

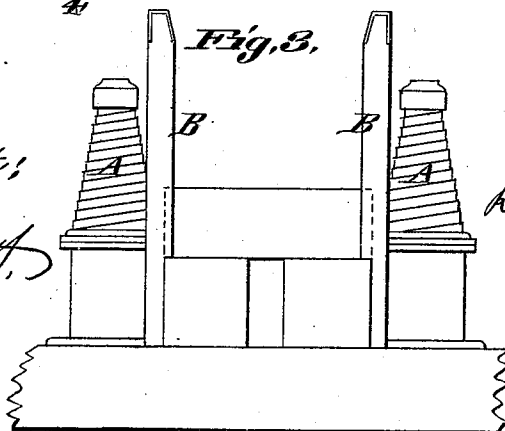
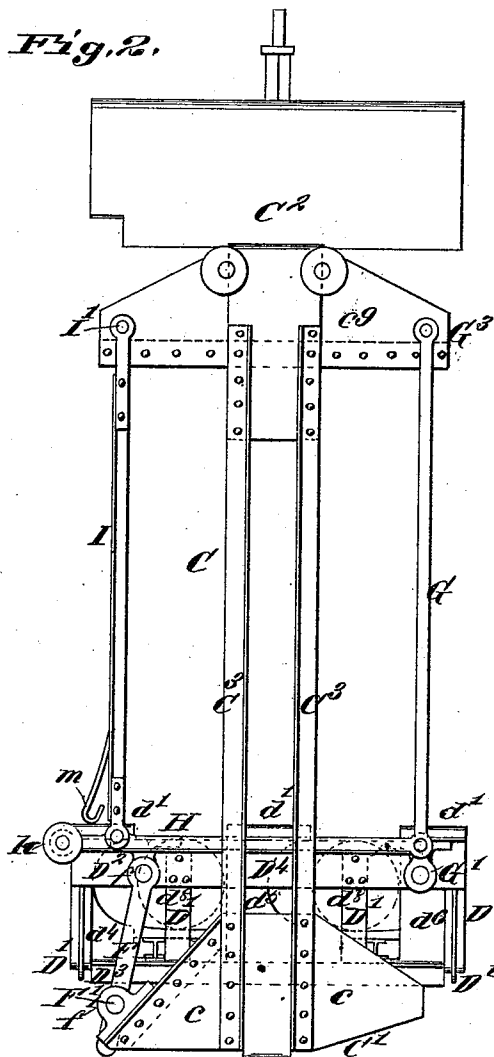
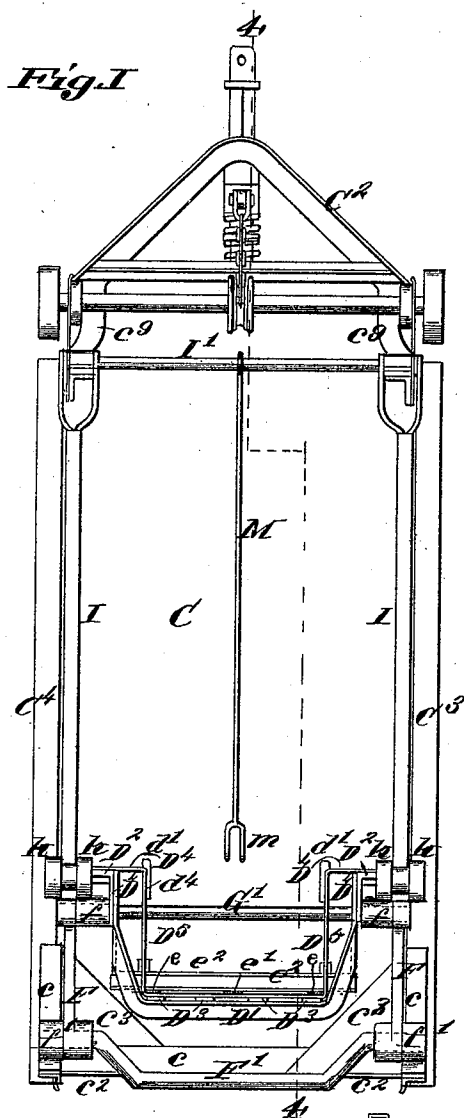
(No Model.)

