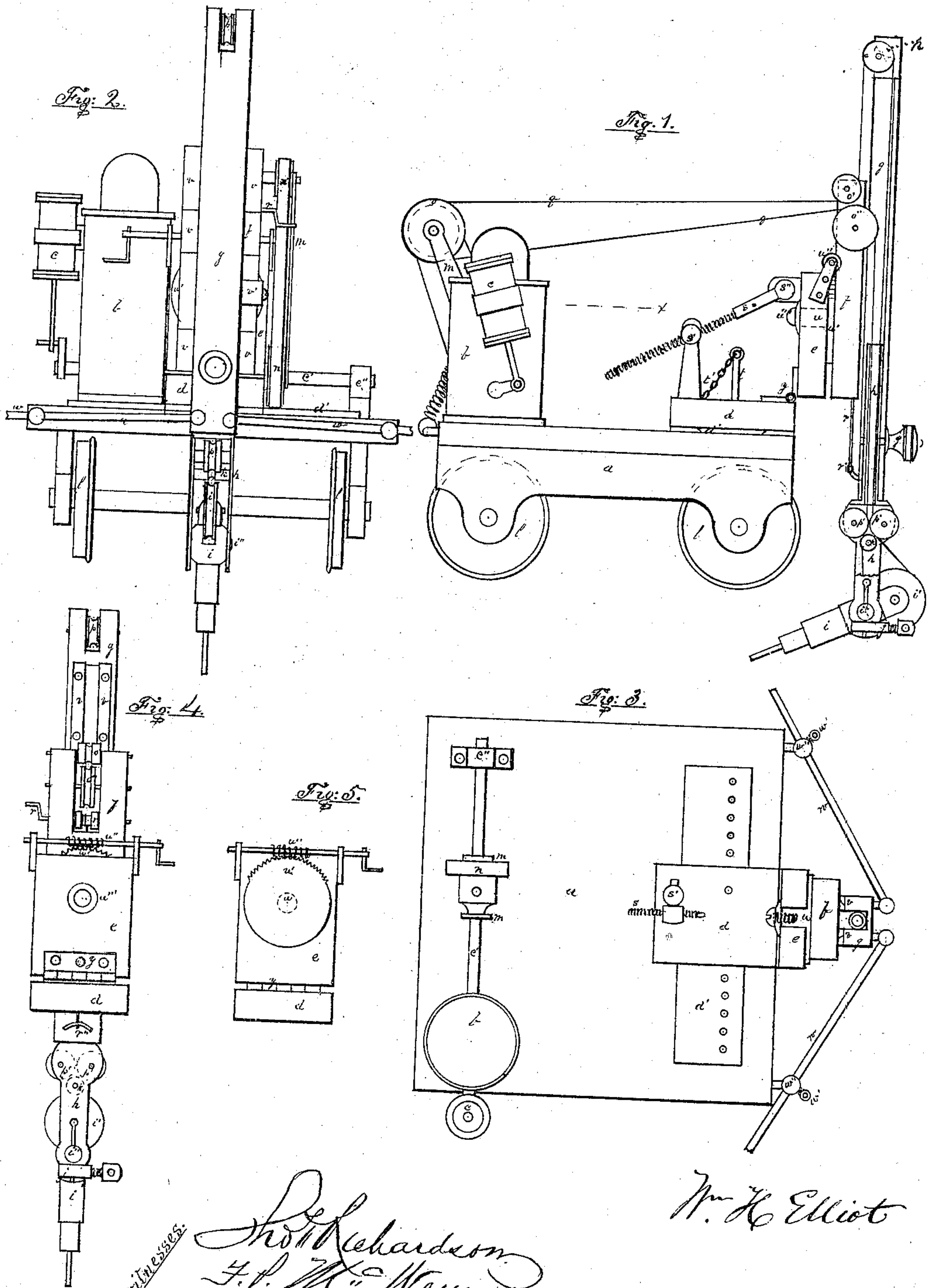


W. H. Elliot

Rock Drill.

No. 102,383

Patented Apr. 26, 1870.



Witnesses:
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WILLIAM H. ELLIOT, OF NEW YORK, N. Y.

