W. S. GARRETT.

PORTABLE DERRICK.

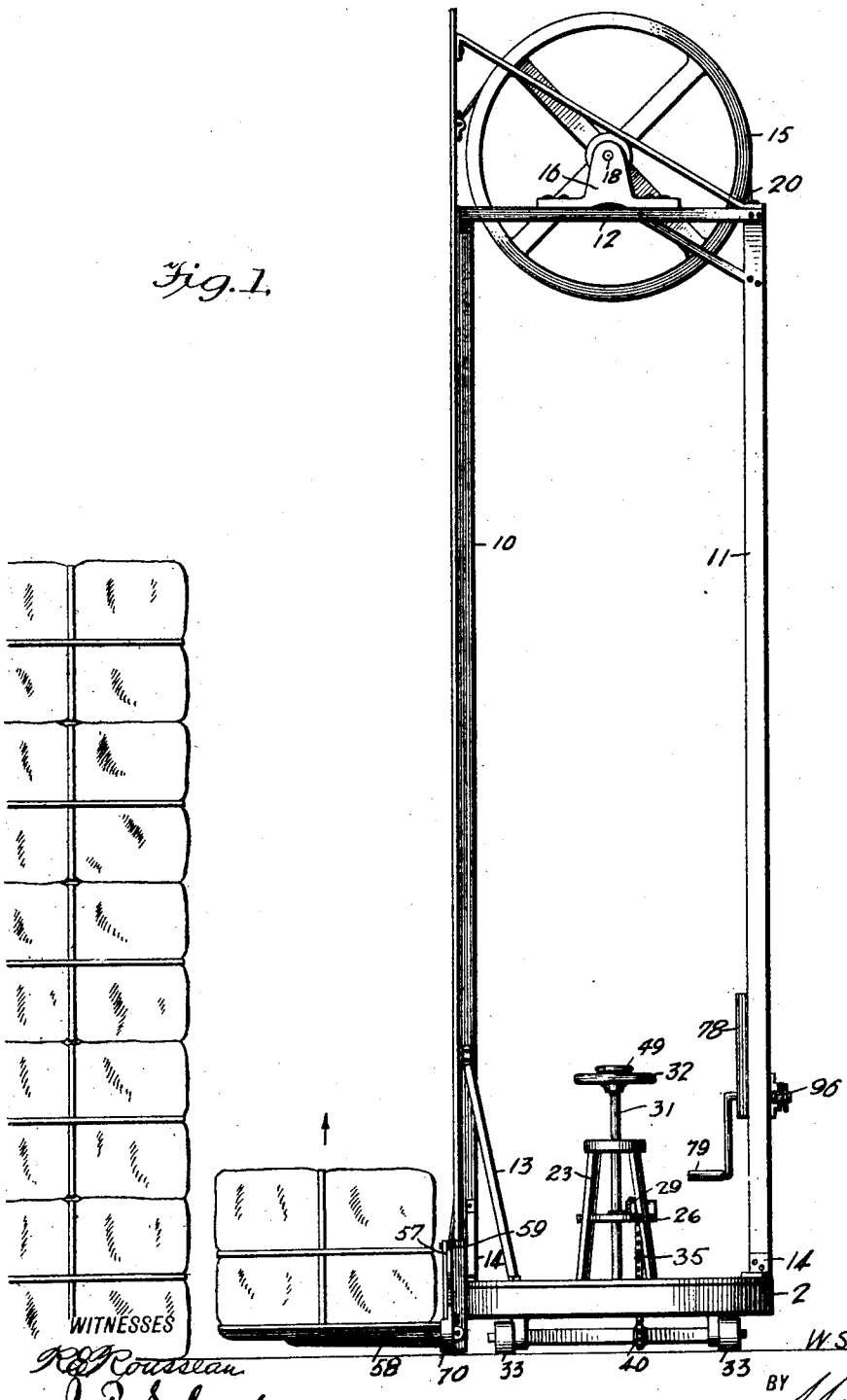
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10 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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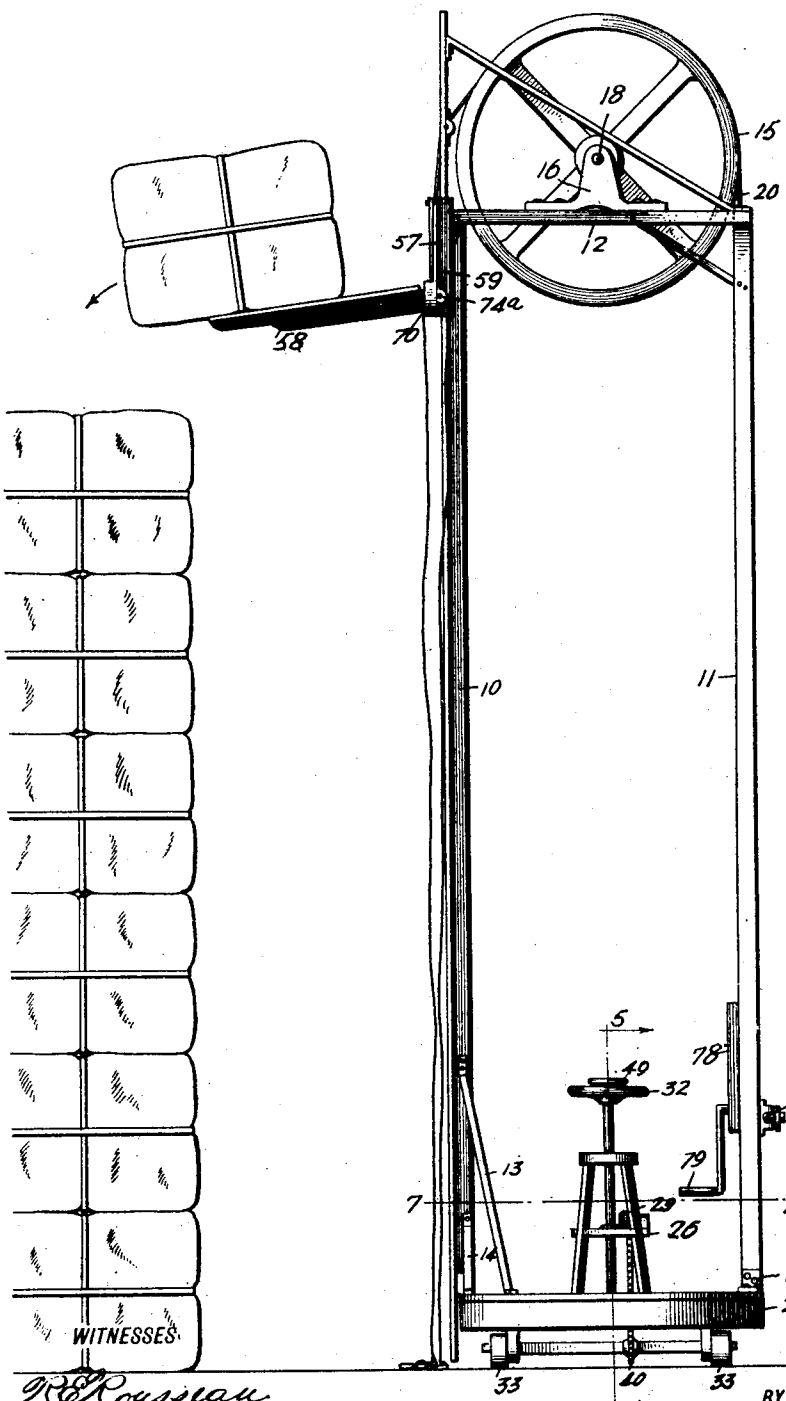


Fig. 2.

