(No Model.) 4 Sheets—Sheet 1.

O. N. GARDNER.

HOISTING, CONVEYING, AND DUMPING APPARATUS.

No. 589,964. Patented Sept. 14, 1897.

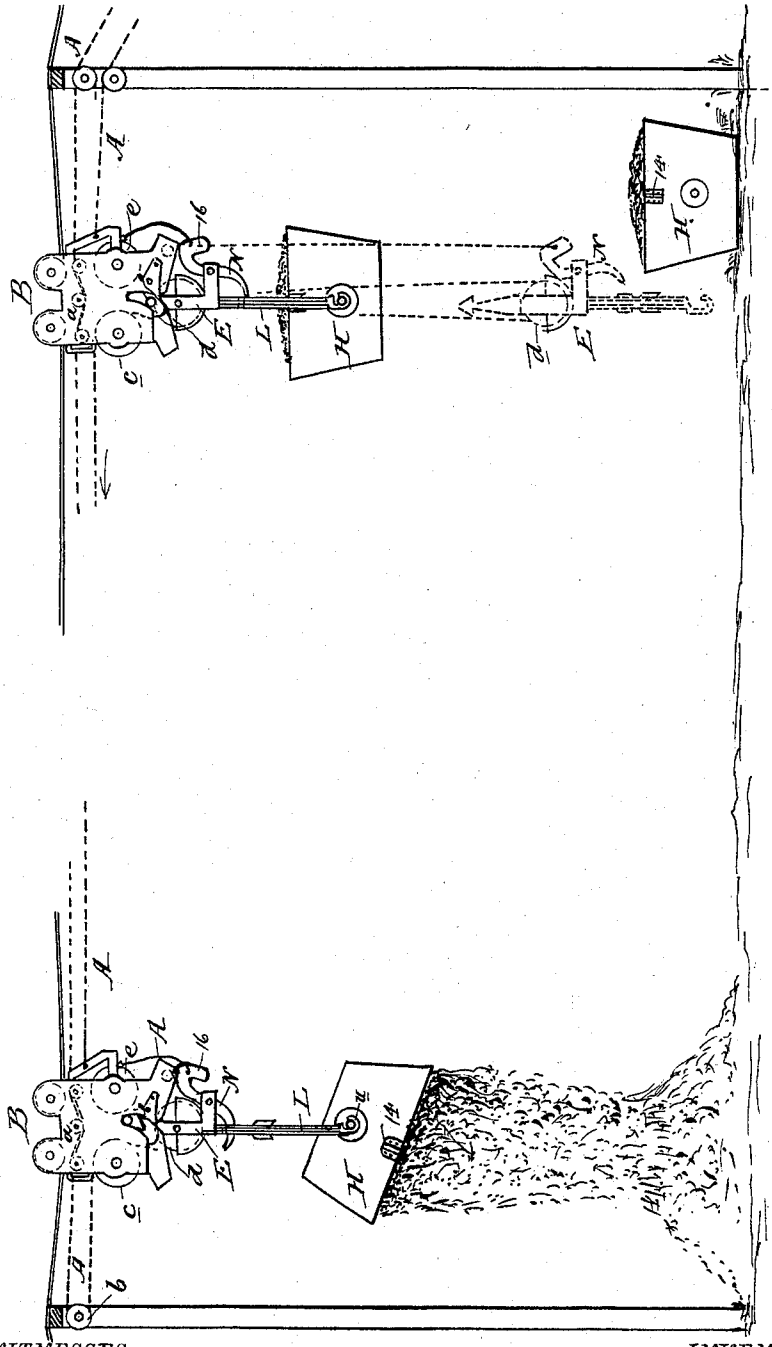


Fig. 1.

