C. W. HUNT.

Apparatus for Loading, Conveying and Unloading Coal.

No. 147,400. Patented Feb. 10, 1874.

FIG 1

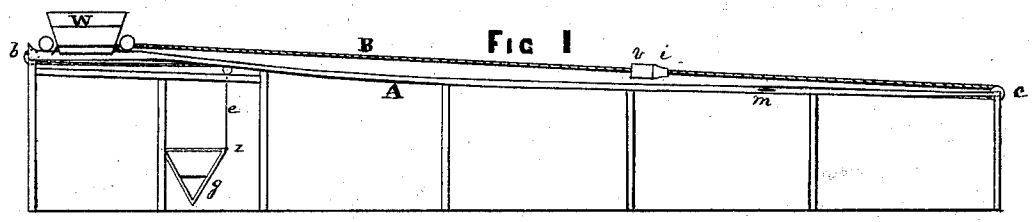


FIG 10

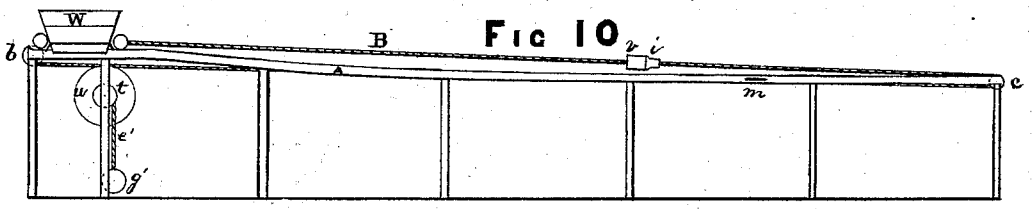


FIG 2

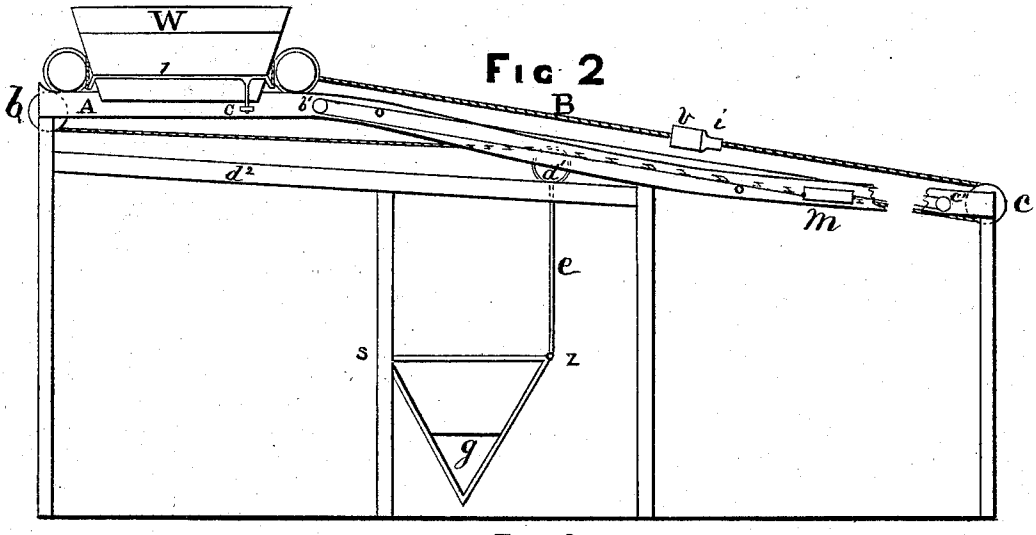


FIG 5

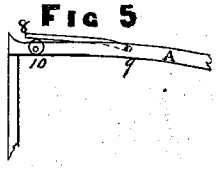


FIG 6

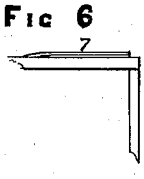


FIG 3

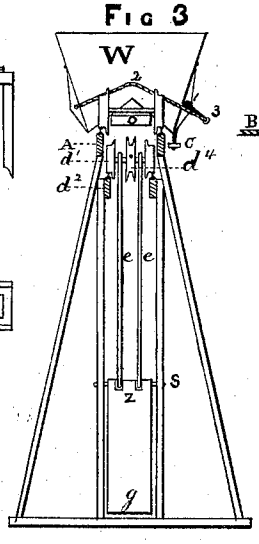


FIG 4

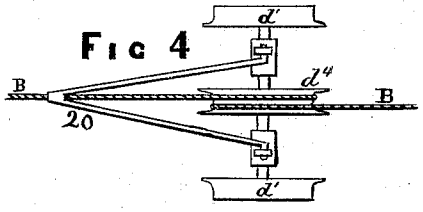


FIG 7

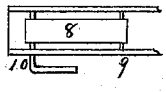


FIG 8

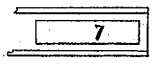
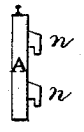


FIG 9



Witnesses.
F. B. Staples.
Geo. W. Foxe

Inventor.
C. W. Hunt

UNITED STATES PATENT OFFICE.

CHARLES W. HUNT, OF WEST NEW BRIGHTON, NEW YORK.

IMPROVEMENT IN APPARATUS FOR LOADING, CONVEYING, AND UNLOADING COAL.

Specification forming part of Letters Patent No. **147,400**, dated February 10, 1874; application filed December 4, 1873.

To all whom it may concern:

Be it known that I, CHARLES W. HUNT, of West New Brighton, in the county of Richmond and State of New York, have invented new and useful Improvements in the Construction, Arrangement, and Mode of Operating Rail or Tram Ways, and the cars or wagons used thereon, and the machinery for moving, unloading, and operating such cars or wagons for coal-yards, docks, or places where the transfer of mineral substances or other materials is required over short distances; and the following is a description of my said improvements.

My present invention has for its object the utilization of the momentum of loaded cars or wagons upon an inclined rail or tram way, moving by their own gravity thereon, from the place of loading to the place of discharge, in such a manner and by such devices that the momentum and force thus acquired and stored up will, by the instrumentality of such devices connected with the car or wagon, unlock the sides or bottoms of the cars and discharge their loads, and immediately thereafter, by the action of a counterpoise-weight, which the momentum has raised and prepared for action, return the empty car, by the reverse movement, to the place of loading, automatically, or nearly so, whereby there is a great saving of labor, time, and expense.

