W. H. ELLIOT.

TRAVELING-CRANES.

No. 194,035. Patented Aug. 14, 1877.

Fig. 1.

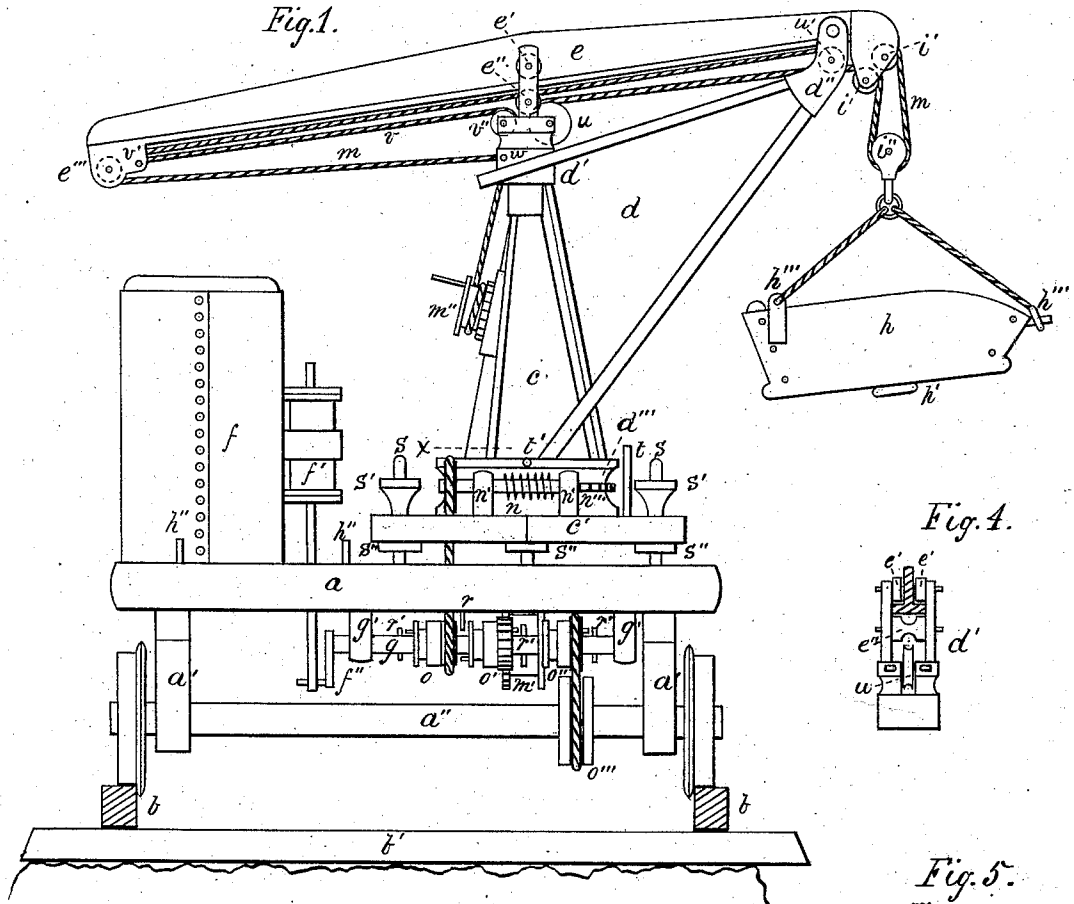


Fig. 4.

Fig. 5.

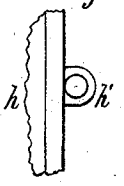


Fig. 2.

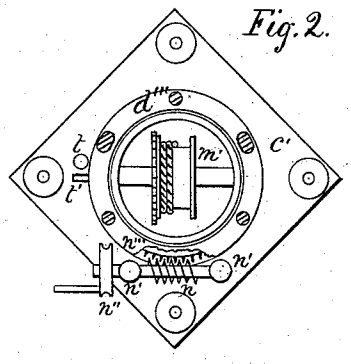
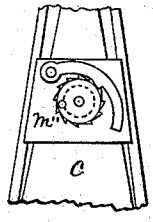


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN TRAVELING CRANES.

Specification forming part of Letters Patent No. **194,035**, dated August 14, 1877; application filed July 11, 1877.

To all whom it may concern:

Be it known that I, WM. H. ELLIOT, of the city and State of New York, have invented a new and Improved Traveling Crane, of which the following is a specification:

The object of my invention is to facilitate the removal of rock and earth from all open excavations, such as cellars, sewers, &c.; and its nature consists in the use of certain appliances and methods to further the above object, which are herein fully set forth and claimed.