WITNESSES:

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Fig. 3.

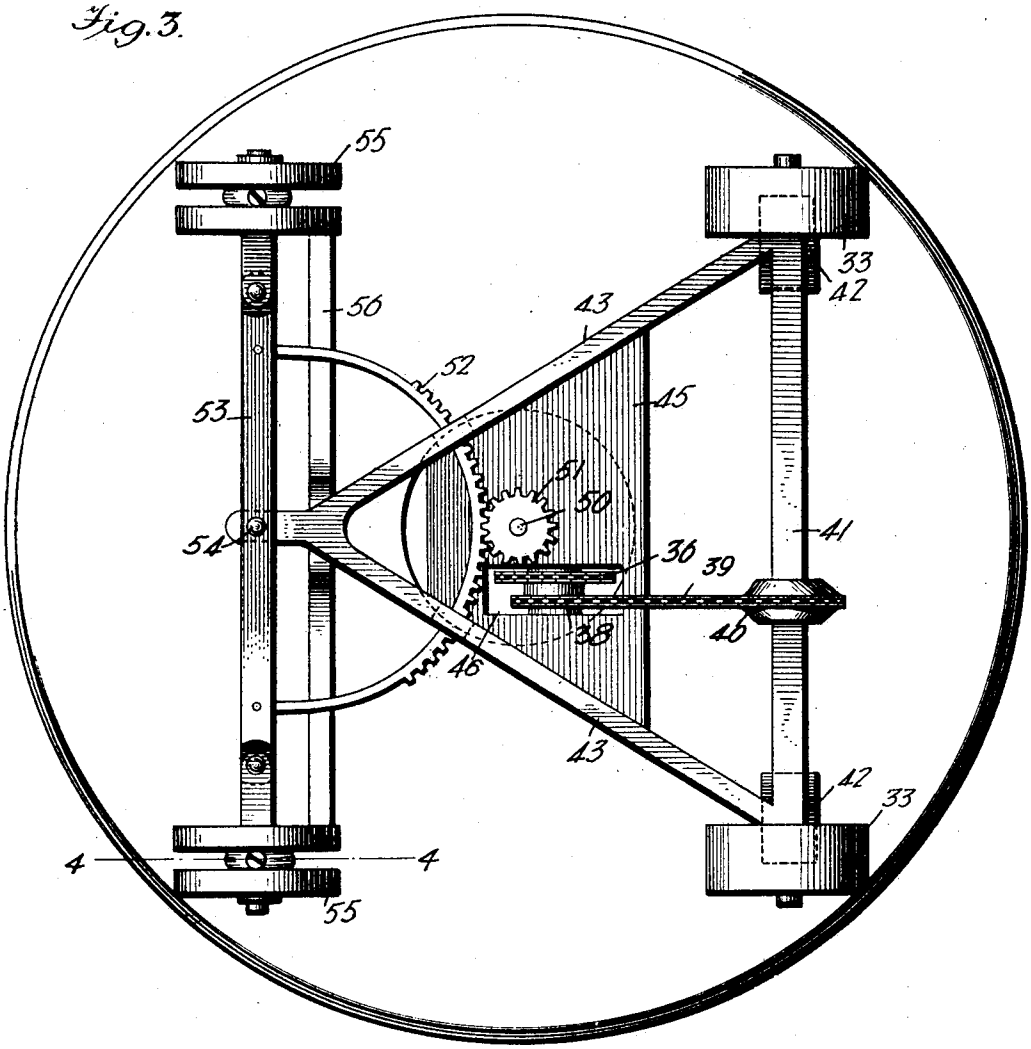
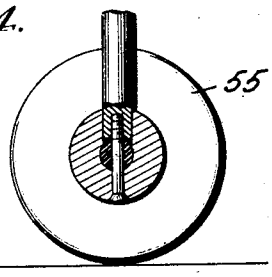


Fig. 4.



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Fig. 5.

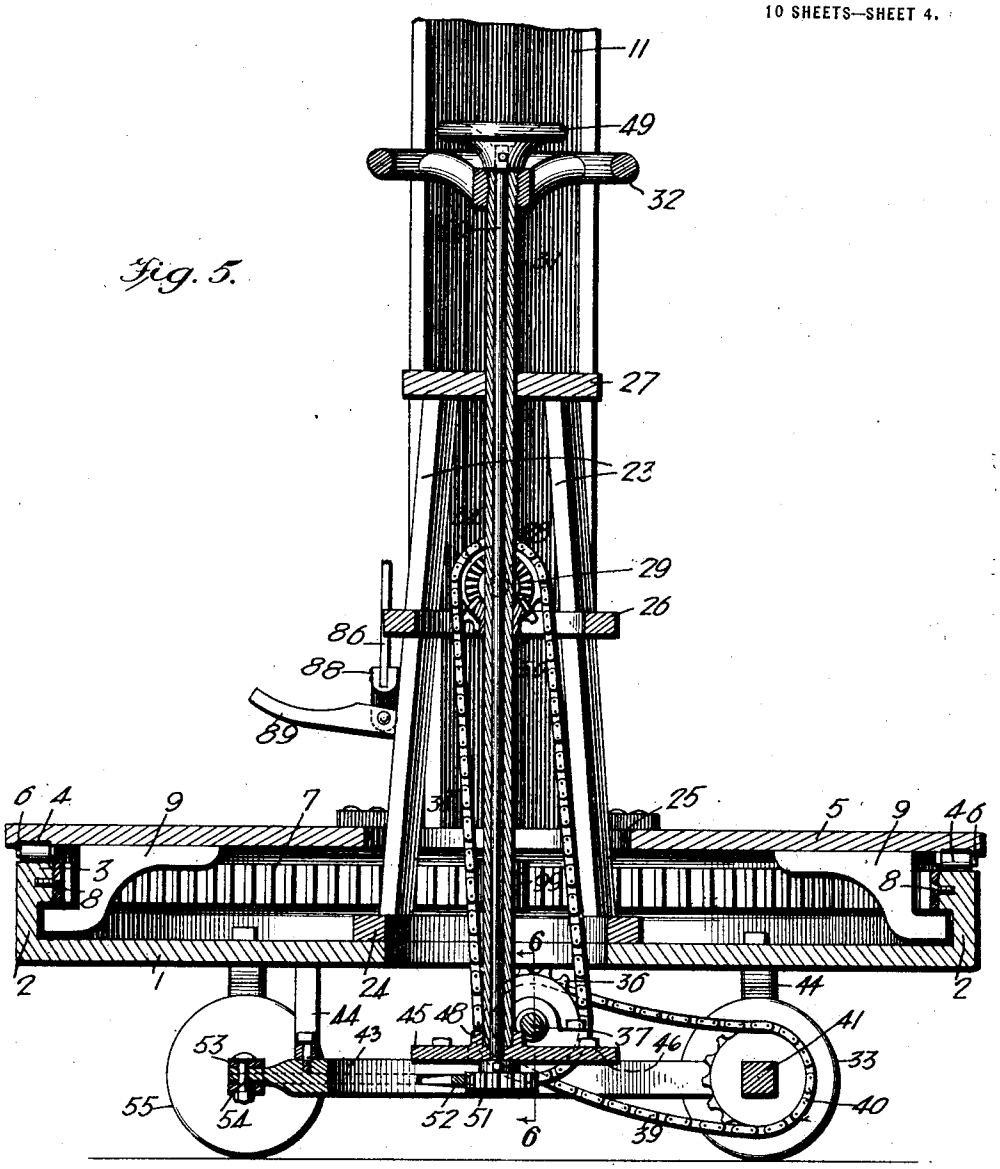
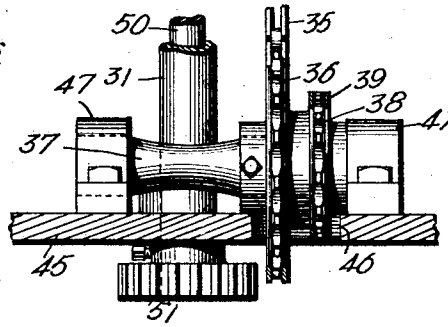


Fig. 6.