My present invention consists of improvements and additions to the invention set forth in Letters Patent of the United States issued to me, bearing date June 11, 1872, No. 127,885. These improvements and additions have reference, first, in combination with a track of the required declination, to the manner of arranging and connecting the operating rope or chain with the counterpoise-weight, and the raising and descent of the weight; secondly, to the construction of a secondary pair of rails under or between the main track, and for the purpose of carrying a pair of wheels, axle, and pulley thereon, for operating and regulating the action and counter action of the counterpoise weight; thirdly, the wheels and axle upon the secondary rails and intermediate pulley upon their axle, around which pulley the operating rope is carried; fourthly, the peculiar construction of the counterpoise-weight, and manner of hanging the same, and the connection of the same with the wheels and pulley upon the secondary rails, for the purpose of accumulating a surplus force to carry back the unloaded car to its place of loading, and of regulating and adjusting the action of the car upon the weight, so as to avoid shock and liability of injury from too much or sudden strain; fifthly, to the manner of securing the ends of the rope, which, after being carried in opposite directions over the pulley which operates the weight, raises the weight, and permits it, by its fall, to return the empty car to its place of loading, and prevents any slack of the rope; sixthly, the safety friction board or block upon the lower end of the track, to prevent car from going off the rails in case of breaking the rope, and an adjustable friction device upon the rails when the car is loaded, for holding it securely while the loading is going on; seventhly, a movable cam, to the end of which a rope is attached, so as to form an endless rope, passing over pulleys at either end of the line of travel of the car, to permit the dumping of the car at any point where the cam may be fixed; eighthly, to the device for locking and unlocking the movable sides of the car, whereby the sides are locked and held fast by the contents of the car when loaded, and are automatically unlocked by a cam, suitably arranged for the purpose, and the doors swung open by the weight of the contents, and the load discharges itself.