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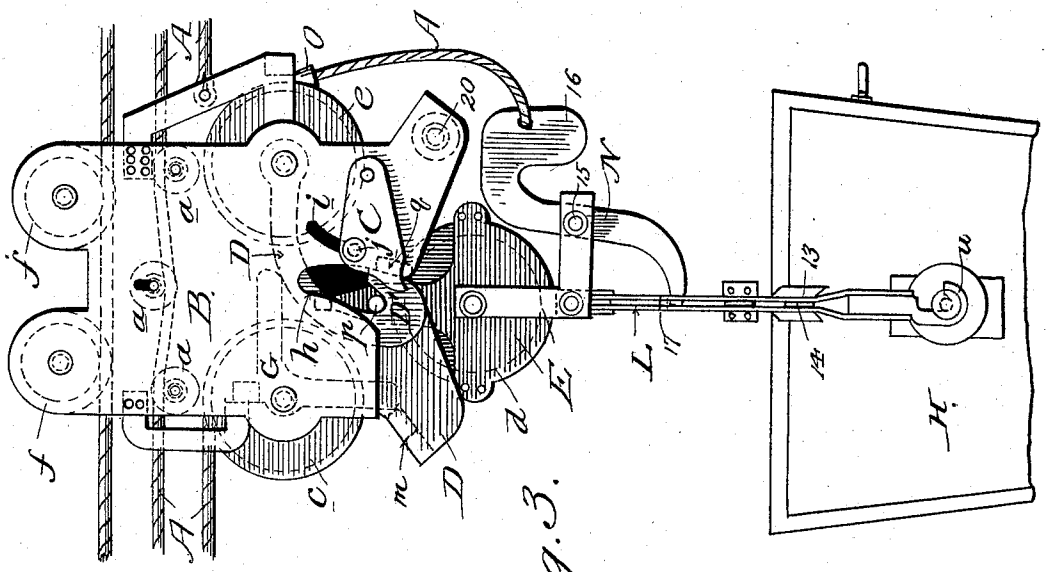


Fig. 3.

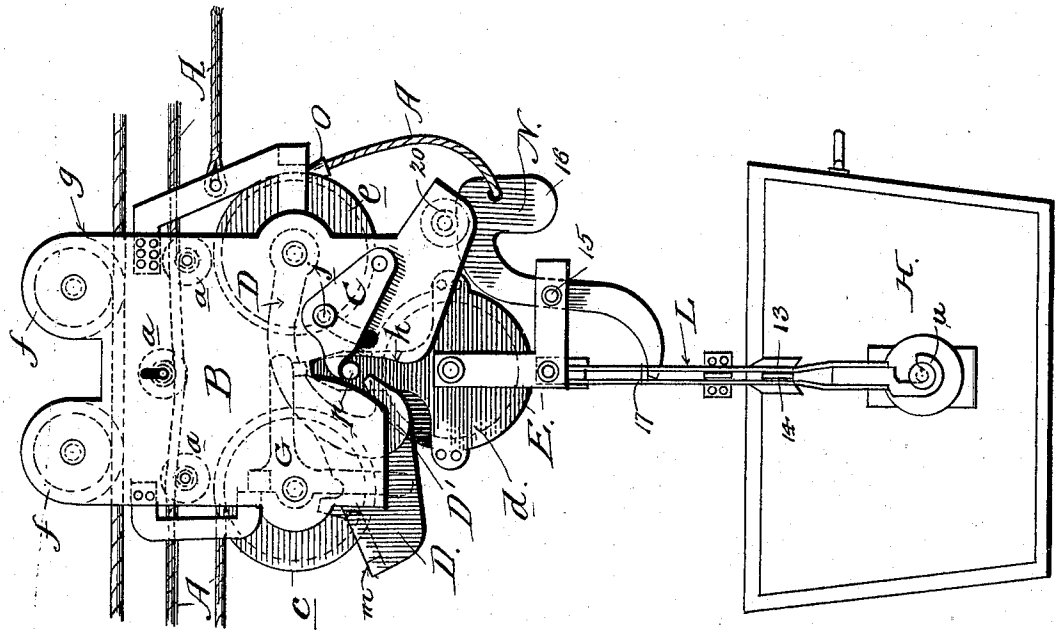


Fig. 2.

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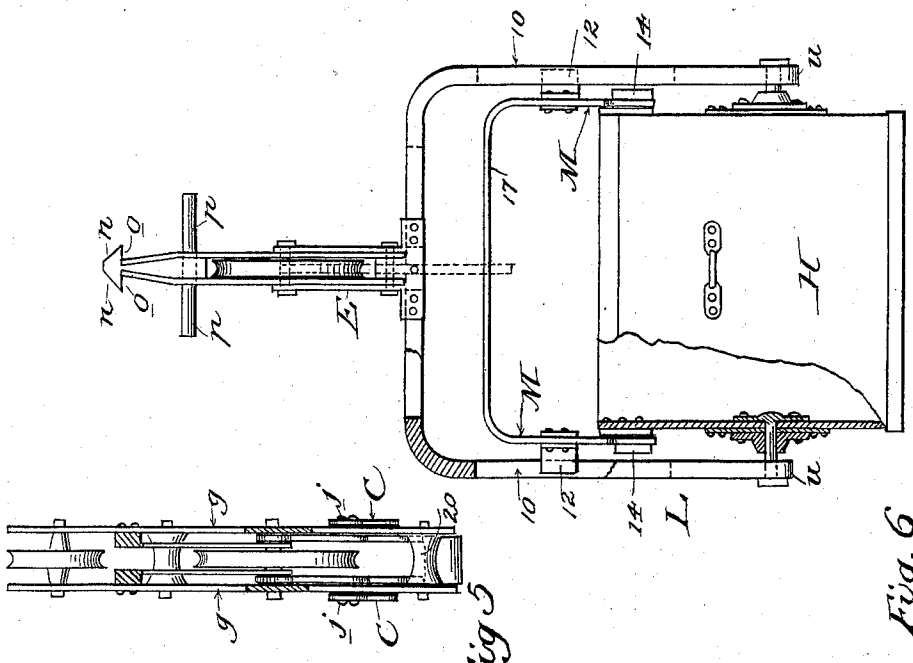