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Fig. 7.

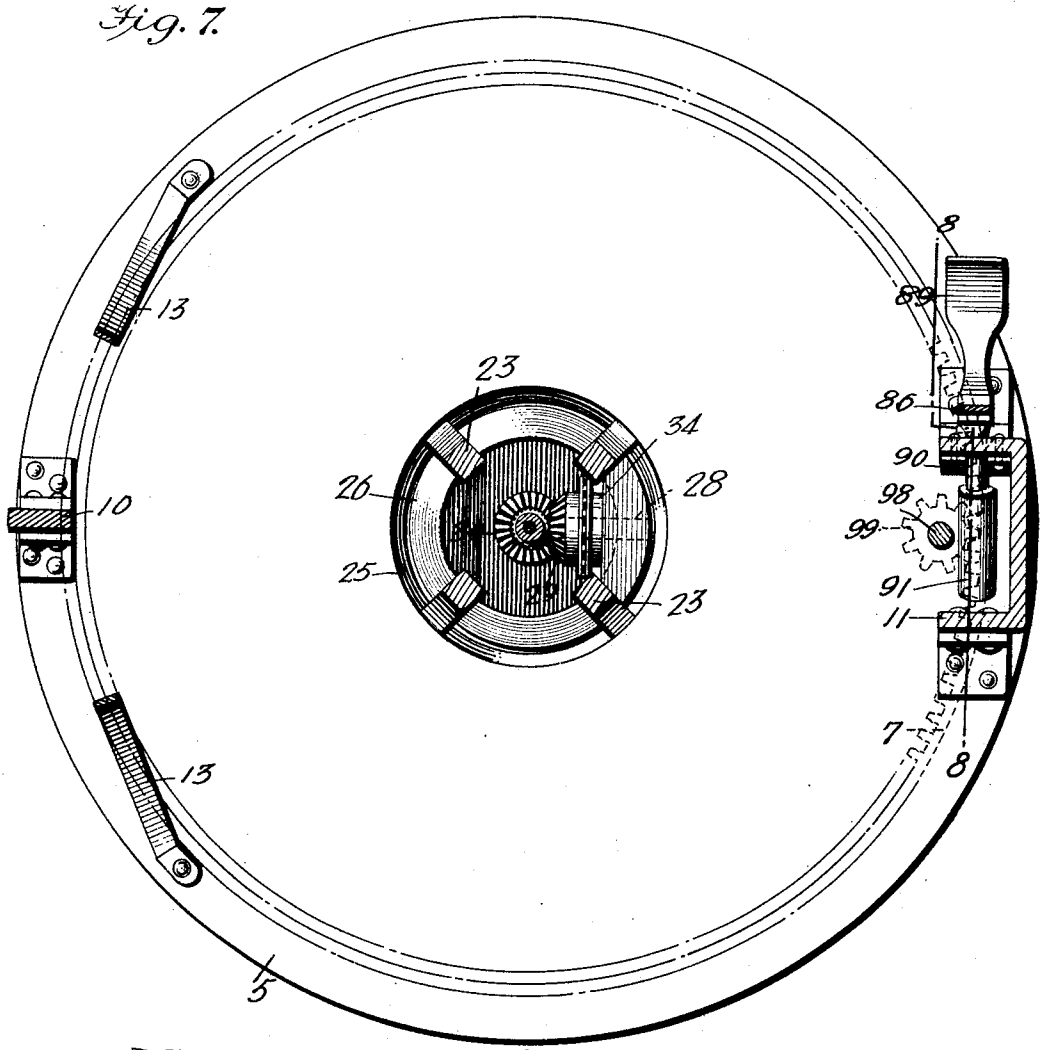


Fig. 9.

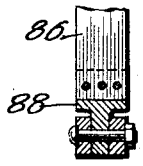
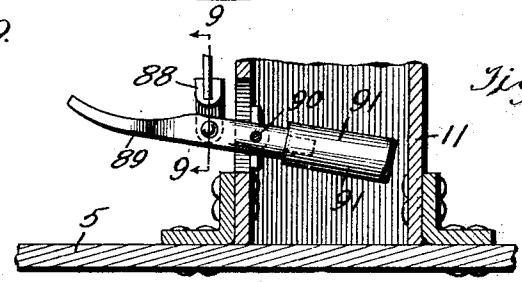


Fig. 8.



WITNESSES

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Fig. 10.

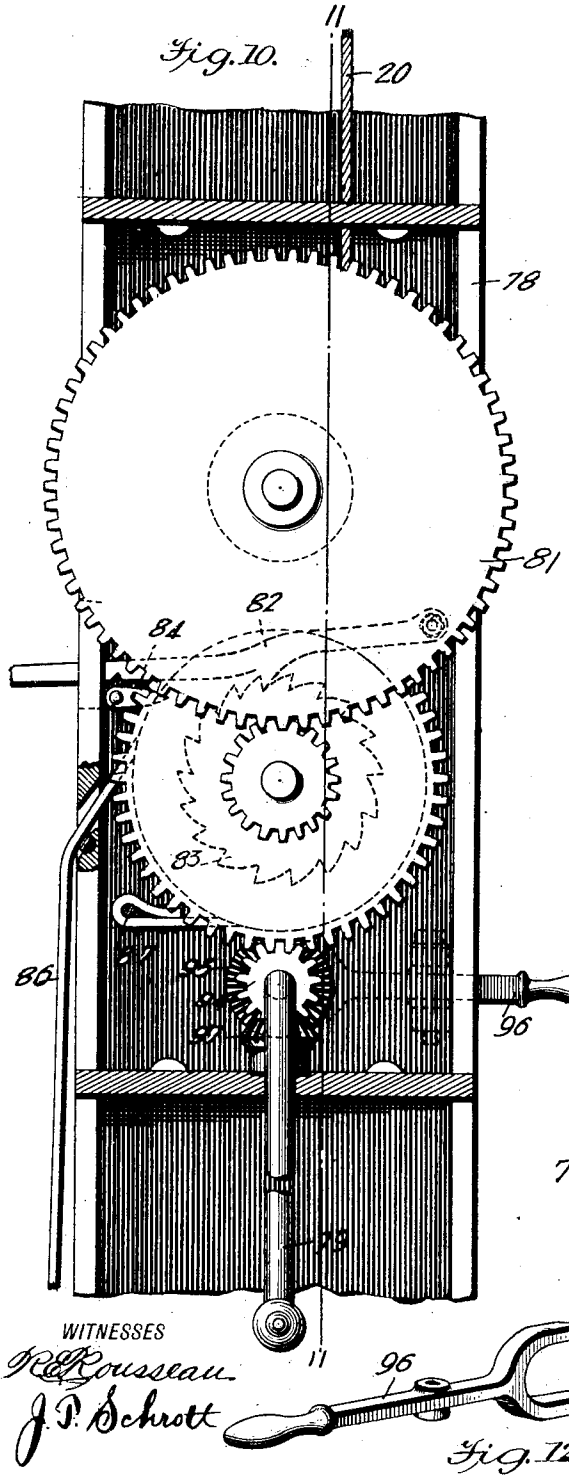
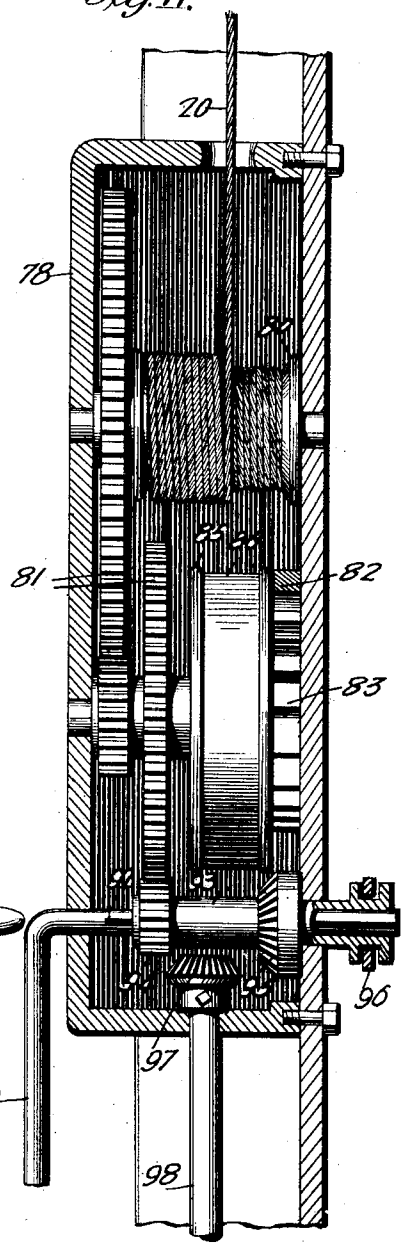


