

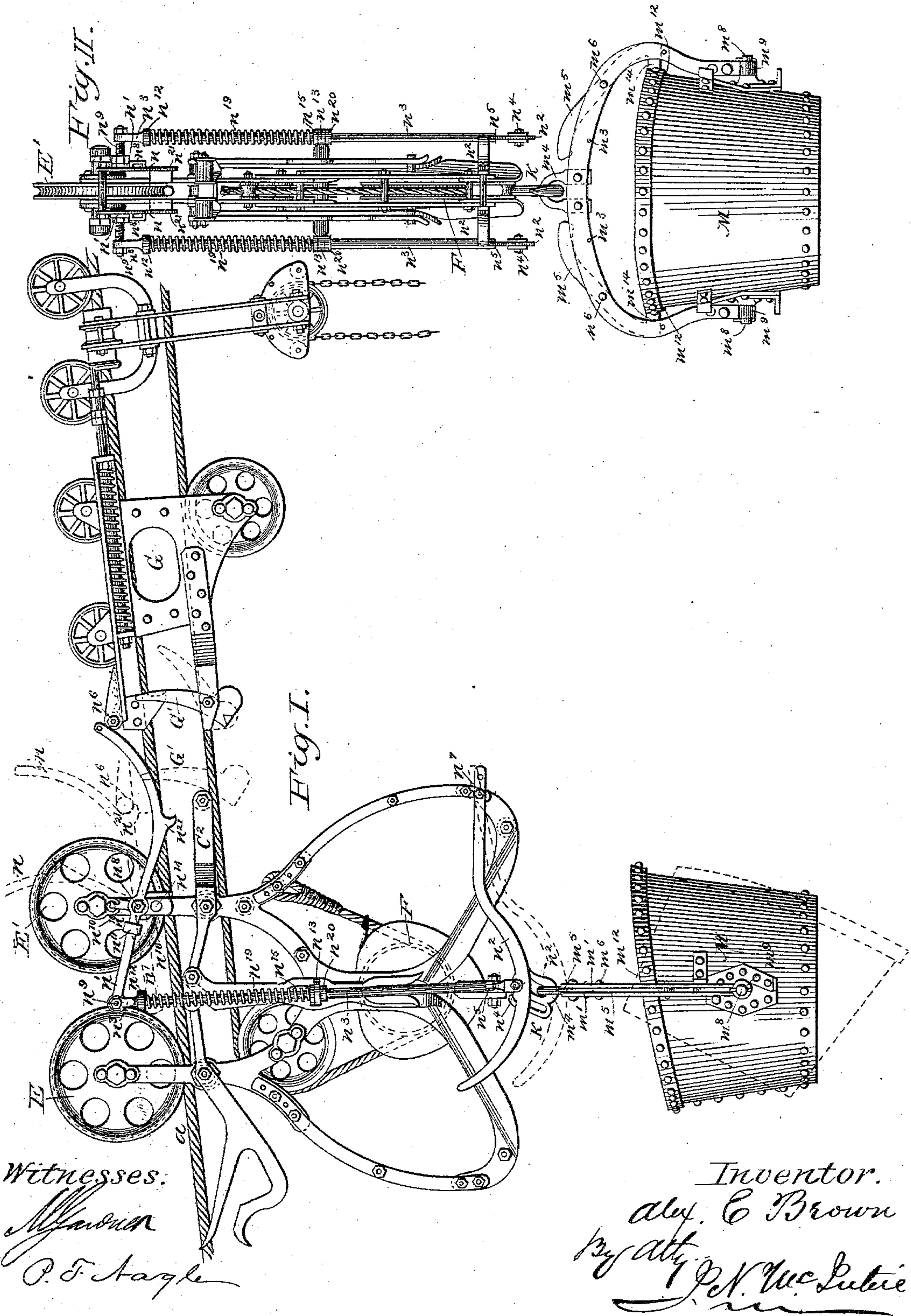
(No Model.)

3 Sheets—Sheet 1

A. E. BROWN.  
HOISTING AND CONVEYING MACHINE.

No. 281,011.

Patented July 10, 1883.