Fig. 6

Fig. 5

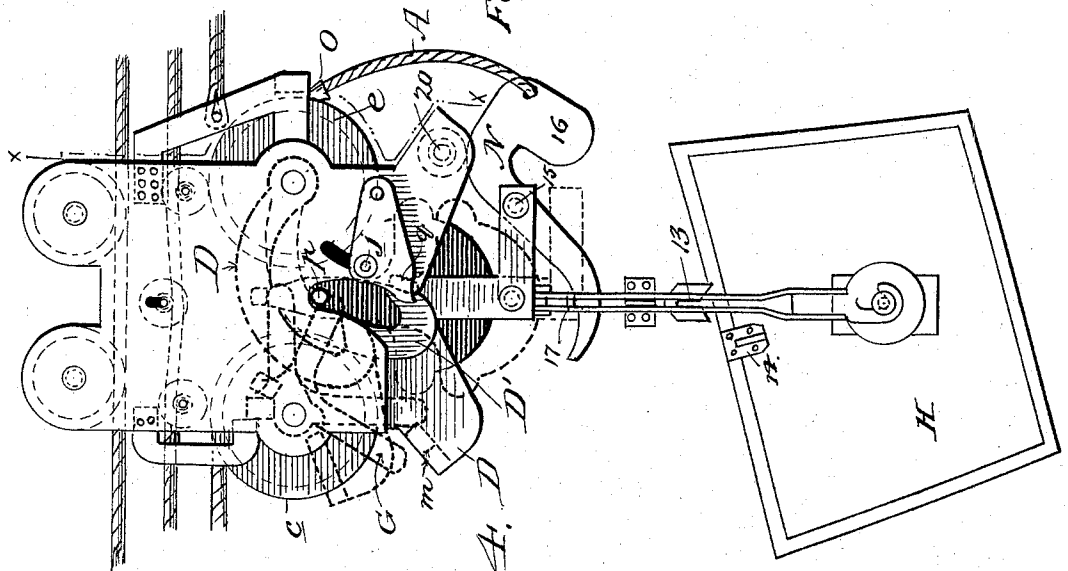


Fig. 4.

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Fig. 7.

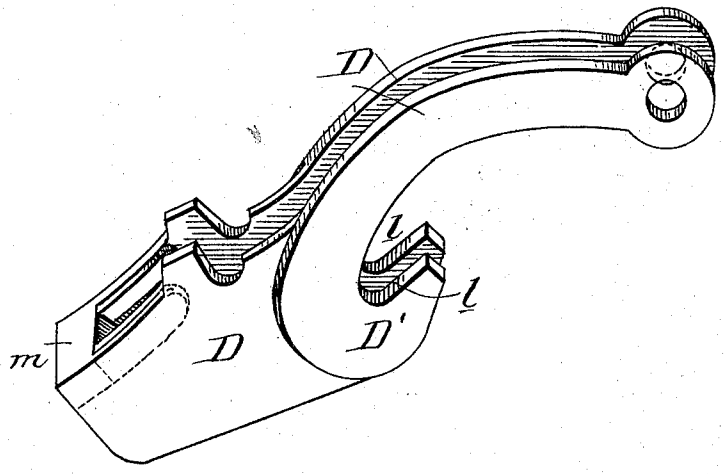
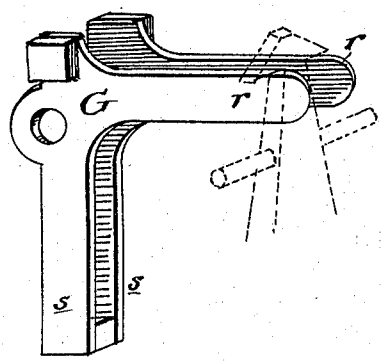


Fig. 8.