Fig. 11.



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Fig. 12.

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Fig. 13.

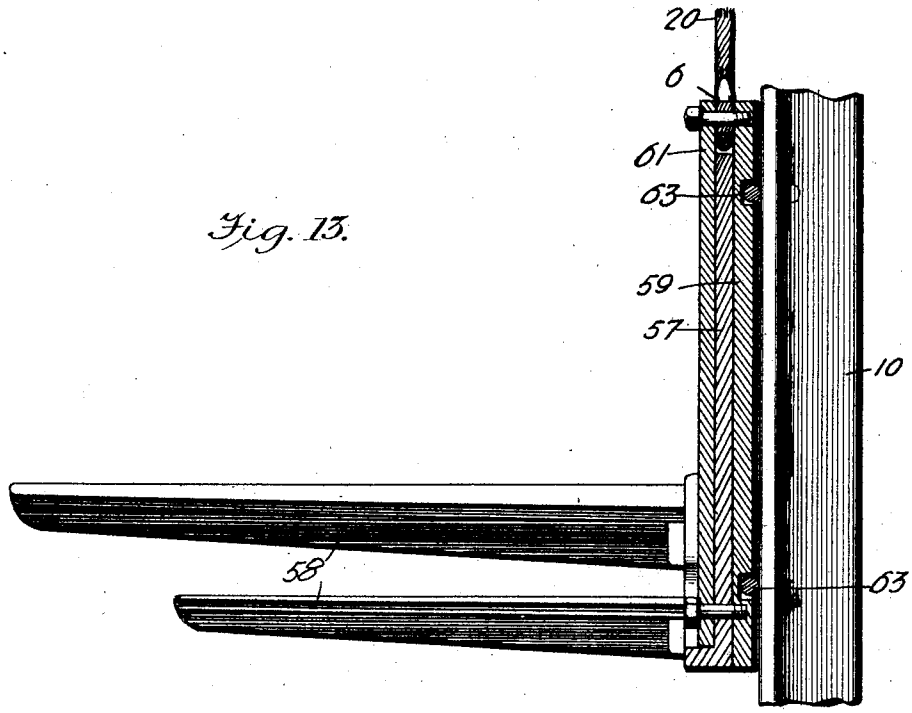


Fig. 14.

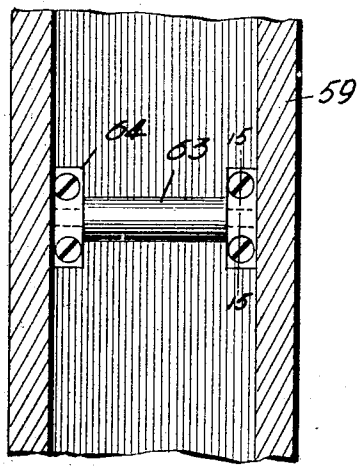
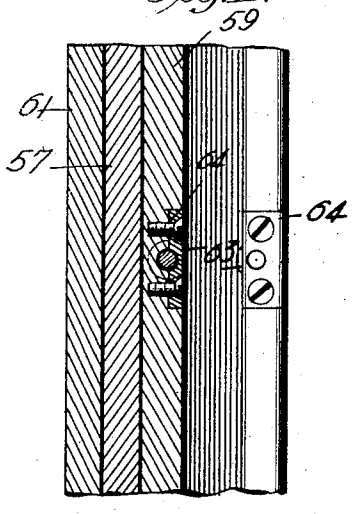


Fig. 15.



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Fig. 16.