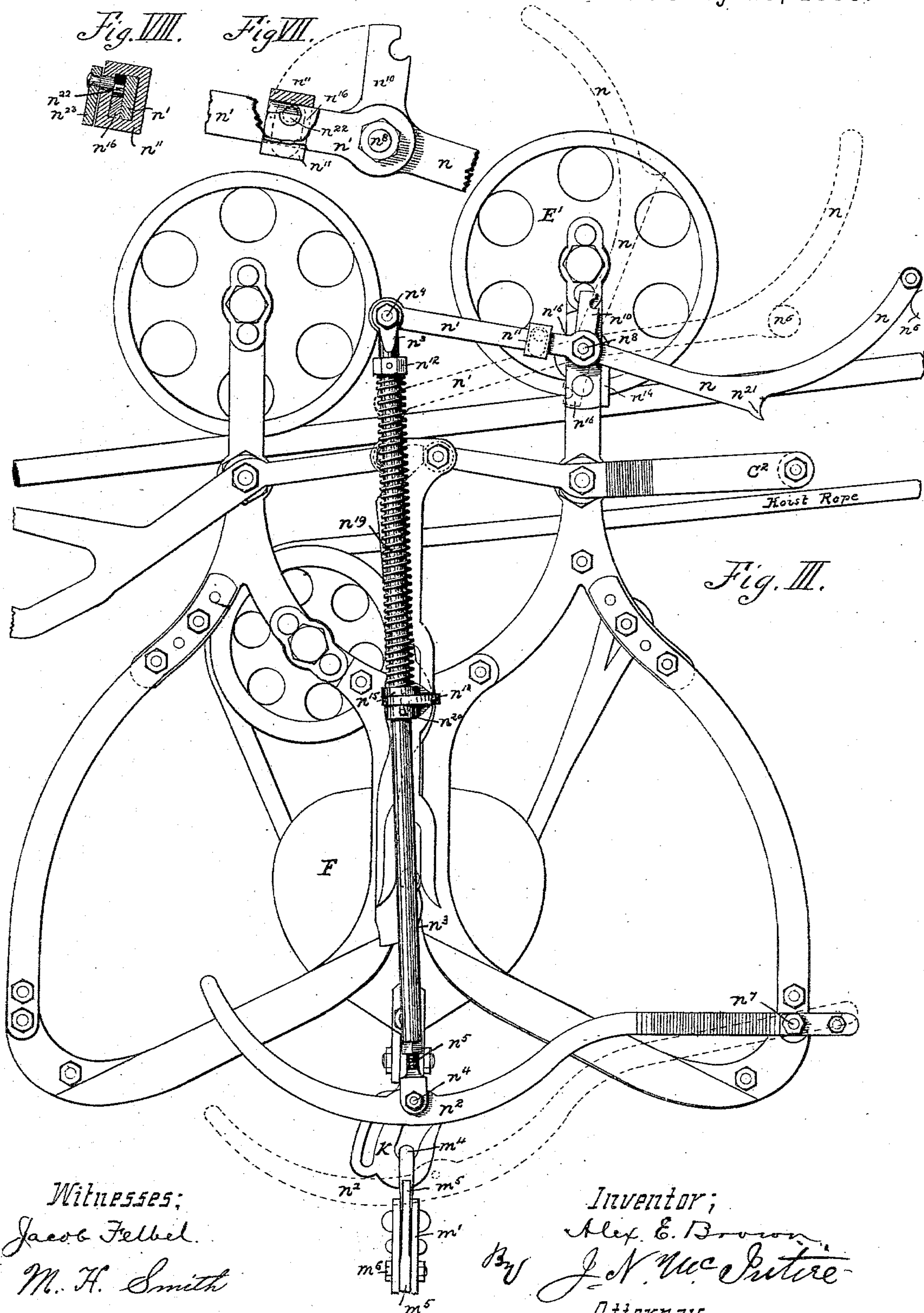
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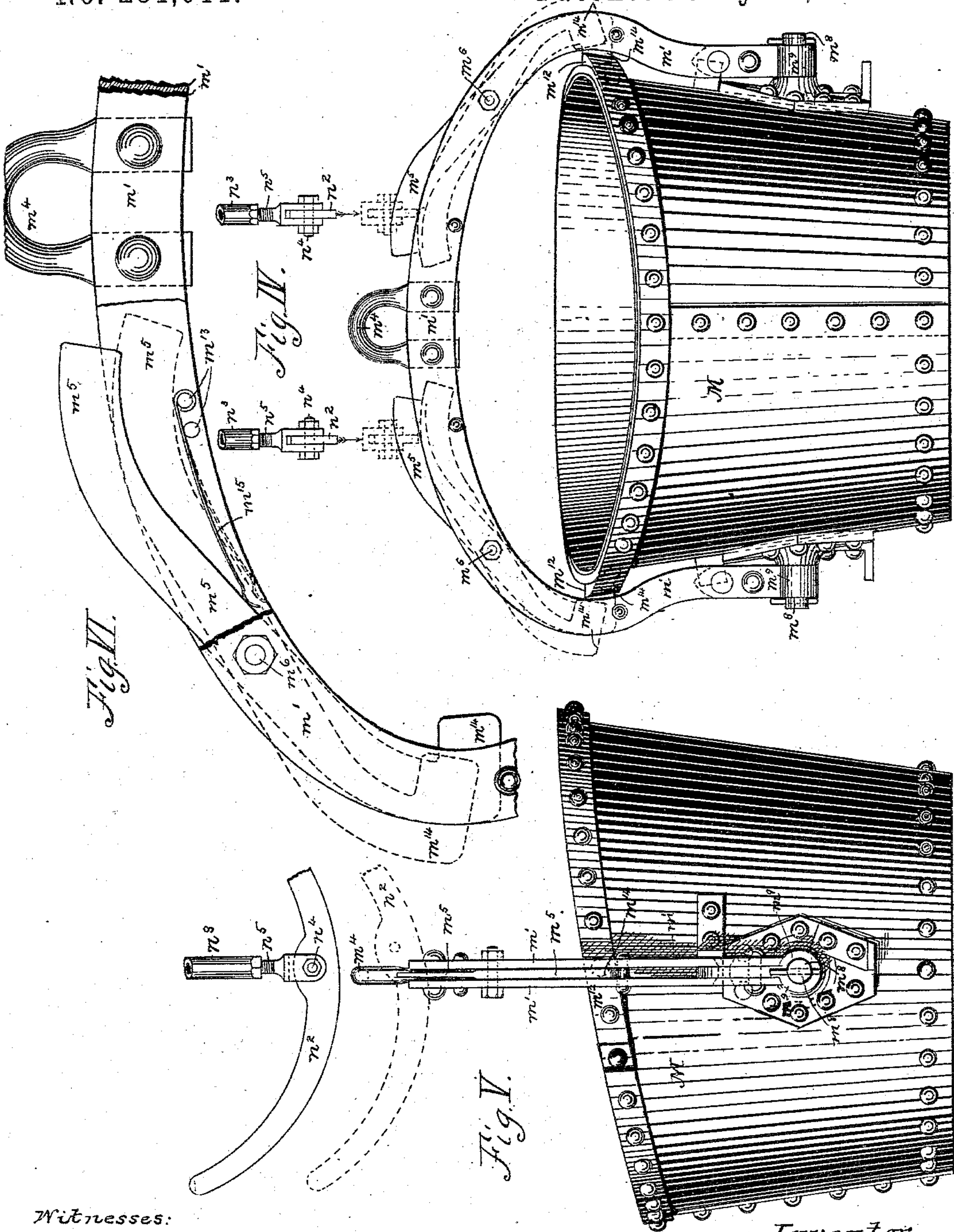
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3 Sheets—Sheet 3.