In the drawings accompanying my specification, Figure 1 is a side elevation of my improved track, carriage, rope, and weight. Fig. 2 is a similar elevation, showing some additional parts not shown in Fig. 1, and other parts more in detail. Fig. 3 is an end elevation of Figs. 1 and 2. Fig. 4 is a top or plan view of a part of the operating devices, and rope by which they are connected with the counterpoise-weight, and its action and reaction with reference to the car as it is alternately full or empty, and of the device for locking and securing the sides of the car. Figs. 5 and 6 are side elevations of friction-blocks on either end of the track; Figs. 7 and 8, top views or plans of the same. Fig. 9 represents, in side view, two guides, upon the exterior side of the

track A, for guiding the cam *m*. Fig. 10 is a side elevation of a modification of my invention.

In all the figures, similar letters represent similar parts.

A A represent the track of the railway, supported on a frame or trestle of suitable height. The place of loading the car is at the end, where the car is placed in the drawing; the place of discharge is at any part of the track. The part of the track where the car stands while taking its load is level; but immediately in advance of this level space the track inclines sufficiently to give the car a rapid movement, sufficient to acquire momentum to raise the weight by which its return to the place of loading is to be effected. This incline of the track need not be continued farther than is necessary to acquire the requisite momentum to return the car. B is the rope by which the car is drawn back automatically after the load is discharged. It passes over two grooved pulleys, *b c*, turning on their axis between the rails at either end of the track. This rope B passes through and slides in an opening or ring, firmly secured to the forward end of the car, and the rope is connected with the weight and the car in the manner now to be described. d^2 d^2, Figs. 1, 2, 3, are secondary parallel rails, under the main track, which form a track upon which traverse back and forth a pair of wheels, d^1 d^1, and their axle, and carrying the pulley d^4 between them. Upon this axle of wheel d^2 d^2 is hung one end of the vibrating rod or arm *e*, and the other end is jointed to the weight *g*. This weight is constructed of a triangular-shaped frame, as shown in the drawing, and at one angle, *z*, it is hinged to the arm *e*, at another angle, *s*, to the fixed upright beam *s'*, and the lower angle is filled with sufficient weight of iron or other material sufficient to form a counterpoise to draw back the empty car after it had descended the track and deposited its load. The rope B is connected with the weight by carrying one end of the rope over the pulley d^4, and bringing it round under the pulley backward, and securing it to some point at the forward end of the secondary rails d^2. The other end of the upper part of the circuit of the rope, after passing round pulley *b*, is passed over pulley d^4 and brought downward and backward to the opposite or after end of the secondary track d^2, and is then secured. Thus, it will be seen, if the rope B is put in motion so that the upper portion of its circuit is carried toward the lower end of the track, its action upon the pulley d^4 will necessarily draw the wheels d^1 d^1 and the axle backward upon the secondary track, in an opposite direction, and thus, by means of the arm *e*, will raise the weight *g* and continue to raise it so long as the rope continues its motion in the same direction. And this effect is always produced by the operation of the loaded car descending the track by means of the block or cam *v*, which is set and secured upon the rope B in such a manner and position that the cam *v*, coming in contact with the block or front of the car in which the rope slides, but through which the cam *v* cannot pass, immediately upon such contact it takes the movement of the car, and carries with it the rope to which it is attached, and thereby raises the weight as above described. As soon as the car is unloaded the weight begins to act, slowly at first, and, increasing in rapidity of its fall, causes the empty car to move backward toward the place of loading. The cam *v* should be placed at such a position upon the rope, that it will not travel back as far as the car itself travels, but will leave the car shortly before it gets up the incline, the car then proceeding to its place of loading by the momentum given to it by the falling weight. The weight must have sufficient gravity and length of movement to overcome the weight of the empty car, and the friction of the gearing, and to drive the car back to its loading-place after the cam *v* has ceased to act upon it. It will be observed that the connecting-arm *e* is split or divided, Fig. 3, so as to permit the rope B to pass freely through. A guide, 20, shaped like the letter **V**, is jointed to the axle of the wheels d^1, and having at its angle a ring through which the rope B slides, whereby the two wheels and their axle are kept in a true line upon the secondary track.