4 Sheets—Sheet 1.

R. D. O. JOHNSON.
DUMPING APPARATUS.

No. 552,476.

Patented Dec. 31, 1895.



Attest;
Charles Pickles
[Signature]

Inventor;
Reno D. O. Johnson,
by Rex Moody,
his Atty.

(No Model.)

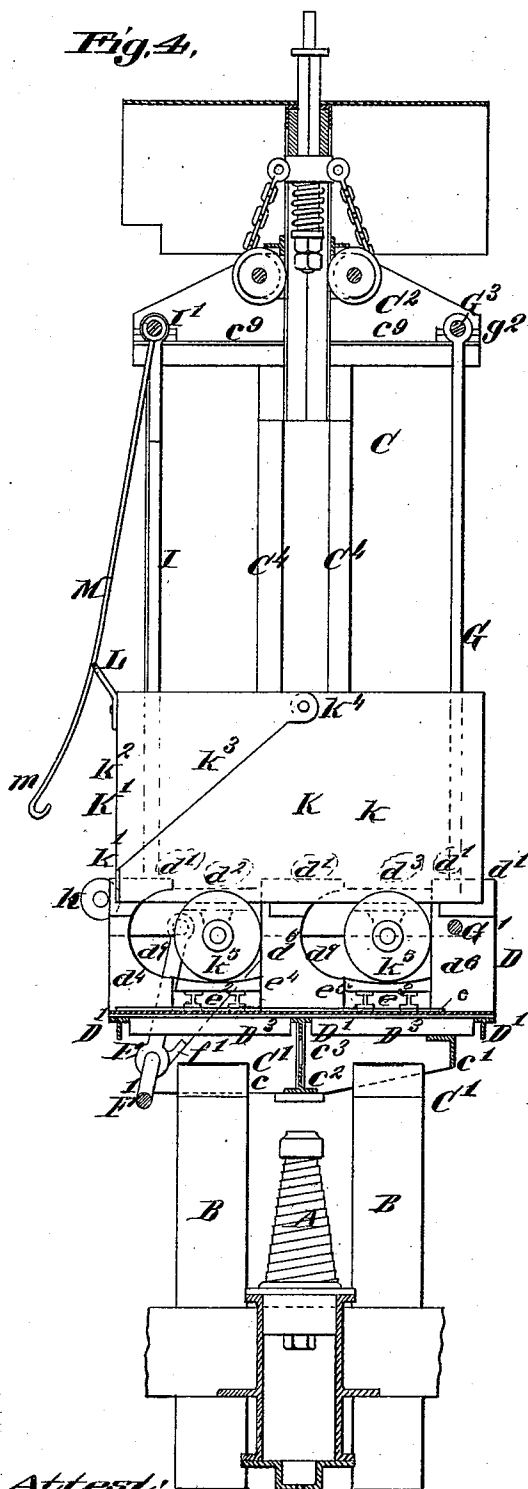
4 Sheets—Sheet 2.

R. D. O. JOHNSON.
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No. 552,476

Patented Dec. 31, 1895.

Fig. 4,



Attest:
Charles Pickles
[Signature]

Fig. 5.