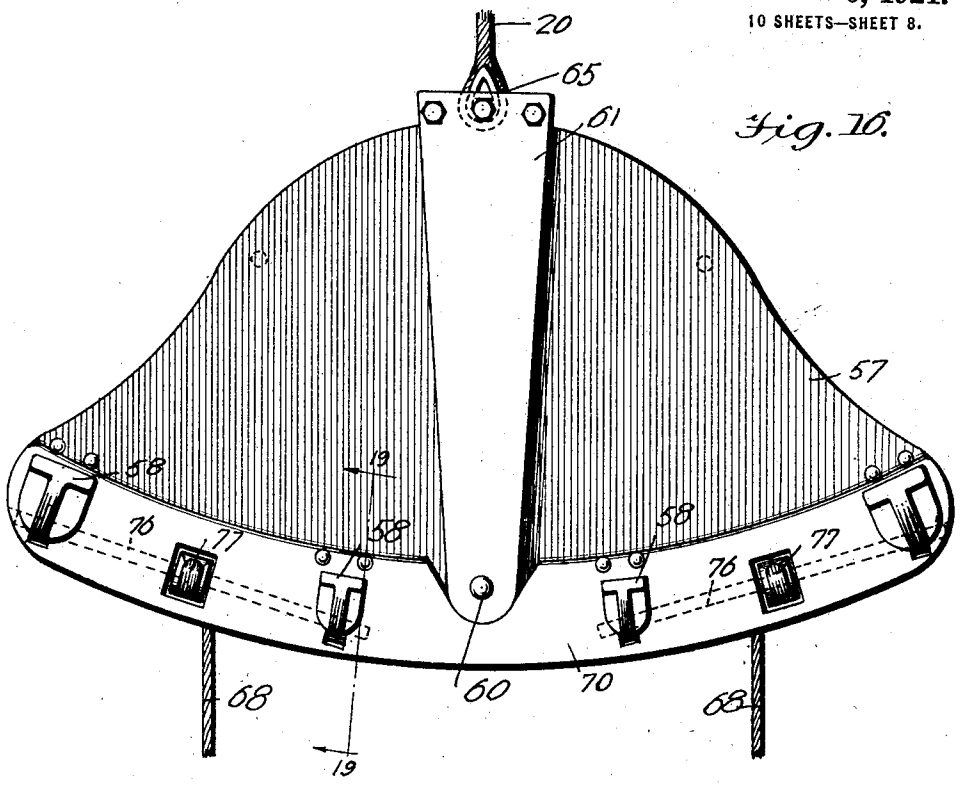
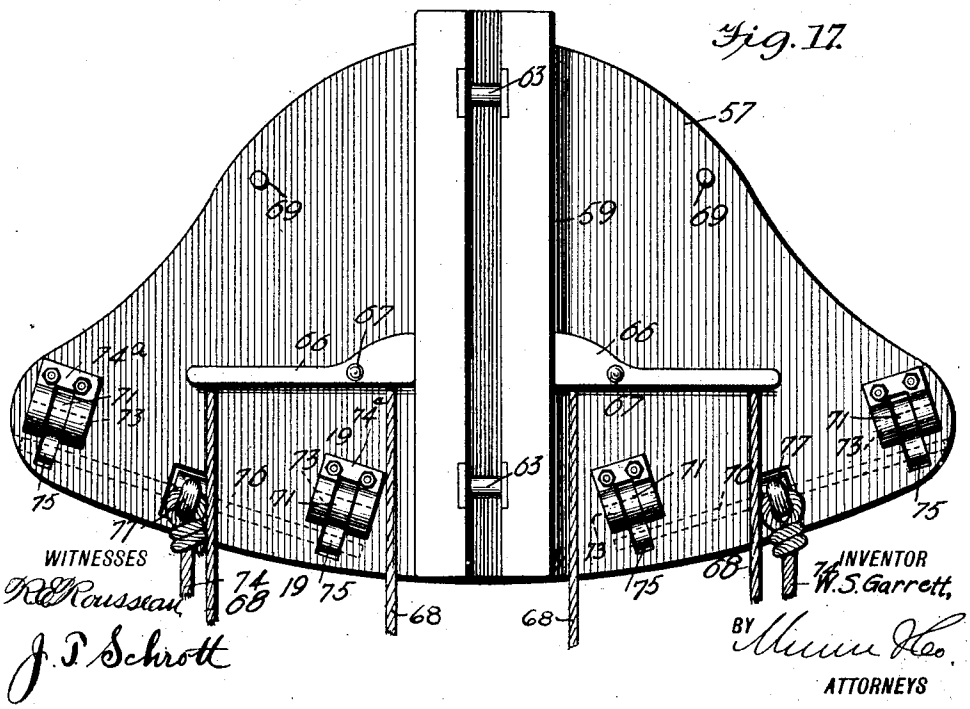


Fig. 17.



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Fig. 18.

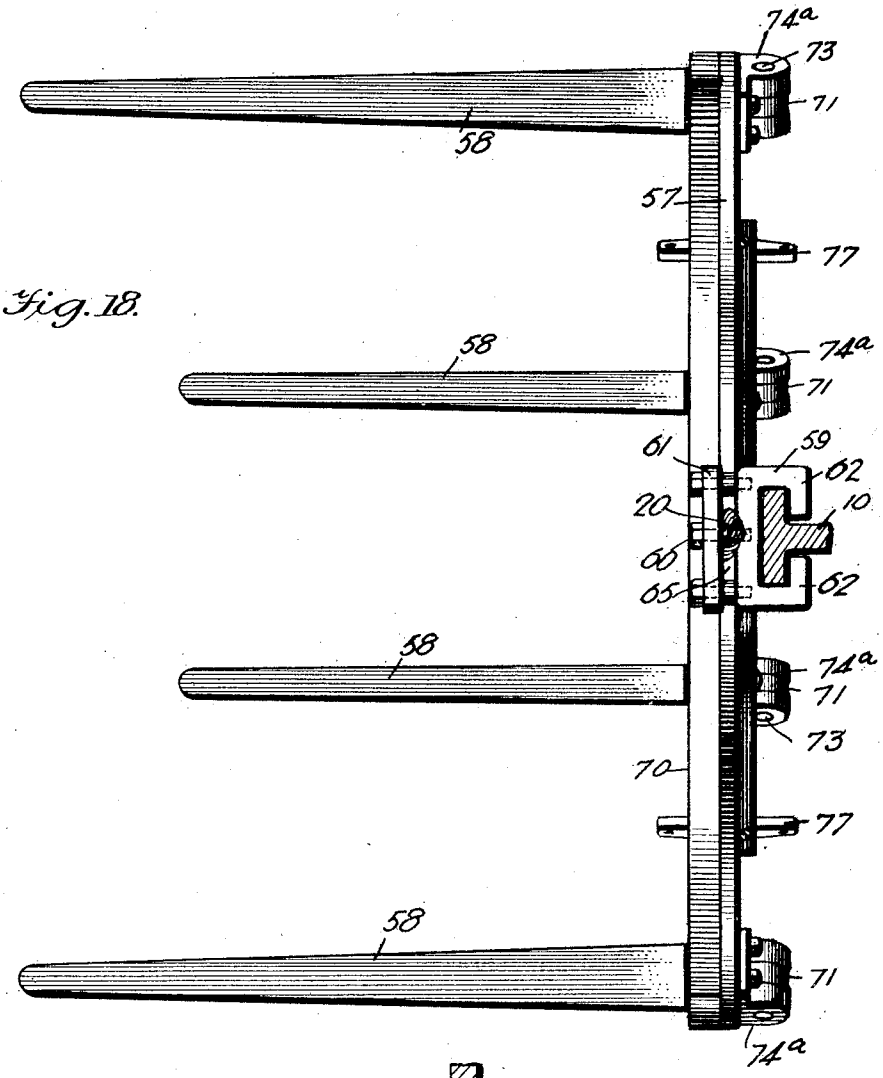
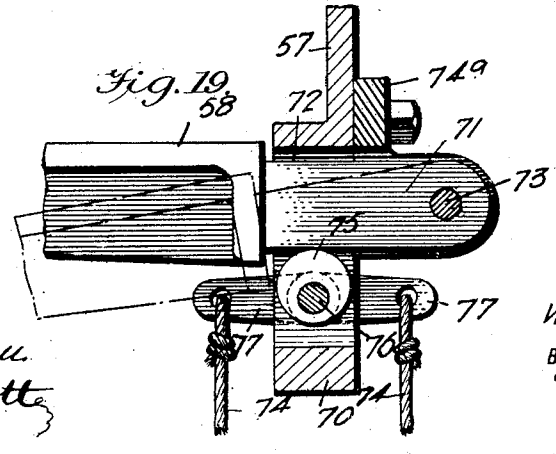


Fig. 19.



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Fig. 20.