WITNESSES

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UNITED STATES PATENT OFFICE.

OMAR N. GARDNER, OF JAMESTOWN, NEW YORK.

HOISTING, CONVEYING, AND DUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 589,964, dated September 14, 1897.

Application filed December 17, 1896. Serial No. 615,957. (No model.)

To all whom it may concern:

Be it known that I, OMAR N. GARDNER, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Hoisting, Conveying, and Dumping Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to means for hoisting, conveying, and dumping ore, coal, grain, earth, and other material in dredging, excavating, and other work in which a bucket after being loaded at any point with the material is hoisted and conveyed along a line of suspended cable or tramway or other form of track or guide until the point of dump or deposit is reached, when said bucket is automatically released and tilted under the direction of the engineer of the hoisting-engine and by means of a momentary stoppage of one of the winding-drums with which the engine is connected, while the other drum is kept in motion to pull upon the carrier or trolley and by its action further raises the suspended sheave-carrier and through the connections hereinafter described effects the automatic release of the carrier and the simultaneous tilting of the bucket.

My invention consists of the parts and the constructions and combinations of parts forming the improved apparatus for hoisting, conveying, and dumping, which I shall hereinafter fully describe, and point out in the claims.

In the accompanying drawings, in which like letters and figures of reference indicate corresponding parts, Figure 1 represents a line of tramway, suspended cable, or fixed guide, showing a loaded bucket being conveyed and showing a second bucket in the act of discharging its load, the sheave-carrier being shown lowered in dotted lines ready to be engaged with a loaded bucket for the purpose of hoisting the latter. Fig. 2 is an enlarged view of the traveling carrier or trolley, showing the sheave-carrier elevated and just entering the trolley or traveling carrier and in a position just before it is engaged by the suspending gravity-latch. Fig. 3 is a similar view showing sheave-carrier and latch in engagement and the former suspended from the latter. Fig. 4 is a similar view showing the position of the parts when the sheave-carrier is being released and the bucket is simultaneously being allowed to tilt about its trunnions to discharge the load. Fig. 5 is a vertical sectional view on the line $x\,x$ of Fig. 4. Fig. 6 is an end view of the bucket and its attached sheave-carrier, showing the supplemental bail or slidable frame by which the bucket is locked and automatically released and allowed to tilt. Fig. 7 shows a detail in perspective of the swinging latch. Fig. 8 is a like detail of the L-shaped lever or frame which actuates the latch and moves it to one side to permit the sheave-carrier to pass out of the traveling carrier or trolley.

In carrying out my invention I construct any suitable and well-known form of tramway, which may be a suspended and fixed cable, track, or guide, upon which the traveling carrier or conveyer or "trolley," by which latter term I shall hereinafter refer to this part, is adapted to travel to convey the material from the point of excavation to the point of discharge. It will be understood that this apparatus contemplates a use in connection with any well-known and appropriate form of hoisting-engine, (not shown,) having independent drums around which the opposite portions of a hoisting rope or cable A are designed to be wound, one of the ends of said rope or cable being secured to one side of the trolley, while the other portion of the rope or cable passes over the line of tramway and over and below guide-pulleys a on the trolley-frame, and after passing around an end pulley b this portion of the rope or cable is returned and passed over a grooved pulley c and under a similar pulley d on the sheave-carrier and finally over a third pulley e, when its extremity or end is suitably connected with a swinging lever, to be hereinafter mentioned, which serves as the means for actuating the devices which release the bucket and allow it to tilt about its trunnions. With the exception of the latch and the bucket-releasing devices these features are well known and no claim, broadly, is made to them.

The trolley B carries the pulleys before mentioned, and also has journaled in its upper portion the pulleys f, which travel on the tramway or suspended cable in the usual

manner. The trolley comprises in addition to the features already mentioned a frame composed of side plates *g*, through the bottom edges of which opens a substantially curved recess or opening *h* for the entrance and discharge of the sheave-carrier, said side plates having also the curved slots *i* made in them at one side of said central opening.

Pivotally secured to the frame, one on each side of the frame, is a stop or plate C, whose free end projects into the entrance slot or space *h* and whose upward movement is determined by a pin or lug *j*, carried on its inner face between its ends, contacting with the end wall of the slot *i*.