Letters Patent No. 102,383, dated April 26, 1870.

IMPROVEMENT IN MACHINERY FOR DRILLING ROCK.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, WILLIAM H. ELLIOT, of the city, county, and State of New York, have invented a new and improved Machinery for Excavating Rock; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Similar letters of reference indicate the same devices in all the figures.

To enable others skilled in the arts to comprehend, make, and use my invention, I will proceed to describe its nature, construction, and operation.

The nature of my invention consists in suspending a drilling-machine, by attaching it to the lower end of a rigid suspending shaft, which is made adjustable in a vertical direction in suitable ways or guides, so that said machine may be brought to and held rigidly in any required position by the suspending shaft, either with or without the assistance of braces; in providing a joint or bearing, by which the shaft and drilling-machine may be made to swing in a direction across the excavation, in addition to the horizontal axis of the drilling-machine, by which the feed is directed; in the employment of ways or guides, by which the suspending shaft and drilling-machine may be made to traverse across the excavation, in connection with a joint, by which these devices may be made to swing across the excavation, for the purpose of throwing the drilling-machine under projecting rock; in the employment, in connection with the last-mentioned ways and joint, of another joint, by which the suspending shaft may be made to swing in a direction parallel with the excavation and with the track upon which the car runs; and

It further consists in the arrangement of pulleys in such relation to the suspending shaft and drilling-machine, that the driving-belt running over said pulleys may carry the power of the engine to the drill without danger of derangement by changing the position of the suspending shaft or drilling-machine.

Figure 1 is a side elevation of the car, suspending shaft, drilling-machine, and adjusting devices.

Figure 2 is a front elevation of the same.

Figure 3 is a horizontal section of the same, at dotted line *x*, fig. 1.

Figure 4 is a rear elevation of the suspending shaft, drilling-machine, and adjusting devices.

Figure 5 is a front elevation of a portion of the adjusting devices.

- a*, car.
- b*, boiler.
- c*, engine.
- c'*, main shaft of same.
- c''*, bearing of shaft *c'*.

- d*, sliding bed.
- d'*, cross-ways for bed *d* to slide upon across the car.
- e*, swinging bed, hinged to sliding bed *d*.
- f*, swinging bed, pivoted to bed *e*.
- g*, rigid supporting shaft.
- g'*, screw-nut and loop, for binding vertical bearing or joint *h'* to shaft *g*.
- h*, frame of drilling-machine *i*.
- h'*, hollow vertical bearing or support of drilling-machine.
- i*, fly-wheel of drilling-machine.
- i'*, horizontal axis or support of drilling-machine.
- j*, clamp, for holding fast the bearings of axis *i''*.
- k*, friction-pulley.
- m*, swinging frame for tightening belt.
- n*, pulley on shaft *c'*, connected by belt to pulley *n'*, on the free end of swinging frame *m*.
- o*, pulley on same shaft with pulley *n'*.
- o'* and *o''*, pulleys on swinging bed *f*.
- p*, pulley on upper end of shaft *g*.
- p'*, pulleys in frame *h*.
- q*, belt, running around pulley *o*, under *o'*, over *p*, down between pulleys *p'*, around the fly-wheel *i*, back between the pulleys *p'*, over *o''*, and back to pulley *o*.
- r*, windlass, for raising and lowering the shaft *g*.
- r'*, staple in the shaft *g*, to which the windlass rope *r* is attached.
- s*, screw-brace of bed *e*.
- s'*, screw-nut, supported on bed *d*.
- s''*, joint of brace on bed *e*.
- t*, bolt, for fastening bed *d* on ways *d'*.
- u*, axis or bearing in bed *e*, upon which bed *f* swings.
- u'*, circular plate, attached to bearing or pivot *u*, upon which bed *f* swings.
- u''*, worm, which works in teeth cut on the edge of circular plate *u'*.
- v*, vertical ways of shaft *g*.
- v'*, clamp, for making the shaft *g* fast in the ways *v*.
- w*, braces for shaft *g*.
- w'*, screws for binding the braces.
- x*, line of section.
- y*, hinge of bed *e*.