The arrangement just described of passing the rope B over the pulley d^4, in opposite directions, not only operates to give the required action to the weight, but it prevents slack upon the rope, by one part of the rope giving or winding over the pulley in one direction, while the opposite part of the rope gives or unwinds upon the pulley in the other direction. The arrangement of the secondary track, and the horizontal movement of the pulley d^4, alleviate the shock of the car when coming in contact with the cam *v* and the first starting of the weight; and owing to the form and manner of hanging the weight, the force of the weight's action and resistance is gentle at first, and it increases gradually from the start, until it has exerted its greatest force, and then its action is gradually diminished in force, thus saving the car and gearing from the shocks of too sudden start or strain, which would be dangerous, and destructive to the operating parts. An india-rubber cushion, *i'*, Fig. 2, or a spiral spring, may be placed upon the end of the cam *v* to soften the action of the car in striking the cam.

The diameter of the pulley d^4 and that of wheels d^1 d^1, measuring from the center of the rope on the grooves of d^4, should be equal, to give equal revolutions to the wheels and pulley, and thereby avoid friction.

The carrying the rope over the pulley d^4 in opposite directions, as above described, and connected with the wheels d^1 and the weight *g*, cause the velocity of the weight, when being raised by the rope and pulley, to be less than the velocity of the rope by about one-

half, or in the ratio of one to two, thereby greatly reducing the strain upon the rope.

O O, Fig. 2, is an endless rope passing over pulleys b^1 c^1 at or near the opposite ends of the track, the ends of the rope being secured to the ends of the cam *m* upon the upper portion of the endless rope. The pulley b^1 should be near the place of loading, so that the person standing near the place of loading can readily move the rope so as to adjust and fix the cam *m* at any desirable point for unlocking and opening the sides of the car, by the arm upon the car, hereafter described, coming in contact with the cam.

Upon the track A is placed the hinged friction-block 8, shown in side view in Fig. 5, and top view in Fig. 7. The hinge is shown at 9; the loose end is forked so as not to interfere with the rope B. When the car is at its place of loading, it stands directly over this friction-block, and the block is so placed that the car slides easily over it. Under the loose end of this block is placed an eccentric-wheel, 10, Fig. 5, fast upon a shaft having its bearing in the sides of the track. To this shaft is attached a crank-handle by which the eccentric is turned. When the eccentric is turned so that its larger segment is uppermost, it raises the lower end of the friction-block so that it presses against the under side of the solid projecting-blocks fixed between the wheels of the car, and holds it while it is receiving its load. When the car is to start, the crank is turned so that the friction-block falls, and the car, being released from the pressure of the block 8, is free to move upon the track.

Figs. 6 and 7 show a side and top view of a friction and safety block, 7, at the opposite extremity of the track, upon which the projecting block of the car may slide, and the car thereby arrested without shock by passing over its upper surface, in the event of the car getting loose from the rope.

In Fig. 10 is shown a track which is intended to operate for the same purposes as above set forth, but with a more simple apparatus for operating the counterpoise-weight. In this plan there is a drum, *u*, over which the endless rope B is wound in such a manner that the movement of the rope, caused by descent of the car, winds up, upon the projecting shaft *t* of the drum, a rope *e'*, to which is suspended the weight *g*. The operation of this plan is obvious without further description.