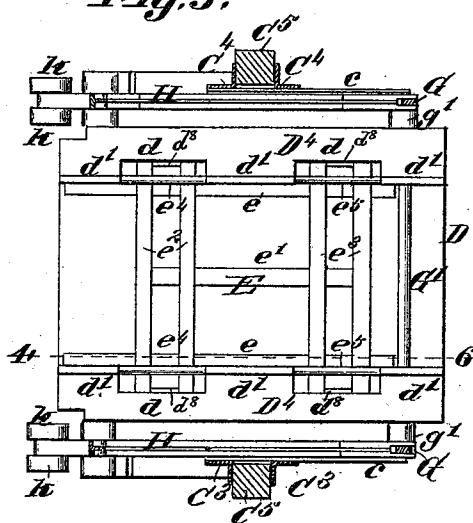
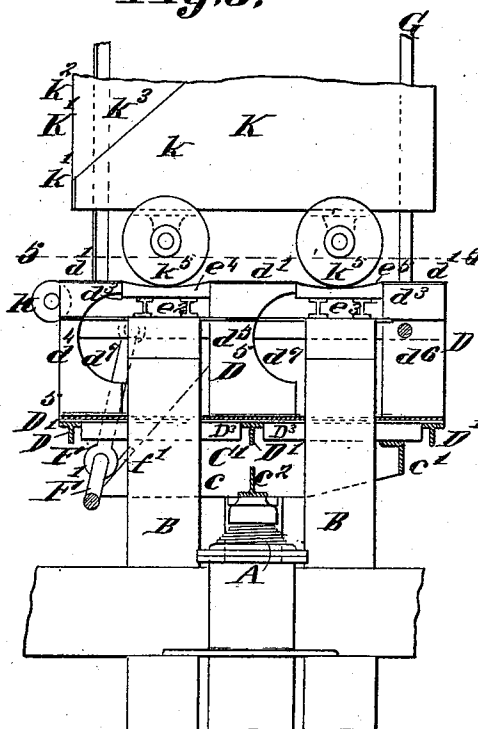


Fig. 6.



*Inventor,
Reno D. C. Johnson,
by Rex T. Moody, his Atty.*

(No Model.)