The object of my invention is to provide means of placing and supporting a rock or ore-drilling machine in any necessary position in the excavation below the car, being particularly applicable to deep rock cuttings, such as sewers, cellars, canal, and railroad cuts.

The modification of my invention shown in the drawings is applicable to sewers.

In the excavation of cellars or other wide cuts, it would be necessary to place several machines on the same cross-ways, so that several holes may be drilled at the same time in a line across the excavation.

In excavating sewers, a drilling-machine should be placed on each end of the car.

My invention is applied in a manner similar to that which was patented by me on the 18th of June, 1867, and for a particular description of the drilling-machine herein referred to, I make special reference to my patent of June 18, 1867, No. 65,802, which was granted to me for improvements in the construction and operation of machines for drilling rock and ore.

The earth is first removed from over the rock where the sewer is to be cut. A railroad track is then laid down on each side of the excavation, and the car with the machinery upon it is then run upon the track. The drilling-machines are then lowered to the rock by means of windlass *r*, and by means of the several joints the machines are placed in any desirable position, and then made fast.

By supporting the several machines on independent shafts, one drill may be placed near the bottom of the excavation, while others may be used near the top.

The car should be propelled on the track by the same engine that drives the drilling-machines.

The frame *m* should have its axis of motion in the axis of shaft *c*, and may be made to slide on ways, and be supported independent of the shaft.

The drill and suspending shaft may be adjusted in any position across the car, by sliding the bed *d* on the ways *d'*, using the pin *t* as a lever for moving the bed, and also as a bolt for making the bed fast to the ways.

The bed *d* should also be fastened by a clamp, similar to the fastening of the shaft *g* in the ways *v*.

By means of the screw-brace any desired inclination may be given to the swinging bed *e*.

Where there are several machines on the same cross-ways, it would be impossible in some cases to so place the car on the track as to apply all the drills to the proper places on the rock without some means of changing the position of the drills in relation to each other and to the car.

By the use of the joint *y* and the screw-brace *s*, one machine may be thrown forward to a considerable distance, while another drill on the same cross-ways may be thrown back under the car. Thus all the machines may be brought to and held in the most desirable position for making the holes.

The swinging bed *f* is bolted to the plate *u*, and swings with it upon axis or bearing *u*, and is moved by worm *u'* working in the teeth on the edge of plate *u*. By this means, the shaft *g* with the drilling-machine is made to swing across the excavation upon bearing *u*, so as to throw the drill under projecting rocks in the sides of the excavation, and in other ways accommodate the position of the drilling-machine to the work to be done.

The bolt *u''* secures the plate *u* with the bed *f* in position.

The suspending shaft *g* slides vertically in ways *v*, being raised and lowered by windlass *r*, and bound fast in the ways by clamp *v'*. By these means the drilling-machine may be lowered to the point where the work is to be done, and held there by the clamp *v'*.

By making the suspending shaft itself adjustable vertically, so as to be raised or lowered in ways or guides, instead of making the drilling-machine adjustable at different heights upon the suspending shaft, I obtain several advantages.

In the excavation of sewers or other cuts of considerable length, it is necessary to employ with the car having the drilling-machine upon it, another car, provided, as shown in my patent of November 23, 1869, with a shield, for preventing the fragments of rock from flying, a drop for breaking rock, and a crane for lifting detached rock out of the excavation.

Now, to use these two cars with the machinery upon them on the same excavation, when the track for the car to run upon is laid down upon the surface of the rock or earth, as it usually is, it is necessary

that the suspending shaft having the drilling-machine upon its lower end should itself be made adjustable vertically, so that everything suspended from the car may be drawn up above the track to enable the car to move off over that part of the rock where no excavation has been done, so that it may be out of the way of blasting, and also to give an opportunity for the attendant car to bring up and deposit the shield over the charges, and to break up and lift out the rock after the charges have been fired.

In the excavation of narrow deep sewers, the irregularities of the sides and bottom of the cut often make it necessary to draw the suspending shaft, with the drilling-machine upon it, entirely out of the excavation before moving the car at all. The same is necessary also to enable the car to pass over the ground from one excavation to another.