Figure 1 is an elevation of my improved traveling crane. Fig. 2 is a horizontal section of the crane at dotted lines *x*. Fig. 3 is an elevation of a windlass for moving the sliding beam. Fig. 4 is an elevation of the head of the crane. Fig. 5 is a plan of the hinge of a cart-body.

a is the body or frame of the car; *a'*, the bearings of the axles *a''*; *b*, tracks; *b'*, cross-ties; *b''*, bottom of the excavation; *c*, cone or mast of the crane; *c'*, base of the cone; *d*, arm of the crane, composed of the head *d'*, the block *d''*, the base *d'''*, and seven rods, three of which connect the base with the head, two connect the head with the block *d''*, and two connect the base *d'''* with said block; *e*, beam, which is supported by and slides upon the arm of the crane to elongate the same. A section of this beam represents an inverted **T**, as shown in Fig. 4. *e'* and *e''*, friction-rolls in the head *d'*, upon which the beam moves; *e'''*, sheave in the rear end of the beam *e*; *f*, steam-boiler; *f'*, cylinder of the steam-engine; *f''*, crank of the same; *g*, crank-shaft; *g'*, bearings of the same; *h*, cart-body; *h'* and *h''*, hinges which attach the cart-body to the car or to the axle of a cart; *h'''*, fastenings for lifting devices; *i* and *i'*, sheaves in the head of the beam *e*; *i''*, lifting-sheaves; *m*, lifting-rope; *m'*, cylinder, upon which rope *m* is wound; *m''*, windlass which moves the beam *e*; *n* and *n'''*, worm and gear which swing the arm of the crane around cone *c*. The gear *n'''* is fastened to, and makes a part of, the base of the arm *d'''*. *n'*, bearings of the worm; *n''*, pulley and crank for driving the same; *o*, clutch, which connects the crank-shaft with the pulley *n''* and worm *n* by means of a belt; *o'*, clutch, which connects the crank-shaft with cylinder *m'* by means of gears; *o''*, clutch, which connects the crank-shaft with pulley *o'''* on one of the axles by means of a belt. These clutches are provided with suitable levers for operating them. *r*, locking-pin, which projects down from the body of the car; *r'*, pins through the crank-shaft, which make a part of the clutches. Clutches *o* and *o''* are each composed of a hub, having in it a groove for a forked lever and a pulley for carrying a belt. They each, also, have a pin projecting from the end of the clutch next to the pins *r'*, with which they engage. Clutch *o'* is composed of a hub, having in it a groove for a forked lever, and a pinion which connects with a gear on the side of cylinder *m'*. This clutch has a pin projecting from each end, one of which engages with pin *r'* in the crank-shaft, and the other with stationary pin *r*. The levers give these clutches a longitudinal movement upon the crank-shaft, by which means the machinery with which each clutch is in connection is made to move or be at rest, as occasion requires. The pins in each end of the clutch *o'* are so arranged that this clutch must always be in connection with pin *r'*, to raise or lower the lifting-sheave; or, with the stationary pin *r*, to prevent the rope *m* from being run out by a load on the crane. S, screw-rods, which are fastened in the body of the car, and project up through the corners of base *c'*; S', hand-nuts on rods S, above base *c'*; S'', the same on the rods below the base *c'*; *t*, pin in the base of the cone; *t'*, pin in the base of the arm. These pins stop the arm from making a complete revolution, which prevents it from twisting the lifting-rope injuriously. *u*, sheave in the head *d'*, over which rope *m* runs; *u'*, friction-roll in block *d''*, for the support of beam *e*; *v*, rope for adjusting beam *e*; *v'*, pin, to which rope *v* is attached; *v''*, sheave over which rope *v* runs; *w*, pin in head *d'*, to which rope *m* is fastened at one end; *x*, point of section.

My invention, as herein set forth, consists of certain improvements upon that shown in my patent of November 23, 1869, to which reference is made.

I employ on my improved traveling crane a double reversible steam-engine, whereby I may reverse the movement of any part of the machinery by reversing the engine, as set forth in said patent.

I have represented my improved crane as

running upon tracks or rails, both of which are placed upon one side of the excavation. This is necessary in case several adjoining cellars are to be excavated, as it would be impracticable to make a car large enough to reach tracks on each side of so large a field. In prosecuting the work two tracks are laid down along but a few feet from the border of the field to be excavated. Upon these tracks a rock-drilling engine is first run, which bores a line of holes directly upon the line of the field. Following this machine a traveling crane is run upon the tracks, which, when the holes have been blasted, picks up the broken rock and carries it to a point where carts and wagons can conveniently come to receive it, both machines doing their work over the side of their respective cars, and outside of the tracks. When in this way these machines have removed the rock entirely across one side of the field, a third track is laid down behind the two first, the two machines moved over upon the two rear tracks, and the first track taken up, when, beginning at one end of the excavation, the same process is repeated.