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# UNITED STATES PATENT OFFICE.

ALEXANDER E. BROWN, OF CLEVELAND, OHIO.

## HOISTING AND CONVEYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 281,011, dated July 10, 1882.

Application filed April 26, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER EPHRAIM BROWN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hoisting and Conveying Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this application.

My invention relates to certain new and useful improvements in the dumping mechanism of conveying or hoisting and conveying machines, whereby coal, ore, or other substance may be automatically dumped from the bucket or tub through the actions of the machine on this automatic mechanism; and my invention consists in certain novel devices and combinations of devices, which will be hereinafter more fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation of a hoisting and conveying machine and its upgrade stop and clamp devices, made about as shown in my Letters Patent No. 232,236, September 14, 1880, and having combined therewith the novel mechanism I have devised for dumping the contents of the bucket. Fig. II is an end view of the machine with the dumping mechanism, together with the bucket and catch-levers suspended from hoist-block. Fig. III is a side view of the machine, on a larger scale than Fig. I, to more clearly show in detail the dumping improvement, or the system of levers of the dumping device. Figs. IV and V are respectively back and side views of the dump-bucket, with improved bail and catch-lever adapted to work with the automatic dumping device of the machine. Fig. VI is an enlarged view, showing portion of the bucket-bail and one of the catch-levers of the same. Figs. VII and VIII are sectional views of details of one of the levers of the dumping device.