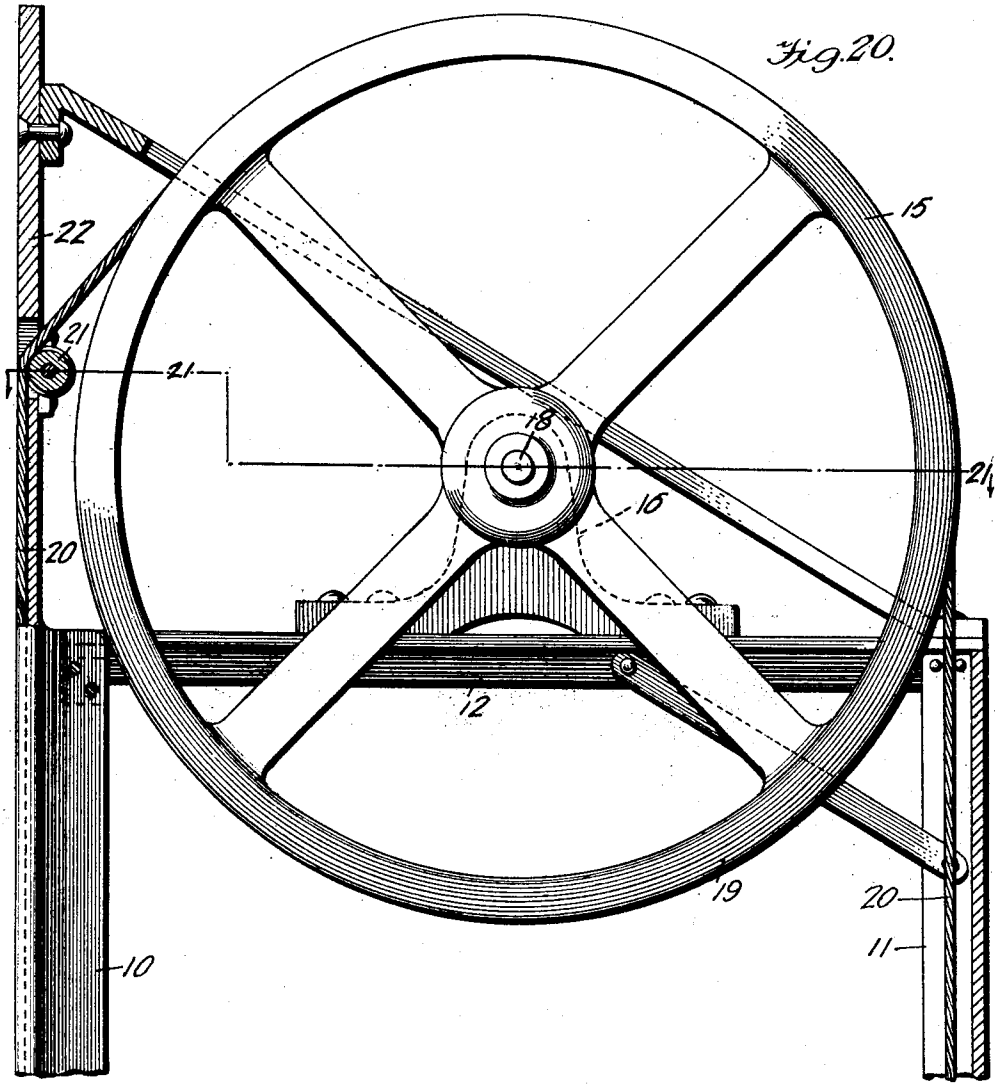
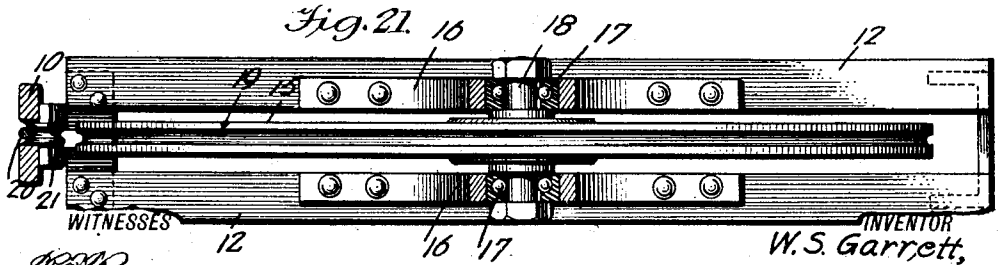


Fig. 21.



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UNITED STATES PATENT OFFICE.

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1,399,424. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed July 1, 1919. Serial No. 307,963.

To all whom it may concern:

Be it known that I, WILLIAM STANHOPE GARRETT, a citizen of the United States, and a resident of Richmond, in the county of Henrico and State of Virginia, have made certain new and useful Improvements in Portable Derricks, of which the following is a specification.

My invention relates to improvements in portable derricks, and it consists in the constructions, combinations and arrangements herein described and claimed.

One of the foremost objects of my invention is to provide a portable derrick which is capable of being easily operated by one man.

A further object of the invention is to provide a portable derrick, in which the steering, propelling, turning, revolving and load lifting functions can all be accomplished by one man.

A further object of the invention is to provide a novel arrangement in a portable derrick, whereby the load can be readily dumped from the lifting cradle by operation from the platform of the derrick.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of the improved portable derrick, showing the lifter cradle at the bottom in position to receive a load.

Fig. 2 is a similar view showing the lifter cradle at the top in the load dumping position.

Fig. 3 is an inverted plan view of the platform, showing the steering and propelling mechanism.

Fig. 4 is a detail sectional view on line 4—4 of Fig. 3 showing the mounting structure of one of the wheels,

Fig. 5 is a detail vertical section through the platform and on the line 5—5 of Fig. 2, showing the mechanism for actuating the steering and propelling mechanisms,

Fig. 6 is a detail vertical section on the line 6—6 of Fig. 5,

Fig. 7 is a detail horizontal section taken substantially on the line 7—7 of Fig. 2,

Fig. 8 is a detail sectional view taken substantially on the line 8—8 of Fig. 7,

Fig. 9 is a detail section taken on the line 9—9 of Fig. 8,

Fig. 10 is a detail front elevation of the hoisting mechanism,

Fig. 11 is a vertical section taken substantially on the line 11—11 of Fig. 10,

Fig. 12 is a detail perspective view of the shifting lever for disconnecting the hoisting mechanism and setting the turn table in revolution,

Fig. 13 is a vertical section of the load lifting cradle,

Fig. 14 is a detail view of one of the roller bearings of the cradle,

Fig. 15 is a detail cross sectional view taken substantially on the line 15—15 of Fig. 14,

Fig. 16 is a front elevation of the lifting cradle, showing the mounting whereby it can be laterally rocked,

Fig. 17 is a rear elevation of the cradle, showing the mechanism for releasing the lifter arm whereby the load is dumped,

Fig. 18 is a plan view of the lifting cradle,

Fig. 19 is a detail sectional view taken substantially on the line 19—19 of Fig. 17,

Fig. 20 is a detail sectional view of the main sheave at the top, and

Fig. 21 is a detail horizontal section taken substantially on the line 21—21 of Fig. 20.

In order to give a clear description of the construction and mode of operation of the improved portable derrick, the various major parts and operations are described below in regular order, concluding with a brief résumé of the operation. Consider first

The frame of the derrick.

This consists of a circular base 1, beneath which the propelling and steering gear is located to support the superstructure of the derrick. The base 1 has a peripheral flange or wall 2, which in turn has a widened bearing head 3 on which the roller bearings 4 move.

A turntable or platform 5 carries the rollers 4 in suitable brackets 6. The turntable 5 is capable of rotation independently of the circular base 1 by means described under the heading "Revolving mechanism." The bearing head 3 carries an internal gear rim 7, secured in place at 8, by means of which the turntable is made to revolve. The turntable is kept from lifting off of the

circular base by suitable supporting means 9. This means is in the shape of suitable brackets, the ends of which extend beneath the bearing plate 3 as clearly shown in Fig. 5.

Arising from the turntable 5 is a pair of channel iron standards 10, 11. These standards are spoken of as being of channel iron. They may be of wood if desired, or they may be of some other structure other than channel iron. These standards, together with a pair of cross pieces 12 at the top, form a superstructure which is suitably braced at 13 and secured to the turntable 5 by the securing means 14. A large main sheave 15 is journaled on top of the superstructure. Attention is directed to Figs. 20 and 21 wherein the construction of the sheaves is clearly shown.