4 Sheets—Sheet 3.

R. D. O. JOHNSON.
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Fig. 7.

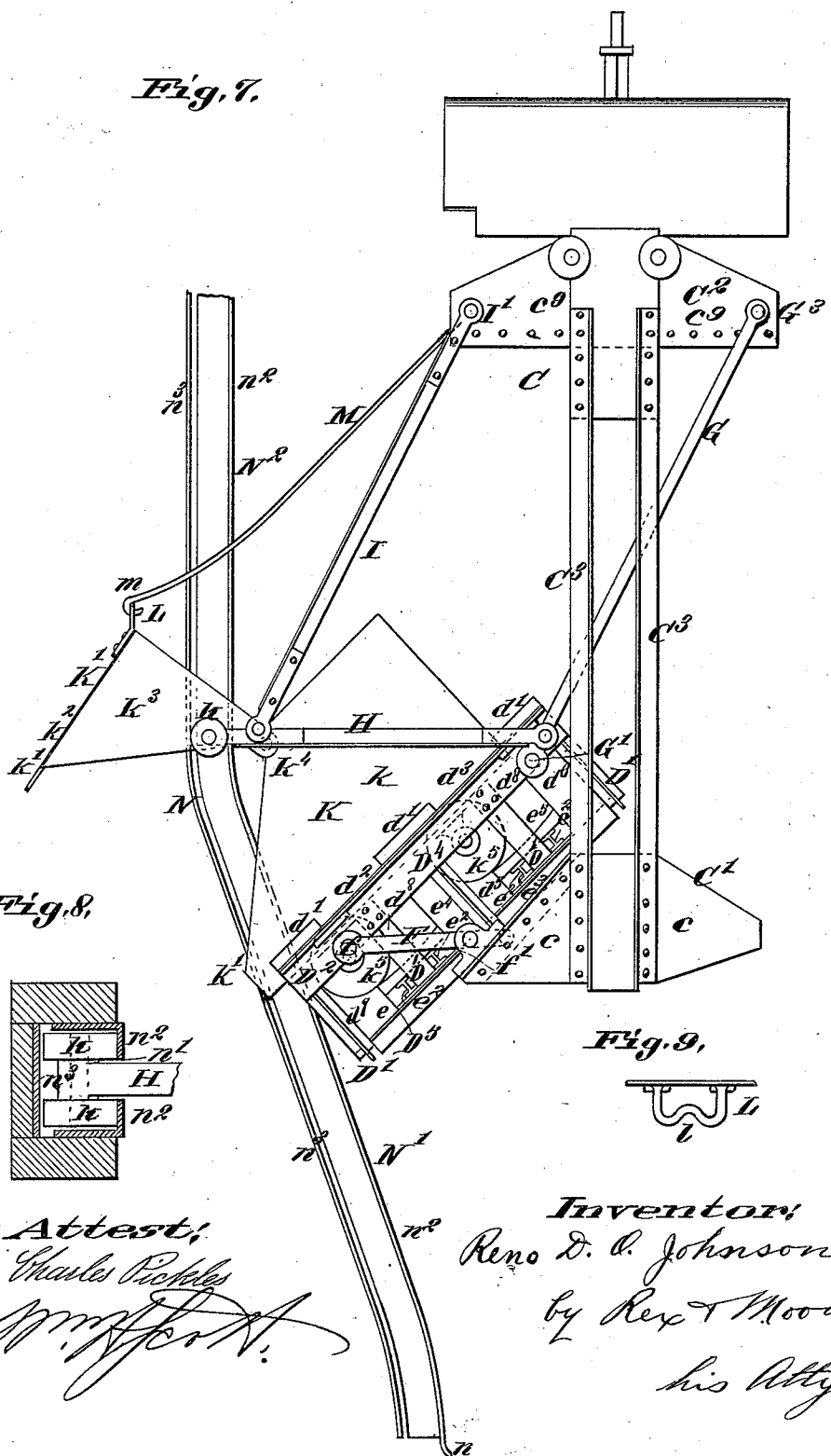


Fig. 8.

Fig. 9.

Attest,

Charles Pickles
M. J. H. N.

Inventor:

Reno D. O. Johnson,
by Rex T. Moody,
his Attys.

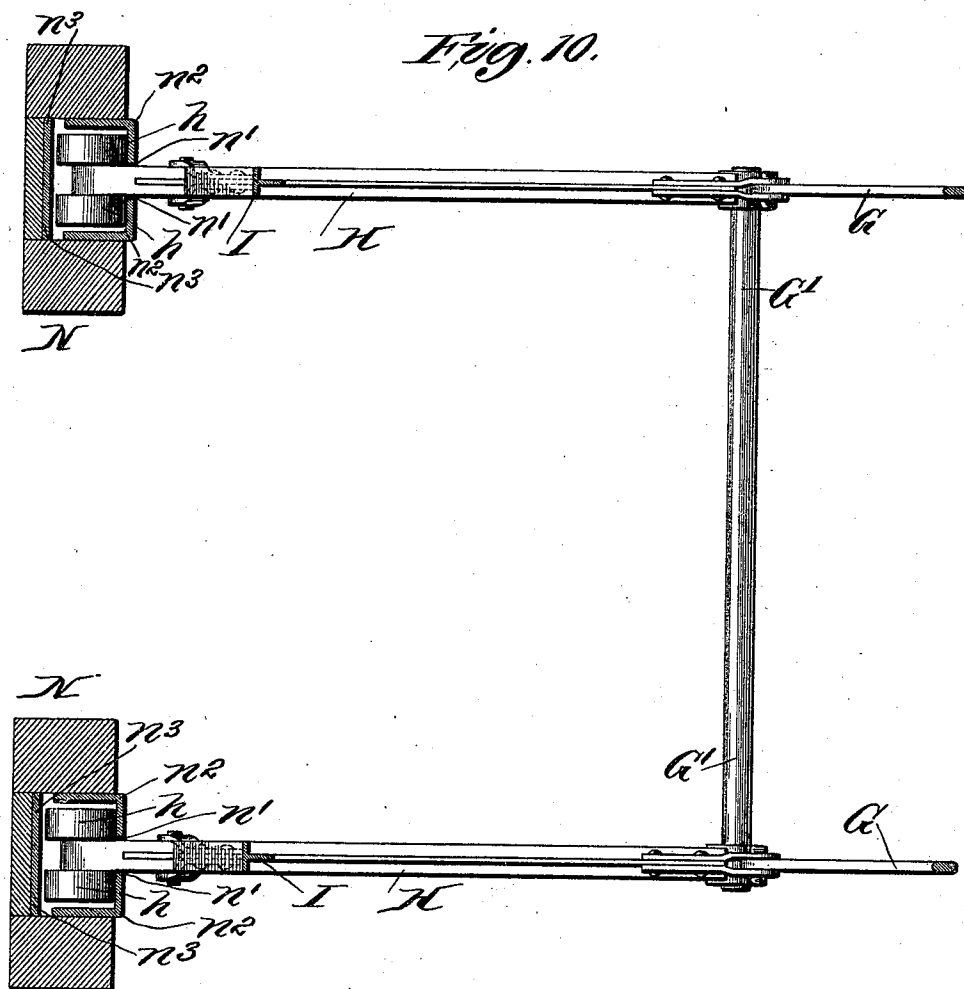
(No Model.)