On one of the pulley-shafts is also pivotally hung a swinging latch D, one on each side between the pulley and the inner side of the frame-plates, said latch being preferably of the curved form, substantially as shown, having an inwardly and upwardly pointing hook-shaped portion D′ with inclined throat or entrance *l*, in which the sheave-carrier is suspended after it has been hoisted. The free end of the swinging latch D extends to or beyond the opposite edge of the frame and is there suitably connected with its companion latch on the other side, as by means of a cross-bar *m*. In other words, the latch is an integral structure composed of spaced plates of the shape shown in Fig. 7.

The sheave-carrier E has mounted in it the pulley *d*, under which the hoisting rope or cable passes, and the frame of this carrier projects upwardly and has its extremity formed with oppositely-inclined planes *n* and shoulders *o*, thus forming an arrow-head entering-point for the carrier. Below this head is passed a transverse pin, which projects from opposite sides of the carrier and thereby forms trunnions *p* for sustaining the carrier in the hook-shaped portions of the side members of the swinging latch.

The operation of the parts thus far given will then be substantially as follows: The sheave-carrier will be lowered in the usual manner to the dotted position shown at the right of Fig. 1 and will be connected with the loaded bucket by means hereinafter described. The hoisting-engine is now started, and one of its drums will commence winding upon one portion of the hoisting-rope, and the sheave-carrier and its load will be hoisted. The arrow-head end of the sheave-carrier passes into the open bottom of the trolley-frame between the side plates thereof, and the laterally-projecting pins or trunnions *p* will strike the under sides of the free ends of the stop or plate C, thereby causing said stop or plate to be raised until its pin or lug *j* contacts with the upper end wall of its slots. As the hook-shaped portion of the swinging latch D substantially closes the entrance to the entrance-slot *h* in the side plates of the trolley-frame, it is apparent that the trunnions *p* must strike the curved or inclined under face of this latch at or before the time they strike the stop or plate C, and when this occurs the upward pull on the sheave-carrier, due to the hoisting-rope, will cause this latch to swing upward about its fulcrum and gradually uncover the entrance-slot *h* and allow the upper portion of the sheave-carrier to enter into the trolley. Just as soon as the sheave-carrier has moved the stop or plate C to its upward limit the trunnions of the carrier will have passed the point of the hook on the swinging latch, when the weighted free end of said latch causes the latch to drop back into its normal position with its hook portion against lugs *q* on the inner sides of the frame-plates and with the throat or entrance to this hook portion directly below the trunnions, whereby when the pull upon the hoisting-rope is relaxed the trunnions *p* ride down the inclined walls of this throat or entrance and finally become seated, thereby suspending the load directly from this latch, the shape and construction of which is on the cantaliver plan, so that the greater pressure brought upon this latch will only cause it to bear more strongly against the lugs *q*. This insures the latch properly and securely sustaining the load and without danger of the accidental release of the load at any point other than the one desired. The sheave-carrier is released from this position and allowed to descend with its load by a very simple mechanism, which I will now describe. On the shaft of the pulley *c* is loosely mounted a lever G of substantially bell-crank or L shape. This lever is shown in Fig. 8, and it consists of parallel-spaced horizontal and vertical bars fulcrumed on the shaft at their meeting-angles, and between these bars the pulley *c* is placed. The inner ends of the spaced horizontal members *r* are disconnected, while the outer ends of the vertical members *s* are connected by a cross-bar which weights said ends, said cross-bar adapted to contact with lugs on the inner sides of the free end of the parallel-spaced members of the swinging latch D. Now, assuming the sheave-carrier to be still suspended in the hook-shaped portion of the swinging latch D and the point of deposit of the load is reached and it is desired to dump the load, the engineer at the hoisting-engine, upon being given the proper signal, stops the holding-drum momentarily, while the other drum keeps in motion, which will result in a pull upon the hoisting cable or line, while the trolley is thus held against further travel. The effect will then be that the sheave-carrier is lifted vertically to remove the trunnions *p* out of the throat of the latch D and the arrow-shaped head of the sheave-carrier is forced between the separated ends of the members *r* of the bell-crank lever G, spreading them apart until the head passes clear of the upper sides of these members. The shoulders of the head now rest upon the members *r*, and the pull upon the hoisting-line being relaxed, the weight of the suspended load being now upon said members, the bell crank lever G will

swing about its fulcrum, and the free end of the lever will bear upon the free end of the swinging latch D and raise said latch, so as to move the hook portion thereof to one side of the plane of the trunnions of the sheave-carrier and thereby uncover the entrance slot or opening and allow said carrier to descend and freely pass out of the trolley. When the arrow-head finally passes off of the members *r* of rocking lever G, the weighted free ends of the latter and of the swinging latch will cause these parts to assume their normal positions ready for another engagement and release of the sheave-carrier.