Suitable bearings 16 on the cross pieces 12 at the top, have journals 17 in which the shaft 18 of the main sheave is supported. The sheave 15 has a groove 19 in which the hoisting rope or cable 20 runs. An idler 21, supported on an upward extension 22 on the standard 10, guides the cable 20 on the left side. The hoisting cable 20 extends from the hoisting mechanism at the right to the load lifting cradle at the left.

The propelling mechanism

is best shown in Figs. 3, 4, 5, 6, and 7, to which attention is directed. A pedestal 23, made of suitable open framework, is suitably secured at 24 to the circular base 1 and extends through an opening 25 in the turntable 5.

Bearing plates 26, 27 connect the various portions of the framework of the pedestal. A stub shaft 28 is suitably journaled on the bearing plate 26, and carries a bevel pinion 29. This bevel pinion is driven by a similar pinion 30 on the propelling sleeve 31, which carries the propelling wheel 32 at the top. On turning the propelling wheel 32, the stub shaft 28 is made to turn. Motion is thereby imparted to the rear wheels 33 through a sprocket 34 on the stub shaft 28, a chain 35 which leads to a large sprocket 36 on a counter shaft 37, a smaller sprocket 38 integral with the sprocket 36, a chain 39 and a sprocket 40 on the axle 41 by which the wheels 33 are carried.

The axle 41, although shown square in Fig. 5, is rounded at the ends, or otherwise provided with suitable bearings in the journals 42 of the gear frame 43. This gear frame is fixedly supported beneath the circular base 1 by suitable means 44. A plate 45 extends across and on top of the gear frame 43.

This plate has a suitable opening 46 to admit the projecting part of the gears 36, 38. Suitable bearings 47 on the plate 45, support the countershaft 37. The plate 45 also has a suitable step bearing 48 in which the lower end of the propelling sleeve 31 rests, as clearly shown in Fig. 5.

The reader will understand at once that the operator stands on the turntable 5 and propels the derrick in the desired direction by turning the propelling wheel 32. This operates to turn the rear wheels 33, thereby causing the derrick to move. Obviously, the wheels 33 may be rotated by power other than that exerted by the operator as, for example, by means of an electric motor. This modification is not desired to be illustrated, however, as it can be clearly understood how such an arrangement would be made in case it were used. Attention is now directed to

The steering mechanism,

also shown in Figs. 3 and 5. The steering wheel 49 is suitably fixed to the steering shaft 50 which extends down inside of the propelling sleeve 31. The shaft and sleeve are movable independently of each other by turning one or the other of the wheels at the upper ends. The steering shaft 50 extends through the plate 45, where it carries the gear 51 which meshes with the gear segment 52 on the front axle 53.

This axle is suitably arranged to turn on the fixed pivot 54. It carries the steering wheels 55 at the extremities. A reach bar 56 extends from one side to the other in parallelism with the front axle. Both wheels 32 and 49 are close at hand to the operator, and as he turns the propelling wheel 32 to cause the derrick to move over the floor, he can give the steering wheel 49 a sufficient part of a turn to adjust the steering wheels 55 at the top to cause the derrick to move in the proper direction.

The lifting cradle,

best shown in Figs. 13, 14, 15, 16, 17, 18 and 19, comprises a rockable head 57 from which a plurality of movable lifter arms 58 extend. These arms are normally rigidly fixed substantially at right angles to the rockable head 57, but are capable of being sufficiently released to allow them to assume positions at inclined angles with respect to the rockable head 57, so that the load will slide off as in Fig. 2.

A carrier 59 forms the support on which the head 57 is pivotally or rockably mounted at 60. The carrier includes the front carrier plate 61 which serves to keep the rockable head 57 in place and provide an adequate support therefor. The carrier 59 includes flanges or arms 62 which extend around adjacent portions of the standard 10 as clearly shown in Fig. 18.

The standard 10 constitutes a rail on which the bearing rollers 63 of the carrier 59 ride. These rails can be of any suitable type and

may be fastened in position by the means 64, clearly shown in Figs. 14 and 15. The cable 20 is suitably attached to the carrier 59, as at 65.

Holder arms 66, pivoted at 67 on back of the rockable head 57, serve to keep the head 57 from rocking when they engage the sides of the carrier 59 as shown in Fig. 17. Ropes 68 extend down from the arms 66 within reach of the operator. On pulling either set of ropes, the holding arms are released so that the head 57 can be rocked to one or the other side, thereby rolling the load off laterally if it be so desired.

Stop pins 69 limit the rocking motion of the head 57. These pins can be arranged either to engage the carrier 59 or the front plate 61, either arrangement serving to limit the movement of the rockable head. The lower edge of the head 57 is thickened at 70, to provide a more ample base for the support of the arms 58 and the mechanism cooperating therewith.

Each lifter arm 58 has an extension 71 which extends through an opening 72 in the thickened edge 70, and is pivotally mounted at 73 in a suitable bracket 74. Each lifter arm is capable of swinging down into the dotted line position in Fig. 19 to let the load slide off as in Fig. 2, when one of the cables 74 is pulled.

There is a cam 75 beneath each extension 71. The cams 75 on the respective sides of the carrier 59, are mounted on cam shafts 76, to which oppositely extending arms 77 are attached. These arms carry the pull cables 74. It will be understood at once that on pulling on one or the other cable 74, the shaft 76 is rocked in the corresponding direction, thereby moving the cams 75 from beneath the extensions 71, letting the lift arms 58 move to the dotted line position. On pulling on the opposite pull cable, the reverse action takes place and the lifter arms 58 are restored to the normal positions. It may be observed in Fig. 19 that the cams 75 are housed in the openings 72, so as to protect them from possible injuries.

The hoisting mechanism

is contained in a casing 78, as clearly shown in Figs. 10 and 11. This casing is carried by the right standard 11. On turning the handle 79, the cable 20 is either wound on or unwound from the hoisting drum 80 thereby causing the lifting cradle to respond either by an up or down movement, as may be required. A train of gears 81 between the handle 79 and the shafts of the drum 80 enables the application of sufficient power to the hoisting cable 20 to raise the load.

A dog 82, coöperating with the ratchet 83, serves to hold the load at any desired place along the standard 10. The dog remains in engagement with the ratchet 83 by gravity but may be held out of engagement by a detent 84 at one side, as shown in Fig. 10.

A brake drum 85, to which the brake band 86 is applied, enables the gradual letting down of the lifter cradle upon the release of the dog 82. The brake band is suitably attached at one end at 87, the other end extending down to a connection 88 which is joined to the treadle 89 in Fig. 8. This treadle is pivoted at 90 and has a counter weight 91 which keeps the brake band normally loose. The operator steps on the treadle 89 in order to tighten the brake band around the drum.

The revolving mechanism

forms a part of the hoisting mechanism, but its operation is altogether independent from the hoisting mechanism. The shaft 92, of which the handle 79 is a part, carries a shiftable sleeve 93, with a spur gear 94 on one end and a bevel gear 95 on the other.

Under normal conditions, the spur gear 94 meshes with the nearest large gear of the frame 81, the shifting handle 96 having been shifted to secure this position. When the shifting handle 96 is shifted in the other direction, the bevel gear 95 is made to engage the bevel pinion 97 on the upper end of the revolving shaft 98, so that upon turning the shaft 92, by means of the handle 79, the revolving shaft 98 is made to turn. A spur gear 99 on the lower end of the revolving shaft 98, meshes with the internal gear 7 carried by the peripheral wall 2 of the circular base 1, so that the turntable 5 is made to revolve in respect to the circular base. It is understood that when this operation occurs, the spur gear 94 is out of engagement with the gear 81 and no movement of the hoisting mechanism results.

The operation.