4 Sheets—Sheet 4.

R. D. O. JOHNSON.
DUMPING APPARATUS.

No. 552,476.

Patented Dec. 31, 1895.



Attest:
W. H. J. H.
Charles Pickles

Inventor:
Rene S.O. Johnson
By Rex & Moody
his Attys

UNITED STATES PATENT OFFICE.

RENO D. O. JOHNSON, OF ISABELLA, MISSOURI.

DUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 552,476, dated December 31, 1895.

Application filed June 22, 1895. Serial No. 553,667. (No model.)

To all whom it may concern:

Be it known that I, RENO D. O. JOHNSON, a citizen of the United States, residing at Isabella, in the county of Ozark and State of Missouri, have invented a new and useful Improvement in Dumping Apparatus, of which the following is a specification.

My invention relates to apparatus intended especially for use in mining-shafts for elevating and automatically dumping coal, ores, and other materials.

It has for its chief objects, first, to provide means by which the substance elevated may be automatically dumped from a car without stopping the cage or moving the car off the cage, and difficulties and dangers heretofore experienced from overturning avoided; second, to provide means for momentarily substantially stopping the upward movement of the dumping-car during the operation of dumping without the use of a catch or stop fastened to the mining-shaft and without stopping the body of the cage; third, to provide means for automatically holding the dumping-car in position during the dumping and automatically disengaging it when at the foot of the shaft; fourth, to strengthen and improve the car used, and, fifth, to provide improved means for automatically opening the end-gate of the dumping-car at the time for dumping the contents of the car. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the dumping end of the cage. Fig. 2 is a side elevation. Fig. 3 is a detailed view of bumpers and landing-blocks used at the bottom of the shaft. Fig. 4 is in part a vertical transverse section of the cage on lines 4 4, Fig. 1, and 4 6, Fig. 5, and in part a side elevation of the dumping-car in the position occupied when being elevated on the cage. Fig. 5 is a horizontal section on line 5 5, Fig. 6. Fig. 6 is a vertical transverse view along the line 4 6, Fig. 5, showing the cage and car resting on the landing-blocks and bumpers and the car in position to be pushed off the cage. Fig. 7 is a side elevation showing the position of the parts in dumping. Fig. 8 is a detailed view of the inclined guide and the end of one of the tilting arms with its friction-rollers in said guide.

Fig. 9 is a detailed view of an eye attached to the end-gate of the dumping-car, and Fig. 10 is in part a plan view of portions of my improvement and in part a cross-section of a pair of tilting guides.

Similar letters refer to similar parts throughout the several views.