I will now describe the bucket and the means by which it is caused to automatically dump its load simultaneously with the passage out of the trolley-frame of the sheave-carrier. The bucket H is of the usual type, with its trunnions disposed in a plane a little to one side of the vertical center of the bucket, so as to insure its tilting when the devices hereinafter mentioned are released. Its trunnions are engaged by hook portions *u* of a U-shaped bail L, suitably secured to the frame of the sheave-carrier. The side arms of the bail are provided with slots 10, which in the preferred construction are formed by making the bail of spaced plates. In these slots or guides operate the flanges 12 of suitable T-plates riveted to the side arms of a supplemental U-shaped bail M, located within the main bail, as shown in Fig. 6, said supplemental bail having the lower ends of its side arms forked, as shown at 13, whereby the forked portions straddle the flanges 14 of suitable T-plates riveted or otherwise secured to and projecting from the sides of the bucket near the upper edge. When these forked portions are thus in engagement with the flanges 14, the bucket is locked against tilting about its trunnions, and in this position it may be safely hoisted. To effect the automatic release of the bucket, I employ a lever or piece N, which I fulcrum near its center on a pin or bolt 15, passing through the frame of the sheave-carrier. One end of this lever is weighted, as at 16, and the opposite end, which is preferably of curved or hook form, points inward and toward the bail of the bucket and its extremity is adapted to bear under the top bar 17 of the supplemental bail M, as shown in Fig. 3. To the weighted end of this lever N, I connect the free end of the hoisting-line, securing a button or stop O on the line at such a distance from the end that there will be some slack line between the button or stop and the weighted end of the lever N, when the sheave carried is held by the swinging latch D, as in Fig. 2. When the sheave-carrier is raised out of this latch and its head caused to act on the bell-crank lever G, the outer end of the lever N will be raised into contact with a roller or stud 20 in the bottom of the trolley-frame, and the inner curved end of the lever N will be forced inward under the supplemental bail M with a cam-like movement, thereby causing this bail to slide in the main bail and its forked members to ride out of contact with the flanges on the bucket. This automatically releases the bucket and allows it to turn about its trunnions and dump the load simultaneously with the release of the sheave-carrier from the trolley and by the same pull upon the hoisting-line that effects the release of said carrier. As the sheave-carrier and its load descends the slack in the hoisting-line is taken up and the lever N is thereby rocked about its fulcrum to pull the inner end out of engagement with the supplemental bail, which allows the said bail to drop, so that it may be made to engage and lock another bucket at the point of excavation or loading.

The empty bucket is hauled back to the initial point while suspended from the sheave-carrier, but the latter is in an unlatched condition, so that when the point of loading is reached the carrier may be lowered without any unlocking or tripping of any of the parts of the latching mechanism, which said parts are also in position to latch and carry the reloaded bucket, as before described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hoisting, conveying and dumping apparatus, the combination of a trolley, a tramway or guide therefor, a hoisting line or cable, connected with the trolley, a sheave-carrier, a tiltable bucket having a separable connection with the sheave-carrier, a swinging latch carried by the trolley and into engagement with which the sheave-carrier is drawn by the hoisting-line, means for effecting the automatic release of the sheave-carrier from the latch and means for releasing the connections between the bucket and sheave-carrier simultaneously with the release of said carrier from its latching devices.

2. In a hoisting, conveying and dumping apparatus, the combination of a trolley and means whereby it is transported from one place to another, a swinging latch carried by the trolley, a sheave-carrier from which the load is suspended having means for automatically latching with said lever, and a pivoted trip in the path of movement of the carrier adapted to be actuated by the latter for withdrawing the latch from the path of descent of the carrier to pass out of the trolley and remain unlatched during the return of the empty bucket for reloading.

3. In a hoisting, conveying and dumping apparatus, the combination, with a trolley, a tramway or guide therefor and a hoisting rope or line connected with the trolley and effecting its movement from one point to another, of a latch pivoted within the trolley and having a hook-shaped end, a sheave-carrier connected with the hoisting-line and from which the load is suspended, having a head to enter the trolley from below and provided with trunnions adapted to raise said latch as said

head passes into the trolley, said latch automatically dropping into the path of the trunnions and latching thereto whereby the weight of the load is transferred to the latch, and a pivoted trip for withdrawing the latch to allow the carrier to pass out of the trolley.