The car W, Figs. 1, 2, 3, is constructed with a bottom of two fixed equal sides, rising to a pretty sharp angle at their intersection, as seen in Fig. 3. The sides of the car are composed of two parts—one fixed, the other movable. The lower half of the sides of the car swing outward when discharging the load, and inward when the car is to be loaded, being hung by suitable hinges to the upper fixed part of the sides of the car. Along one of the swinging leaves, 4, near its lower outer edge, is placed the vibrating rod 1, Figs. 1 and 3, which is held by, and turns in, eyes of bolts fixed in the swinging leaf. The ends of this rod 1 are extended beyond the end of the car each way, and their projecting ends 3 3 are bent at nearly right angles to the rod, and have at their ends eyes or rings. Upon the opposite swinging leaf 5 of the car, toward the lower outer edge at the corners, are two bolts, having eyes or rings in their projecting heads. Fastened to the eyes of 3 3, and through the eyes of the bolts in the opposite leaf, a rope or chain, 2, is passed, the rope passing entirely around the car. The ends of the rope are fastened to the eyes 3 3, so that the swinging leaves or doors are, when closed, made fast to each other, and not to the car, by this rope. Upon the rod is fixed the vibrating arm C in such a manner that when the arm C is downward the rope will be always strained so as to draw together and hold closed the swinging leaves of the car by means of the projecting cranks 3 3, to which the rope 2 is fastened, and which cannot turn downward by reason of the arm C pressing against the side of the leaf; but when the end of the arm C comes in contact with the cam *m*, the arm C is pushed upward and outward, whereby the cranks 3 3 are turned upward and inward, and the rope 2 being thus released from the strain also releases the leaves, and the pressure of the load opens the doors, and the load is immediately discharged by its gravity. The cranks being thus turned downward to their position for closing the leaves, the car is again ready for its load.

From the preceding description the manner of operating my invention may be readily understood. The man in charge stands at the place of loading. After seeing that the sides of the car are closed, and the load completed, he releases the car from the friction-block which holds it, when it immediately begins to descend the track, and it descends to the point of discharge, at the same time automatically raising the counterpoise-weight. As soon as the car nears the place of discharge it comes in contact with the block *v*, carrying the rope B with it and raising the weight *g*. When the weight *g* has raised high enough, so that its fall will return the empty car, the arm C comes in contact with the cam *m* and automatically releases the rope 2, when the load by its gravity opens the doors and is discharged. The weight *g* then overbalancing the weight of the empty car begins to fall, and by its descent, by means of the rope B, automatically draws and sends the car back to the place of loading, when the swinging sides of the car being again closed it is again loaded, and the operation thus continuously carried on.

Having thus described my improvements, and the manner of constructing and operating the same, I claim as my invention therein and desire to secure by Letters Patent—

1. In combination with the rope B and car W and the track, the secondary track d^2, wheels d^1 d^1, the pulley d^4, the weight *g*, operating in

the manner and by the means substantially as set forth.

2. A counterpoise-weighted frame, *g e*, in combination with the track d^2, constructed and operating substantially as set forth.

3. The wheels d^1 and pulley d^4, constructed with similar diameters, for the purpose and effect, substantially as set forth.

4. The combination of the rope B, pulley d^4, secondary track and wheels d^1, constructed and arranged as set forth, for the purpose and effect of reducing the speed of the weight in falling, as compared with the speed of the operating-rope, substantially as set forth.

5. The vibrating friction-block 8 and eccentric 10, constructed substantially as set forth.

6. The fixed friction safety-block 7, operating for the purpose and in the manner substantially as set forth.

7. The endless-rope *o*, in combination with the vibrating arm C upon the car or wagon, and the guides *n n*, arranged and operating for opening, closing, and fastening the swinging sides of the car, substantially as set forth.

8. The drum *u*, projecting shaft *t*, and suspending-rope *e*, with the weight, operated by the rope B, constructed in the manner and for the purposes substantially as set forth.

9. The adjustment of the block *v* in a position upon the rope B, in reference to the car and the action of the weight, so that the car will be carried back with sufficient force upon the track by contact with the block *v*, and the rope stopping its movement short of the car reaching its place of loading, the car is then carried the remaining distance over the track by the momentum which it has received before the time of the stopping of the movement of the rope.

10. The triangular guide 20, attached to the axle of the wheels d^1 d^1, and having its apex or axle provided with a ring, through which the rope B slides for keeping the wheels in true line, substantially as set forth.

CHARLES W. HUNT.

Witnesses:
J. B. STAPLES,
GEO. W. FOX.