A A, Figs. 3, 4, and 6, are spring-bumpers located at the bottom of the shaft. They are of ordinary construction.

B B B B, Figs. 3, 4, and 6, are landing blocks.

C, Figs. 1, 2, 4, 5, 6, and 7, is a dumping-cage, of which C' is the bottom, C² the top, and C³ C³ and C⁴ C⁴ posts connecting the top and bottom of the cage. C⁵ C⁵, Fig. 5, are vertical guides attached to the sides of the shaft which guide the cage. The parts C³ C³ run on opposite sides of one of said guides, and the posts C⁴ C⁴ on opposite sides of the other.

The bottom of the cage may be of ordinary construction, but is shown constructed as follows: c c are the side pieces, shown riveted to the post C³ C³ and C⁴ C⁴. At their rear ends they are shown connected by the angle-iron c', and are connected together centrally by the T-iron c² and angle-braces c³ c³.

D, Figs. 1, 2, 4, 5, 6 and 7, is a tilting platform upon which the dumping-car is carried. It is preferably constructed in the manner shown in the drawings. In the construction shown D' D' D' are U-shaped ribs.

D² D² are side pieces attached to the outer side of the ribs.

D³ D³, &c., are beams resting on the ribs D.

D⁴ D⁴ are top pieces, having space enough between them to permit a car to descend therein. They are preferably provided with openings at d d d d, in order to permit the car-wheels to pass down. Except at the openings d d, &c., sections of iron beading or rails d' d', &c., are attached to the inner edges of the top pieces D², and at their inner edges they are supported by a lining d⁵, preferably U-shaped in cross-section, except where cut away in the manner hereinafter described. The bottom of the lining D⁵ of the platform D rests upon the beams D³. It is cut away from top to bottom at d² and d³ on both sides, leaving upright side pieces d⁴ d⁴, d⁵ d⁵, and d⁶ d⁶.

standing on each side. The edges of the pieces $d^4 d^4$ and $d^5 d^5$ are shown cut away in the shape of a segment of a circle at $d^7 d^7$.

Within the tilting platform a frame E is movable vertically. It is shown composed of two longitudinal side bars ee , a central bar e' , cross-bars $e^2 e^2$ and $e^3 e^3$ attached to the bars ee and e' , and four sections of rails $e^4 e^4 e^5 e^5$ resting on and attached to the cross-bars $e^2 e^2$ and $e^3 e^3$. These sections of rails $e^4 e^4 e^5 e^5$ are preferably curved down toward the middle from each end, as shown. The only function of the central longitudinal bar e' is to strengthen the construction, and as will be obvious it may be omitted. The side bars ee , by coming in contact with the inner sides of the U-shaped part D⁵, prevent lateral motion on the part of the frame. Longitudinal motion is prevented by guides $d^8 d^8 d^8 d^8$, attached to the sides of the platform D, and passing down between the cross-bars $e^2 e^2$ and $e^3 e^3$, as shown in Figs. 2, 5 and 7.

The sections of rails $e^4 e^4$ and $e^5 e^5$ are the right length to substantially fill up the gaps left between the pieces $d^7 d^7$ when in their highest position, and when in that position co-operate with the pieces $d^7 d^7$ in forming a track across the platform D.

The forward part of the platform D is preferably linked to the bottom C of the cage by means of two arms F F, whose upper ends are preferably journaled at ff in opposite sides of the platform D, and whose lower ends are preferably keyed to the bent shaft F', whose ends are preferably journaled in bearings $f' f'$, attached to the sides cc of the bottom of the cage, at points which are preferably somewhat farther forward than those positions occupied by the journal-bearings at ff when the platform is in a horizontal position. The object in having the shaft F' bent is to permit the tilting-platform D to drop down lower than it could if the shaft were straight and the other parts proportioned, as shown. As will be obvious, the method of pivoting the lower ends of the arms ff to the bottom of the cage is only one of many equivalent methods which might be adopted. It is preferred on account of the strength contributed to the construction by the shaft f' .

