wheel, the middle of the axle being pivotally connected to the frame, two rods pivotally connecting said axle with the axle of the steering wheels of the engine, whereby all the steering wheels are steered in unison, means for transmitting power from said engine to the working parts of the derrick and means for disengaging the traction wheels from the engine proper when the derrick is in operation; said rods being converged toward each other with the ends pivoted to the axle at the derrick frame.

3. The combination with a traction engine having a boiler, of a band detachably secured about the boiler and provided with apertured arms, a bar in said apertures and a derrick having a main frame with a pair of supporting wheels under one end, the other end being supportingly connected with said bar.

4. The combination with a traction engine having a boiler, of a band detachably secured about the boiler and provided with apertured arms, a bar in said apertures and a derrick having a main frame with a pair

of supporting wheels under one end, the other end being supportingly connected with said bar, and horizontally arranged braces from each end of the bar to the boiler to help hold the bar in position.

5. The combination with a traction engine having a boiler, of a band detachably secured about the boiler and provided with apertured arms, a bar in said apertures and a derrick having a main frame with a pair of supporting wheels under one end, the other end being supportingly and detachably connected with said bar.

6. In a machine of the class described, in combination, a lower structure involving a portable frame, a pair of alined horizontal shafts mounted thereon, gears fixed on the adjacent ends of the shafts and an idler gear connecting said gears, bevel gears fixed one near the outer end of each shaft, an upper structure involving a larger bevel gear meshing with two opposite points upon said bevel gears on the shafts and constituting the turn table of the machine, means journaled on said two shafts and engaging over the edges of the table to prevent displacement of it, a mast secured in the middle of the table, a derrick boom pivotally secured near the base of the mast, operative connection between the boom and the top of the mast, a journal bearing embracing the top of the mast and inclined downwardly spread brace rods from said bearing to the lower part of the structure, a motor connected with the lower structure operative controlled connection between the motor and the boom to hoist it, a working scoop suspended from the boom and operative controlled connections between it and the motor, and reversible operative connection between the motor and one of the shafts of the bevel gears on which the turn table rests.

7. The combination with a traction engine of a shoveling, digging and hoisting derrick detachably connected with the boiler of said engine, said derrick comprising a horizontal main frame with a pair of supporting wheels under one end, the other end being supported by the connection with the boiler, two horizontal shafts journaled on the frame in central alinement, a miter gear fixed on the inner end of each of said shafts and a bevel gear on each outer end thereof, a third miter gear mounted to mesh with the two first named miter gears to cause them to turn in reverse directions, a large bevel gear meshing upon the upper edges of the two first-mentioned bevel gears and forming a turn table, a worm wheel fixed on one of the alined shafts, a worm screw engaging said worm gear, a shaft journaled upon the frame and having two friction disks and a pulley secured on it, means for transmitting power from the engine to said pulley, a shaft extending from the worm screw and provided with a friction wheel, a hand lever arranged to move said friction wheel alternately into contact with either of the friction disks, two castings journaled and retained one on each of the alined shafts and having each two studs with rollers thereon engaging the top of the turn table near the periphery thereof; said castings and the shafts supporting same being arranged at diametrically opposite points of the table, a mast secured centrally on said table to rotate with it, a collar forming a journal box for the top end of the mast, two brace rods pivotally connected with their lower ends one at each side of the boiler, the upper ends of the rods converging to and being pivotally attached at opposite sides of the collar on the mast, a boom pivoted near the base of the mast to swing in vertical plane, means fixed on the table to guide the boom in said vertical movement and cause it to swing from side to side with the turning of the table, two rope drums mounted on the frame and means for throwing either drum into operative connection with the driven shaft having the friction disks, brakes controlling the drums, a block-and-fall connecting the swinging end of the boom with the top of the mast and having operative connection with one of the drums, a scoop having a rigid arm pivotally suspended from the upper portion of the boom, a block-and-fall extending from the scoop to the outer end of the boom and having operative connection with the second rope drum.

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

WILLIAM H. MATHER.

Witnesses:

L. N. GRANT,

W. F. PEABODY.