To facilitate the changing of the crane and drilling-engine from the front to the rear tracks, they should have independent wheels, so constructed as to turn upon a vertical axis, and be provided with screws or jacks by which the wheels may be raised a few inches from the tracks; also with short cross-tracks upon which to run the machines across from one track to the other. Thus prepared these machines are moved over as follows: First raise them by the jacks, turn the wheels across the main tracks, put under the cross-tracks and let machines down upon them, run the machines across, then raise them, take out the cross-tracks, turn the wheels to correspond with the main tracks, and let the machines down upon them. Thus by these simple means these machines are easily changed from one track to the other.

To raise or lower a load on the crane I have only to connect clutch o' with the crank-shaft, and then give the steam-engine movement in the right direction.

To swing the arm of the crane around from point to point, I connect the clutch o with the crank-shaft, by which the crane may be moved in either direction.

To move the car upon the track, I connect the clutch o'' with the crank-shaft, when the car will move in either direction with the engine.

For the purpose of increasing the length of the arm of the crane I employ beam e. This beam slides longitudinally upon friction-rolls in the top of the arm, and is thrown forward by means of the rope v, which is attached to the rear end of the beam at v'. It then passes over sheave v'', and is wound upon windlass m''. By turning the windlass the rear end of the crane e''' is brought up against the head d', which projects the beam forward over the top of the arm, by which means the length of the arm, from its vertical axis to the head of the beam, is doubled. The lifting-rope m is attached at one end to the pin w in the head of the arm. It then passes around sheave e''', along under the beam over i', under i'', over i, and over u, down to the cylinder m', upon which it is wound. This arrangement of the rope m prevents the movement of the beam from raising or lowering the load on the arm or beam-head. As the distance between pin w and sheave e''' decreases by the forward movement of the beam, the rope passes over the several sheaves and compensates for the increasing distance between sheaves i and u, so that the distance between the head of the beam and the sheave i'' is neither increased nor decreased by the movement.

The advantages offered by this feature of the invention, particularly when employed upon a locomotive, are very great, as the numerous obstacles to the use of a crane that is fixed in position, or has an arm of fixed length, (always met with in the streets of a city,) are easily overcome by the use of a crane provided with an extension-arm, and carried upon a self-moving car.

To facilitate the removal from the excavation of earth and the smaller pieces of rock, I employ detachable cart-bodies, as seen at h, Fig. 1. This cart-body is provided with fastenings h''' and with suitable chains or ropes for connecting it with the sheave i'', and it is also provided with hinges h' for attaching it to the car-body or cart-axle, and these hinges are so constructed that the cart-body can readily be dumped from either the car-body or cart-axle. This feature of the invention, when used in connection with a self-moving car, enables the workmen to remove the rock and earth with once handling, and also obviates the necessity of driving the teams into the excavation and dragging the loads out of it.

When the beam has been thrown out by rope v and windlass m'', it may readily be drawn back, after it has been relieved of its load, by a rope attached to its head, without the aid of the windlass. It may, however, be drawn back by the windlass in the same manner in which it is pushed out by the use of two sheaves at v'' and two ropes, one attached to the forward, and one, as shown, to the rear, end of the beam. These ropes would require to be so connected with the windlass m'' that while one rope is wound upon it the other would be unwound. By this arrangement the beam could easily be pushed out and drawn back with its load upon it.

In my improved crane the cone c terminates in a hollow pivot, upon which the head d' is fitted. Upon this pivot rests the weight of the arm and its load, while the base d''' of the arm has a bearing around the base c' of the cone.

I have, in the drawings, shown the crane occupying a car by itself; but it may with propriety be used upon a rock-drilling engine. In this case, for cutting sewers, the vertical shafts, with their respective rock-drills, would occu-

py each end of the car, directly over the sewer, while the crane or cranes would occupy the sides of the car, directly over the track, but in such location that they could reach the bottom of the sewer, either before or behind the engine, or both.

My improved crane is entirely supported on screw-rods S, and by means of the hand-nuts S′ and S″ the cone is adjusted to a vertical position, whatever may be the grade or difference in the height of the tracks. This feature is essential to the successful working of the sliding beam *e*.

Having described my invention, what I desire to have secured to me by Letters Patent of the United States is—

1. A traveling crane having the following elements: a sliding beam for elongating the arm of the crane, adjusting devices for keeping the crane-mast in a vertical position, and a car, whereby the crane may be moved from point to point, with its load suspended, substantially as specified.

2. The rope *m*, rope *v*, and the windlass *m″*, in combination with sliding beam *e*, when said ropes are arranged to operate substantially as and for the purpose specified.

3. The detachable cart-body *h*, provided with hinges *h′* and fastenings *h‴*, substantially as and for the purpose specified.

WM. H. ELLIOT.

Witnesses:

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WM. H. PAGE.