In all the figures the same parts are indicated by the same letters of reference.

The projecting lever  $n$ , suitably bent or curved at one end, as shown, is pivoted to the frame of the machine by a pin or bolt,  $n^8$ , and is connected at its other end, by means of pro-

jecting portion  $n^{16}$  of the lever  $n$  and the adjustable collar  $n^{11}$ , to the lever-arm  $n'$ , which latter is also pivoted at  $n^8$ . The lever  $n'$ , at its other end, is in pivotal connection, by means of pin  $n^9$ , with rod  $n^3$ , which rod passes through the stationary slotted guide-nut  $n^{13}$ . The lower end of rod  $n^3$  is connected to a lever,  $n^2$ , by means of pin  $n^4$  and adjustable screw-bolt  $n^5$ . This lever  $n^2$  is pivoted to machine-frame at the point  $n^7$ .  $n^{12}$  is a collar fastened to the connecting-rod  $n^3$ .

$n^{19}$  is a suitable spring on guide-rod  $n^3$ , arranged to butt against the collar  $n^{12}$  and washer  $n^{15}$ , so as to counteract the tendency of parts  $n^3$ ,  $n^2$ , &c., to drop by their own weight from the positions shown in full lines to that shown in dotted lines, and which spring also serves to return the said parts  $n^3$ ,  $n^2$ , &c., to their normal positions after the load is dumped and the carriage is on its return downgrade.

$n^{14}$  is a projecting lug from the carriage-frame to prevent the lever  $n$  and its connecting parts from dropping lower than shown in drawings.

$n^{20}$  is a collar on the connecting-rod  $n^3$ , that serves to check undue rising of the rod  $n^3$  and levers  $n'$  and  $n^2$ .

$n^6$  is a roller or rollers suitably constructed and applied on upgrade-stop G.

It will be seen from Fig. II that all these parts described are in duplicate or in pairs—one part on each side of the machine—for the evident purpose of balancing the machine or making the same symmetrical with respect to the cable tramway on which it travels.

M is a tub or bucket suspended from the machine by the hook K of hoist-block F, which enters the eye or loop  $m^4$ , riveted to the bail  $m'$ , the latter being secured to the bucket by trunnions  $m^8$  in eyes  $m^9$ , riveted to bail.

$m^5$  are catch-levers pivoted to the bail, on each side of its center or middle, by the bolts or rivets  $m^6$ . The catch-levers  $m^5$  are so shaped and pivoted that when free to act by gravity or its equivalent the upper portions of them project some distance above the edge of the bucket-bail, while the head  $m^{14}$ , formed on the lower portion, will project inside of the bail and in front of the stop-lug  $m^{12}$ , thus locking the bucket in carrying position. The tend-



ency of the lower portion of the catch-levers  $m^{14}$ , either by gravity or its equivalent, (a spring) is to drop or close, so as to lock the bucket in position shown in Fig. I. The shape of the bucket M is such that when fully loaded there is a tendency of the same to turn on its pivots  $m^5$  and dump in the direction shown by the arrow in Fig. I. This is prevented when the catch-levers  $m^5$  are in their normal positions—that is, with their heads  $m^{14}$  in front of the lugs  $m^{12}$ , preferably riveted to the bucket. It will be seen from this that if the upper portion of  $m^5$  be pushed down, as indicated in Figs. IV and VI by dotted lines, the bucket, if loaded, will be free to dump, as in that position the head  $m^{14}$  of the catch-lever is out of contact with the lugs  $m^{12}$ . The bucket is so hung on the trunnions that when it is empty the weight of the bottom of the bucket, or the center of gravity of the same, is sufficiently below the trunnion to cause it to right itself, and when the bucket is full the tendency of the load is to tip it over and dump the load.

The bail  $m'$ , I prefer to construct of two pieces of iron separated from each other a suitable distance to allow the eye of the trunnions  $m^9$  being riveted between them. This construction also allows the catch-levers  $m^5$  to be pivoted between the two riveted bail-pieces, thus holding the catch-levers  $m^5$  in position and protecting them nearly their entire lengths, (excepting the projecting portion of the upper end of catch-lever.) The catch-levers  $m^5$  may be made either to act by gravity by making the lower portion or head,  $m^{14}$ , heavier than the portion above its pivot, and thus always secure a tendency of the same to drop into locked positions with respect to the bucket. An equivalent action may be produced, without making the head  $m^{14}$  heavier than the upper part, by means of a spring or springs,  $m^{15}$ , secured, as shown at Fig. VI, by rivets  $m^{12}$  to bail  $m'$ , and bearing against the under side of the catch-lever  $m^5$ .