4. In a hoisting, conveying and dumping apparatus, the combination of a tramway or guide, a hoisting-line, a trolley connected with said line and adapted to travel on said tramway or guide, a sheave-carrier, having trunnions on its opposite sides, a latching-lever pivoted in the trolley and having a free end in the path of said trunnions, a pulley in said carrier beneath which the hoisting-line passes, whereby the carrier is drawn into the trolley and the latch raised to permit the trunnions to pass it, said latch adapted to fall, by gravity, beneath the trunnions and form a support therefor, and a pivoted trip for withdrawing the latch and allowing the carrier to pass out of the same and be returned to the loading-point in an unlatched condition.

5. In a hoisting, conveying and dumping apparatus, the combination, with a suspended track or tramway, a trolley adapted to travel thereon, a hoisting-line connected with the trolley and a carrier from which the load is suspended, having a pulley beneath which the hoisting-line passes, and having trunnions on its opposite sides, of a gravity latching-lever in said trolley, pivotally secured at one end, and having its opposite end free, and having an upwardly-presented hook formation between said ends, said free end being elevated by the trunnions, when the sheave-carrier is elevated into the trolley by the action of the hoisting-line, and then falling beneath the trunnions and receiving them into the hook portion, and a pivoted trip for again elevating the latch and allowing the sheave-carrier to pass out of the carrier.

6. In a hoisting, conveying and dumping apparatus, the combination, with an elevated track or tramway and a trolley adapted to travel thereon and having a bottom opening for the entrance of the sheave-carrier, and having the lower portion of its sides slotted, of a latch within the trolley, pivotally held at one end and having its opposite end free, an inclined throat in the latch and forming an upturned hook, a sheave-carrier from which the load is suspended and having trunnions on its sides, a hoisting-line passing beneath the sheave of the carrier whereby the carrier is adapted to be elevated into the bottom opening of the trolley and the trunnions of said carrier are passed into the slots in the sides of the trolley and contact with and elevate the latch, said latch dropping by gravity, beneath the trunnions and receiving the latter into the inclined throat, and suspending the load, a rocking lever in the trolley-frame above the latch, having one end in the path of upward movement of the sheave-carrier and its opposite end in engagement with the free end of said latch, said lever adapted to be tripped by the sheave-carrier to cause it to elevate the latch out of the path of descent of the carrier, to allow the latter to pass out of the trolley-frame.

7. In a hoisting, conveying and dumping apparatus, the combination, with an elevated track or tramway, a trolley, having guide-pulleys and a pivoted latch, a sheave-carrier from which the load is suspended, having side trunnions, and a hoisting-line connected with the trolley and passing beneath the sheave of the carrier, and elevating the latter until its trunnions engage and are held by said latch, of means for automatically releasing the carrier from its locked position and allowing it to pass out of the trolley and be returned to the loading-point in an unlatched condition, consisting of a rocking lever or piece having an arm in contact with the latch and into engagement with which lever or piece the sheave-carrier is lifted by the hoisting-rope, whereby its weight trips said lever or piece and causes the latch to be moved out of the path of descent of the carrier to permit the latter to pass out of the trolley-frame.

8. In a hoisting, conveying and dumping apparatus, the combination, with an elevated track or tramway, a trolley, having guide-pulleys and a pivoted latch, a sheave-carrier having side trunnions, and a hoisting-line connected with the trolley and passing beneath the sheave of the carrier, and elevating the carrier until its trunnions engage and are held by said latch, of pivoted stops or plates on the sides of the trolley-frame, engaged by said trunnions and limiting the projection of the sheave-carrier into the trolley, and means for automatically releasing the carrier from its locked position and allowing it to pass out of the trolley and be returned to the loading-point in an unlatched condition, consisting of a locking lever or piece having one portion to contact with the free end of the latch and another portion to be engaged by the carrier to swing said piece about its fulcrum and thereby move the latch out of the plane of the descent of the carrier to permit the latter to pass out of the trolley.

9. In a hoisting, conveying and dumping apparatus, the combination, with an elevated track or tramway and a trolley having guide-pulleys, of a pivoted latch in the trolley consisting of separated or spaced plates having one end fulcrumed in the trolley and having the opposite ends connected together and adapted to swing in vertical planes, said plates having their intermediate portions formed with inwardly and upwardly extending hook portions, a sheave-carrier having side trunnions, a hoisting-rope connected with the carrier and elevating it into the trolley whereby its trunnions elevate the latch sufficiently to enable them to pass the hook portion thereof, when said latch drops beneath the trunnions and receives said trunnions into its hook portion, and means for automatically withdrawing the latch to per-

mit the carrier to pass out of the trolley and be returned to the loading-point in an unlatched condition.