The rear end of the platform D preferably rests when in a horizontal position on the cross-bar c' of the bottom C' of the cage. It is linked to the top C² of the cage, preferably by two hangers G G, whose lower ends are preferably keyed to the ends of a horizontal shaft G', passing through the rear end of the platform D and journaled in bearings $g' g'$, attached thereto or formed therein. The upper ends of the hangers G G are preferably keyed to the ends of a shaft G³, which passes through the rear end of the top C² of the cage, and is preferably journaled in bearings in or attached to its sides $c^9 c^9$. As will be obvious, this particular method of pivotally connecting the lower ends of the hangers G G with the platform D at one end and the top of

the cage at the other is only one of many which will occur to a skilled mechanic reading this specification. Tilting arms H H are also directly or indirectly pivotally connected to the rear of the platform D, one on each side, preferably by pivotally connecting one to each of the hangers near its lower end, as shown. Whatever the means of connection it should not be a rigid connection, but should be such as will permit the front end of the platform when tilted to descend below the level of the outer ends of the tilting arms, substantially as it does in the construction represented in the drawings. No special means of connection is essential. The one represented is one of many capable of accomplishing the same purpose, which will occur to any mechanic reading this specification, and I do not wish my claims to be understood as confining me to the particular means represented. The arms H H project forward, and at its extreme outer end each arm preferably carries a pair of friction-rollers $h h$, pivotally connected thereto. The outer end of each of the arms H is preferably upheld by a hanger I, whose lower end is pivotally connected thereto, and whose upper end is preferably forked and keyed to a transverse shaft I', which turns in bearings formed in or attached to the sides $c^9 c^9$ of the top C² of the cage. The object in forking the upper ends of these hangers I is to prevent lateral motion on the part of the arms H.

Other methods of pivotally connecting the upper ends of the hangers I with the top of the cage may be adopted, but the one described is preferred.

K is a dumping-car of ordinary construction, except in the particulars hereinafter described. At its forward end its sides $k k$ slant upward from a point k' , preferably a short distance above the bottom of the car, to a point some distance back of the forward end and preferably about the middle of the side of the car at or near the top. The end-gate K' of the dumping end of the car is preferably composed of an end piece k^2 and two wings $k^3 k^3$, whose tops are preferably about horizontal, and which preferably slant upward along their bottom edges at about the same angle as the sides of the car, and are pivotally connected at or near their outer ends to the car-body, the pivotal connection being lettered k^4 . The precise forms of the car end and end-gate shown are not essential, as will be obvious, though desirable. The sides of the car being duplicates only one side is shown.

An eye L, having a U-shaped top l , is preferably attached to the end-gate.

M is a rod journaled at its upper end in the shaft I' and having its lower end formed into or attached to a double hook m , having its prongs turned inward. This rod M normally rests, when the cage is loaded, on the U-shaped top l of the eye L. The rod is preferably long enough to prevent its hook engaging the eye

L, except when the car is tilted. When the car is tilted forward in the manner herein-after described the hook *m* engages the eye L and stops the downward movement of the end-gate of the car, and if the downward movement of that end of the car continues far enough the dumping end of the car is opened and its contents allowed to slide out. The special form of end-gate above described has been found in practice to be much more durable than any other with which I am acquainted. The described device for opening the end is free from the defects incident to all devices in which the end-gate is forced open by a stationary part, or a part attached to the shaft instead of the cage.

The car K preferably runs upon wheels *k*⁵, of ordinary construction.