Sewers are often cut in rock from twelve to eighteen feet in depth, and in many cases the holes have to be drilled in a horizontal direction at the bottom of the excavation. To put the drilling-machine into the necessary position for this purpose, it must be supported upon a suspending device of sufficient length to reach the bottom, and it must be raised and lowered by devices entirely independent of those that are used for feeding the drill into the rock.

The irregularities in the sides of the excavation are sometimes such that it is impossible to drop the drilling-machine in a vertical line to the bottom of the excavation. In such cases, the joint *u* is made to give the suspending shaft the desired inclination, when it, with the drilling-machine upon its lower end, may be allowed to slide down through ways or guides *v* till it reaches the bottom, where the machine has to be turned upon joint *i''*, which directs the feeding devices, till the drill is brought to the right elevation.

By means of the horizontal axis *i''*, the drilling-machine may be made to take any necessary inclination, and is held in position by clamp *j*, which tightens the bearing upon the axis with sufficient firmness to prevent it from moving, and by the vertical axis or shaft *k* the inclination of the drill may be brought to any point of compass.

The axis *k* is hollow so as to allow the belt *q* to pass through it, and it is held in position by the loop and nut *g'*. The hollow axis *k* passes through the loop, which is tightened upon it by the nut, so as to hold the drill in any desired point of compass.

In case the axis *i''* were placed in the axis of the fly-wheel, changing the inclination of the drilling-machine would not alter the length of belt *q*; but the machine is more evenly balanced with the bearings placed as shown, and consequently more securely held in place by clamp *j*.

The inner ends of braces *w* are fastened to the lower end of shaft *g*, by means of universal joints; the outer ends of said braces slide through the ball and socket or universal joint *w''*, and are fastened by screws *w'*.

When the drilling-machine is to be set in a new position, the screws *w'* are loosened, when the braces will slide through the joints *w''*, and accommodate themselves to the changed position of the machine. The joints also accommodate themselves to the changed position of the braces.

After the machine has been set in the proper position, the screws *w'* are again turned firmly upon the braces, thereby holding the shaft *g* and drilling-machine securely in place.

The car should be fastened to the track by means of clamps or clutches, similar to those described in the patent before mentioned. Then, when the suspending shaft *g* is fastened rigidly to the car by the devices herein described, or by any other suitable devices, the drilling-machine has the advantages of being held in place at the bottom of the cut by the strength and weight of the car which carries it.

I have represented a round belt for driving the drilling-machine in the drawings, but a flat belt may be used with equal facility.

The drilling-machine I employ with this apparatus is the same as that shown in my patent of 1867; but a steam drilling-machine may be used with equal facility. In that case, the flexible pipe for conducting steam would run directly from the boiler to the drilling-machine, dispensing with the belt *q* and all the devices for conducting the same to the drilling-machine.

During the process of drilling, the shaft *g* and frame *h* remain stationary, their use being to hold the drilling-machine in position, the feed motions of the drill being entirely within the machine itself.

The power of the engine may be applied to raising or lowering the shaft *g*, and also to traversing the whole across the car, if desired.

Having described my invention,

I desire to have secured to me by Letters Patent of the United States the following claims, viz:

1. The combination of the rigid suspending shaft *g*, when made adjustable in a vertical direction upon ways or guides *v*, and rigidly fastened to a car by any

suitable means, with a drilling-machine attached to its lower end, substantially as specified.

2. The combination of the rigid suspending shaft *g* with the horizontal axis or bearing *i''* and the joint *u*, substantially as and for the purpose specified.

3. The joint *u*, suitably supported upon ways *d'*, in combination with suspending shaft *g* and a drilling-machine, substantially as set forth.

4. The joint *y*, in combination with the ways *d'* and joint *u*, when these devices are so constructed and operated as to allow free movement of the supporting shaft of the drilling-machine, as described, and also so as to hold the said shaft rigidly fixed to the car, substantially as described.

5. So arranging several pulleys, in relation to the suspending shaft *g* and hollow axis *h'*, that the belt *q* shall pass down to the drilling-machine and return through said hollow axis, substantially as herein specified.

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