From the foregoing it will be plainly seen that the action of the bucket and catch-levers will be such that, whenever the upper portions of the catch-levers  $m^5$  are pushed down, the lower portions or heads of the catch-levers will be out of locking position with the bucket, and the same will be free to dump.

It will be further seen that if the levers  $n^2$  of the dumping device, which, when not in action, always stand directly over the upper portion of the levers  $m^5$ , are pushed down to a position indicated by dotted lines in Figs. I, III, and V, they will depress the upper portions and elevate or unlock the lower portions of the catch-levers and dump the load contained in the bucket.

Having described the relative arrangement of the hoisting and lowering and dumping devices and the general construction of the various parts composing the same, I shall now proceed to describe their operation in detail.

Assuming the bucket to be loaded and sus-

pended from the machine, as shown at Figs. I and II, and pulled along by means of the hoist-rope to a position on the cable in respect to the upgrade-stop, as shown, the projecting end of the lever  $n$  comes in contact with the rollers  $n^6$  on upgrade-stop. Through the further pull of the hoist-rope the lever  $n$  moves upon the roller  $n^6$ , and, turning on the pivot  $n^8$ , pushes down the connecting-rods  $n^3$  by reason of their pivotal connection at  $n^9$  with the same, which in turn forces down the levers  $n^2$ , bringing them in contact with the projecting portions of the catch-levers  $m^5$  of the bucket, and pushing them down and the lower ends up and out of locking position, when the bucket by its load freely dumps. The levers  $n$  are prevented from rolling upon  $n^6$  farther than the required distance to open the catch-levers  $m^5$  of bucket by means of the projecting lug  $n^{21}$ , which comes in solid contact with the roller  $n^6$ , as shown by dotted lines. This also serves as a stop or abutment for the machine, and prevents the lever  $c^2$  of the machine from coming in contact with the swinging piece  $G'$ , and thereby preventing the opening of the hooks that suspend the hoist-block and the lowering of the load. On the return motion of the carriage downgrade, after the load is dumped, the springs  $n^{19}$  lift the levers  $n'$  and  $n^2$  to their former positions, and as the lever  $n$  rolls down and off the upgrade-stop roller  $n^6$  and the levers  $n^2$  are raised, the bucket catch-levers are again left free to lock the bucket as soon as it rights itself.

In practice I find that it is not necessary always to clamp the upgrade-stop tightly when it is desired to use the automatic dumping device; and, in fact, it is oftentimes better to leave this stop loose on the cable tramway, and only held in position by its tail-rope from running downgrade. The weight or the tendency of the stop  $G$  to move downgrade is sufficient to work the automatic dumping device, so that as soon as the dumping-levers  $n$  come in contact with the upgrade-stop the load will be dumped before it comes in solid contact against the lugs  $n^{21}$ , and when the latter do come in contact with the rollers  $n^6$  of the upgrade-stop the motion of the carriage is communicated to the stop itself until the carriage is returned in the reverse direction downgrade. This allows considerable lee-way in the operating of this dumping mechanism, as it relieves the same from any severe or sudden shocks that might be produced if the dumping-levers were brought into forcible contact with the upgrade-stop clamped to the cable. If it is desired to lower the load without dumping it—or, in other words, if it is desired to throw the dumping attachment out of operative condition—it is only necessary to slip the collar  $n^{11}$  along lever  $n'$  off from  $n^{16}$  or the prolonged end of  $n$ . In this position of the collar detached from  $n^{16}$  the lever  $n$  is free to turn on the pivot  $n^8$ , independently of  $n'$ , to the highest dotted-line position shown



in the drawings, up against the projecting hub of the carriage-wheel E'. This will bring the other projecting end,  $n^{10}$ , of lever  $n$  (located about at right angles thereto) in line with  $n'$ , when the collar  $n^{11}$  may be slid over the same, and so hold the lever  $n$  in this upright position. In this position of the lever  $n$  it will readily be seen that the whole of the dumping attachment is out of operative position, as the lever  $n$  cannot now come in contact with the upgrade-stop. It will further be seen that in this position of the dumping device the lever  $c^2$ , that operates in opening the load-suspending hooks of the machine, is free to engage with or roll upon levers G' of the upgrade-stop, and thereby release the load without dumping, as in my patent before alluded to.