While the operation is fully described in connection with the foregoing description of the construction of the various parts, yet it is thought to be of advantage to give a brief résumé. The operator mounts the platform or turntable 5, and by turning the propelling wheel 32, conveys the derrick to any desired place by driving the rear wheels 33 in Fig. 5. The driving connection consists of the various sprockets and chains clearly showr in that figure.

If he desires to make a turn while propelling the derrick, he uses the steering wheel 49, by means of which the front wheels 55 are turned into the direction he desires to go. The lifting cradle, which consists of the rockable head 57 and lifter arms 58, is lowered on the left standard 10 to the desired point, as for example in Fig. 1. The burden is placed on the lifter cradle, and thereupon the operator turns the handle 79 of the hoisting mechanism, so that the cable

20, which is attached to the carrier 59 of the lifting cradle, raises the latter together with the load, to the position in Fig. 2.

Should it be desired to tilt the head 57 in one or the other direction, the ropes 68 are pulled, thereby unlocking the arms 66 from engagement with the carrier 59, and enabling the head 57 to be tilted to that side on which the pull through the rope 68 is strongest. Under other circumstances, the operator may desire to incline the lifter arms 58 so as to let the load slide off as in Fig. 2.

To accomplish this, he pulls on one or the other of the pull cables 74 in Fig. 19, whereupon the cam 75 is moved from beneath the extension 71, letting the lifter arms 58 incline downwardly so that the load slides off as explained. By pulling on the opposite pull cable, the cam 75 is restored to its normal position, thereby raising the lifter arms 58 to the normal position.

While the construction and arrangement of the portable derrick as herein described and claimed, is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:—

1. A portable derrick, comprising a sleeve and wheel operable by one man for propelling the derrick, a shaft in the sleeve with a hand wheel close to the propelling hand wheel for steering the derrick during propulsion, adjacently located hoisting means, and operatively associated load lifting means.

2. A portable derrick, comprising a base structure with means carried thereby enabling the propulsion of the derrick by one man, operatively associated means for steering the base structure during propulsion, a superstructure carried by the base structure, hoisting mechanism, load lifting means operatively associated with said superstructure and hoisting means, and independently operable means associated with said lifting means for discharging the load either laterally or toward the front.

3. A portable derrick, comprising a base structure mounted on wheels, a hand wheel structure, with operating connections to certain of the wheels, for turning said wheels to propel the derrick, and other hand wheel structure, operatively associated with the former and having operating connection to others of said wheels, to steer the derrick during propulsion.

4. A crank for normally operating the hoisting mechanism of a portable derrick, a turntable forming a part of the base structure of the derrick, normally inoperative mechanism capable of turning said turntable by said crank, and means for rendering said mechanism operative and at the same time rendering the hoisting mechanism inoperative.

5. A crank normally operatively associated with the hoisting mechanism of a portable derrick; a turntable forming part of the base structure of the derrick, normally disconnected and inoperative means for turning the turntable, and shiftable means operatively associated with the crank, rendering said turning means operative and said hoisting means inoperative, when shifted in one direction.

6. A crank, with normally operatively associated hoisting mechanism of a portable derrick; a base structure, with a rotatable turntable having a derrick superstructure on which the hoisting mechanism is mounted; normally idle rotating means operatively associated with the crank, turntable and the base structure, and shiftable means for rendering the hoisting mechanism inoperative when shifted in one direction, but rendering said rotating means operative to rotate the turntable and superstructure in respect to the base structure when the crank is subsequently turned.

7. The combination, of a crank handle including a shaft portion, a sleeve slidably mounted on the shaft portion, with a spur gear for driving associated hoisting mechanism, and a bevel gear; operatively associated but normally idle turntable rotating means including a shaft and bevel gear, and means for shifting the sleeve to disconnect the spur gear and connect the bevel gears, whereby the shaft is rotated on subsequent turning of the crank handle.

8. A base structure including an annular bearing head with an undercut portion, a turntable, with anti-friction means running on the bearing head; and means carried by the turntable extending into said undercut portion for preventing the displacement of the turntable.

9. A base structure, including a bearing head with an undercut portion, and having an internal gear in fixed relationship therewith; a turntable including anti-friction means in engagement with the bearing head; means carried by the turntable for holding the turntable in place on the base structure by engaging said undercut portion, and means operatively associated with the turntable in engagement with said internal gear, for revolving the turntable in respect to the base structure when said means is actuated.

10. A base structure, having a gear frame; propelling wheels operatively mounted on the gear frame, propelling mechanism for said wheels including bracket and driving connections carried by the frame; a pedestal carried by the base structure, a propelling wheel, including a propelling sleeve operatively mounted in the pedestal and including a bearing on said frame, with driv-

ing connection to said propelling mechanism; steering wheels operatively mounted on said frame, a steering hand wheel adjacent the propelling wheel, with a steering shaft, extending through the sleeve; and steering mechanism actuated by said shaft, including a segment and gear arrangement.

11. A gear frame with a plate having a step bearing, propelling wheels including an axle operatively mounted on the frame, steering wheels including an axle operatively mounted on the frame, means for actuating the propelling wheels, including a sleeve supported in the step bearing, with operating connections including a counter shaft mounted on said gear frame; and means for actuating the steering wheels, including a shaft extending through the sleeve and plate, with a gear engaging a segment operatively associated with the steering wheel axle.

12. A circular base with an upstanding annular flange terminating in a bearing head with an undercut portion, a turntable operatively mounted on the base, including anti-friction means engaging said bearing head; and means for holding the turntable on the base, including bracket portions extending beneath said undercut portion.

13. A portable derrick, comprising a turntable, with a superstructure including a main rope sheave; a portable base structure in respect to which the turntable is capable of rotating, hoisting means including a cable passing over the sheave and down on one side, mechanism operatively associated with the hoisting mechanism, movable into one position to enable the rotation of the turntable and superstructure on the base structure without actuating said hoisting mechanism, and a load lifting cradle operatively associated with said cable, and running on a portion of said superstructure.

14. A lifting cradle, comprising a movable carrier, a cradle head pivotally mounted on the carrier but normally prevented from movement in respect thereto, and a plurality of lifter arms extending from said head.

15. A lifting cradle, comprising a carrier, a cradle head pivotally mounted on the carrier, means carried by the head and operatively associated with the carrier, for normally preventing motion of the head in respect to the carrier, but capable of actuation to press the head to either side; a plurality of lifter arms movably mounted on the cradle head, and instrumentalities normally preventing said arms from movement, but being capable of allowing limited movement of said arms when the load is to be discharged to the front.

16. A lifting cradle, comprising a head, and a plurality of lifter arms individually mounted but simultaneously movable in respect to the head, and including operatively associated means normally holding the arms at right angles to the head but permitting said arms to assume an inclination when actuated.

17. A lifting cradle, comprising a cradle head with a plurality of sets of lifter arms, means providing a common pivotal mounting for each set of arms, means operatively associated with the arms for holding them in a rigid normal position in respect to the cradle head, and means for actuating said holding means in either direction, to release the arms, allowing them to assume positions at an inclination to the former positions, and thereafter restoring said arms to the aforesaid normal positions.

18. A lifting cradle, including a movable carrier, a cradle head, pivotally mounted on the carrier with means for limiting rocking motion in respect to the carrier, and including a thickened edge with openings, lifter arms arranged in sets, with extensions reaching through said openings, bearing means for said arms, means common to each set of arms, including cams located and housed in certain of the openings for supporting said arms in normally rigid positions; and means for actuating said cams, permitting the arms to move on said bearing means and assume inclined positions in respect to the cradle head, said means being movable in the other direction to restore said arms to the normal positions.

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