10. In a hoisting, conveying and dumping apparatus, the combination, with an elevated track or tramway, a trolley adapted to travel thereon and consisting of separate side plates secured together, having slots in their central lower portions, and having curved slots at one side of the central slots, pulleys mounted between said plates, a downwardly-curved latch between said plates, fulcrumed at one end on one of the pulley-shafts and having its opposite end free to move in vertical planes, said latch having an inwardly and upwardly turned hook at its intermediate portion and normally closing the central slots in the side plates of the trolley-frame, a stop on each side plate, fulcrumed at one end and having its opposite end projecting into said slots, and having a pin working in said curved slots to limit the swinging movement of the stop, and an L-shaped or bell-crank lever fulcrumed on the other pulley-shaft, having a horizontal member with a free end lying in the vertical center of the trolley and a vertical member lying in contact with the free end of the swinging latch, a sheave-carrier having side trunnions adapted to engage and raise said latch and stops and to be engaged and suspended by the latter, and a hoisting-line passing around said pulleys and the sheave of the carrier to elevate the carrier into engagement with the latch and to lift it out of the latch and into contact with the horizontal member of the L-shaped lever whereby the other member of said lever automatically lifts the latch out of the plane of descent of the carrier and allows it to pass out of the trolley.

11. In a hoisting, conveying and dumping apparatus, the combination, with a trolley, means whereby it is supported and means whereby it is caused to travel back and forth, a sheave-carrier and a gravity-latch in the trolley into engagement with which the carrier is elevated, said latch having its downward movement limited by its contact with fixed stops on the trolley-frame, of means for releasing the carrier from its engagement with the latch consisting of a downwardly-swinging lever or piece centrally fulcrumed, in the trolley, having vertical and horizontal arms, said horizontal arm consisting of separated spaced members adapted to be spread apart by the head of the carrier, to permit the latter to pass, said lever or piece swinging downward under the influence of the weight of the carrier upon said members to cause the vertical arm of the lever or piece to lift the latch out of the plane of descent of the carrier, whereby the carrier may be returned to the loading-point in an unlatched condition.

12. In a hoisting, conveying and dumping apparatus, the combination, with a trolley, means whereby it is supported, and means whereby it is caused to travel back and forth, of a sheave-carrier, a latch by which it is suspended from the trolley, means for automatically releasing the carrier from said latch, a hoisting-bucket and means for permitting it to tilt in unison with the release of the carrier from the latching devices consisting of a slide adapted to engage locking lugs or flanges on the bucket and a fulcrumed lever on the carrier having one portion to strike a stop on the trolley and another portion to lift the slide and sever the connection between the latter and the bucket whereby said bucket is permitted to swing about its trunnions.

13. The combination, with a tramway or guide, a trolley having a latch, a sheave-carrier to engage therewith, means for automatically releasing the carrier from the latch, a hoisting-line connected with the trolley and carrier and elevating the latter into the former prior to its release and again elevating it to trip the releasing devices, of a hoisting-bucket having trunnions and a main bail to engage the same and connect the bucket with the carrier, and having vertical guides, flanges or lugs on said bucket, a supplemental bail having flanges or lugs slidable in the main bail and having forks to embrace the flanges on the bucket and lock the bucket, and a lever fulcrumed between its ends to the carrier, having one end to contact with a stop on the trolley as the carrier is being elevated and having its opposite end to ride under the cross-bar of the supplemental bail and thereby slide the forked portions thereof out of engagement with the flanges on the bucket, to allow the bucket to tilt and discharge its load simultaneously with the release of the carrier from the latching devices of the trolley.

14. In a hoisting, conveying and dumping apparatus, the combination, of a sheave-carrier, a tiltable bucket having side flanges or lugs, a bail carried by the carrier and suspending the bucket, a trolley, having means for latching with and releasing the carrier, a hoisting-line by which the carrier is elevated and the trolley moved from place to place, a lever fulcrumed to the carrier, having one end weighted and connected with an extremity of the hoisting-line and adapted to contact with a fixed stop on the trolley, and having its opposite end adapted to be forced inward, by said contact, a button or stop on the hoisting-line near the end which connects with the lever, a supplemental bail for the bucket, slidable on the main bail and having forked extremities to engage the side flanges of the bucket and to release said flanges when the supplemental bail is moved upward by the lever.

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

OMAR N. GARDNER.

Witnesses:
T. WALTER FOWLER,
S. A. TERRY.