Figs. VII and VIII show more plainly in detail the manner in which the levers  $n$  and  $n'$  are made to act together as one lever, either in or out of operative dumping position, by means of the collar  $n^{11}$  and its locking device  $n^{22}$  and  $n^{23}$ .  $n^{10}$  and  $n^{16}$  of Figs. VII and VIII, or the two projecting portions or extensions of  $n$ , have notches in them near their ends, as shown. The collar  $n^{11}$  is made large enough to slide over  $n'$  and either one of these projecting portions  $n^{10}$  or  $n^{16}$ , and it has hung in its side next to the ends  $n^{10}$  or  $n^{16}$  a bolt,  $n^{22}$ , with weighted handle  $n^{23}$ , riveted outside the collar to this bolt, which is free to turn in the hole in this collar. The head  $n^{22}$  of this bolt is only one-half of a circle, as shown in Fig. VII, and is only thick enough to extend across the ends  $n^{10}$  or  $n^{16}$ , and is just the size to fit into the notches of these projecting ends.

In the position shown in Figs. VII and VIII the collar is shown as locked to the projection  $n^{16}$  and lever  $n'$  by this half-round head fitting in the semicircular notch of  $n^{16}$ . The collar may be thrown out of this locked position and slid along the lever  $n'$  by turning the handle  $n^{23}$ , and consequently the semicircular bolt-head  $n^{22}$ , to a diametrically-opposite position to the one shown in the figures. This movement will bring the round portion uppermost, leaving the flat side a little above the entrance to the notch of  $n^{16}$ , when it and the collar may be slipped over the notched end of  $n^{10}$  along  $n'$ , leaving the lever  $n$  and  $n^{16}$  free of any connection with  $n'$ . If the lever  $n$  is now lifted up so as to bring  $n^{10}$  in the position of  $n^{16}$  alongside of  $n'$ , (for the purpose of throwing the dumping mechanism out of gear,) the collar  $n^{11}$  may be slipped back along  $n'$  and over  $n^{10}$  by keeping the handle  $n^{23}$  turned up, so that the round part of the bolt-head  $n^{22}$  is also turned up, and thus allow it to pass over the end of  $n^{10}$  until the notch is reached, when it may be turned down to fit into this round notch, and thereby lock extension  $n^{10}$  to lever  $n'$ . The weight of handle  $n^{23}$  always holds the half-bolt head  $n^{22}$  in its locked position.

From the foregoing it will be seen that the lever  $n$  may be locked in or out of operative

position by means of this adjustable collar and locking-bolt, (without the aid of any screw-driver, wrench, or other implement,) which bolt is always kept in proper position by the action of gravity. From the positions of the suspended bucket and the dump-levers  $n^2$ , (see Figs. I, II, and III,) and the shape of  $n^2$ , it is evident that the bucket M may swing on the hook and block through a considerable arc, and yet always be in operative position in respect to the dump-levers  $n^2$ , as they are made, as seen, in the arc of a circle or arcs of circles approximately described by the swinging of the bucket in the plane of these levers. Again, it will be seen from an inspection of the drawings that the bucket may be raised and lowered, when desired, without any part of it having to pass any portion of the dumping device, as the striking-levers  $n^2$  are always, when not in operation, held in a position sufficiently above the catch-levers of the bucket to prevent their ever coming in contact with the same through any motions of the hoist-block in lifting the bucket and load. The dumping device, being entirely attached to the traveling carriage and always above the bucket and its levers, is always in line with and will operate on the catch-levers of the bucket when the levers  $n$  are adjusted to come in contact with the rollers  $n^6$  of the upgrade-stop, however much the bucket, with its load, may be swinging, either in the plane of the dump-levers  $n^2$  or at right angles to them, as in the latter case the machine and all its parts take the swinging motion of the bucket and levers. The bucket and machine are always in the same relative positions.

It will be seen from the foregoing that my machine is capable of doing these two kinds of work, viz: first, hoisting, conveying, and automatically lowering the buckets without dumping them; and, second, conveying the loaded buckets, and, without lowering, automatically dumping them; and it will be seen that either one of these two results may be accomplished at pleasure by a simple locking in or out of action of the tripping-lever  $n$  of the dumping mechanism.

It will be understood, of course, that my novel mechanism or combination of devices for effecting the dumping of the loaded bucket may be just as well employed in a machine for simply conveying and dumping without any capacity whatever for hoisting and lowering, and I therefore do not wish my invention respecting the dumping mechanism to be considered as limited to its employment in a machine organized for doing these two kinds of work, although I have shown it as embodied therein.

In the several figures the dumping attachment is shown to be used in connection with the upgrade-stop; but it is evident that it is not necessary to be worked only at the upgrade-stop, but may, by proper application of the levers to the downgrade part of the frame



of the machine, be made to operate equally well in conjunction with the downgrade-stop. Further, it may be made to operate at either or both stops, as desired, and I do not wish to limit myself to any specific application of the dumping device in this respect to the machine. Neither do I limit my invention to the special shape or forms of the dumping-levers or parts of the dumping device herein shown, as they may be constructed in various shapes, to suit particular circumstances to which they may be applied.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a machine comprising two separate mechanisms—one adapted to hoist, carry, and automatically lower the bucket without dumping it, and the other adapted to carry the loaded bucket and automatically dump without lowering it, and both of said mechanisms being provided with actuating-arms pivotally attached to the frame of the machine—the actuating arm or arms of the dumping mechanism, constructed or composed of two parts, and provided with means for locking or holding it or them in two different positions—in one position for co-operation with a suitable stop on the cable-way to automatically dump the load without lowering it, and in the other position to prevent co-operation with the said stop, and thus permit the actuating-arm of the hoisting and lowering mechanism to coact with a tripping device located on the cable-way and automatically lower the load without dumping it.

2. In a machine for performing the two kinds of work described, an arm or lever for operating the dumping mechanism, composed of two parts,  $n$   $n'$ , the part  $n$  having two extensions arranged at about right angles to each other, in combination with a collar connecting either of said extensions with the lever portion  $n'$ , as and for the purposes set forth.

3. In combination with lever  $n$   $n'$ , constructed of two parts, the part  $n$  having notched extensions, a collar or sleeve provided with a locking device adapted to enter either of the notches in said extensions, as and for the purposes set forth.

4. In a conveying-machine, the combination, with a suitable stop or abutment located on the cable or rail way, and a suspended bucket provided with catch-levers  $m^5$ , of a system of levers actuated by contact with said stop, and operating to effect the unlocking or unhook-

ing of the catch-levers and the dumping or tipping of the loaded bucket.

5. In a conveying-machine, the combination of the stop or abutment, the bucket provided with catch-levers, the system of levers for dumping the bucket, as described, and means for automatically returning the levers to their normal positions after the same shall have effected the dumping of the bucket.

6. In a conveying-machine, a bucket, the bail of which is provided with catch-levers that are constructed to engage at one end with lugs on the bucket, and to project above the bail at the other end, and be adapted to be there depressed by the levers  $n^2$  of the machine, so as to automatically unhook said catch-levers and permit the self-dumping of the bucket.

7. In combination with a conveying or hoisting and conveying machine, a dump-bucket with bail and catch-levers suitably arranged, and a dumping device attached to the frame of the machine, arranged to be operated upon by suitable rollers or stops on the tramway, the said dumping mechanism so constructed and attached to the frame of the machine that at no time can the catch-levers of the dump-bucket pass or come in contact with any portion of the dumping device through any action of the hoist-rope, or any cause other than the operation of the dumping device by coming in contact with the proper stop or stops on the tramway, substantially as and for the purposes herein described.

8. In a conveying-machine, the combination, with the stop or abutment on the tramway, and with the bucket having the catch-lever  $m^5$ , of the system of levers  $n$ ,  $n'$ ,  $n^3$ , and  $n^2$ , the whole constructed and arranged and operating substantially as described.

9. In a conveying-machine, the combination, with the stop or abutment on the tramway, and with the bucket having the catch-lever  $m^5$ , of the system of levers  $n$ ,  $n'$ ,  $n^3$ , and  $n^2$ , and the springs  $n^{19}$ , the whole constructed and arranged and operating substantially as described.

In testimony whereof I have hereunto set my hand and seal this 23d day of April, 1883.

ALEXANDER EPHRAIM BROWN. [L. s.]

In presence of—

SAML. GIBBONS,  
GOTTLIEB GENDER.