N, Fig. 7, is one of a pair of guides located on one side of the shaft, at the point where the dumping is to be done. The guides being duplicates, only one is shown. One guide N is located in position to engage the friction-rollers *h h* of one tilting arm H and the other the rollers *h h* of the other tilting arm. The guides N each preferably have a lower section N', which inclines upward and outward, and an upper section N², which begins where the outward inclination stops and is preferably substantially vertical. The outward inclination of the inclined section N' is preferably, but not necessarily, continuous throughout its length. The section N² is preferably substantially vertical; but a departure from the vertical, though undesirable, is not entirely impracticable, so long as the tilting platform is not pushed too far back on the one hand or pulled too far out on the other. The guide N is preferably arranged so as to govern the position of the tilting platform until its lower end is passed after the dumping and when the cage descends; but this is not absolutely necessary, as it is not essential that the platform D should be kept tilted after the dumping is completed. The essential portion of the guide is the part inclining upward and outward. Where the tilting platform cannot tilt beyond the desired point, and when in its tilted position remains in that position until forced out of it, section N² of the guide is of little use except to guide the part of the tilting arm engaged by the guide back into the inclined portion after it has been carried up beyond it and is on its descent. It may therefore be dispensed with under such circumstances, though I prefer to use it. Whether the part N² of the guide is used or not, the upper end of the inclined portion should preferably permit the part of the tilting arm thereby engaged to pass out of it and rise above it, so as to prevent the stoppage of the cage at the dumping-point.

The lower end of the guide N is preferably substantially open—that is, it allows the end of a tilting arm or a part thereto attached to pass into it. It is preferably but not necessarily provided with a lip *n* for guiding the

part engaged by the guide up into the mouth of the guide.

Where the arms H each carry a pair of friction-rollers, as shown, the guides N each contains in the section N' a slot *n'* to permit the outer end of one of said arms to pass upward while its rollers *h h* are engaged. On each side of this slot pieces *n*² *n*², whose guiding or bearing faces face substantially outward, are arranged to engage the rollers *h h* as the cage passes upward and hold said rollers in position. The back of the guide N is preferably provided with a part or parts *n*³ for the rollers to roll on when the cage descends, and which forces the tilting platform back into its normal position. The bottom of each guide N is preferably provided with a lip *n* for forcing the rollers *h h* to enter the guide. This lip is not an essential feature, though desirable. In the preferable form of my improvement the construction of section N² of the guide may be substantially the same as section N'; but the parts *n*² *n*² are not essential, and where the guide is not used on the descent of the cage the part *n*³ in section N' may be omitted, though desirable. Section N² of the guide N preferably extends as high as the arms H can be carried by the hoisting machinery.

My improvement operates as follows: The cage being at the bottom of the shaft, as shown in Fig. 6, rests upon the spring-bumpers A A, except its movable frame E, which rests upon the landing-blocks B B B B, whose tops are in contact with the under sides of the cross-bars *e*² *e*² and *e*³ *e*³. These blocks pass up through the bottom of the cage on the outside of the lining D⁵, and extend up far enough to lift the rail-sections *e*⁴ and *e*⁵ to substantially the same level as the pieces *d*'. A continuous track across the platform D being thus formed, an unloaded car resting on the sections of rails *e*⁴ *e*⁴ and *e*⁵ *e*⁵, as shown, may be pushed off and a loaded car pushed onto the cage in its place. The new car tends to come to rest on the sections *e*⁴ *e*⁴ and *e*⁵ *e*⁵ of the track by reason of their form. The cage being loaded is started upward. As it rises the movable frame E, upon which the loaded car rests, sinks until the landing-blocks B B, &c., cease to support it and it comes to rest upon the part D⁵ of the platform D. The car continues in its original position on the track-sections *e*⁴ *e*⁴ and *e*⁵ *e*⁵ until the guides N N are reached. When said guides are reached the outer end of each tilting arm H enters the slot *n'* in the guide N on its side, and its rollers *h h* come in contact with the inner faces of the parts *n*² *n*² on each side of said slot. As the guide slants outward and the rollers *h h* cannot escape therefrom, the arms H H pull the rear end of the tilting platform D, to which they are connected, forward. As the arms F F, upon which the weight of the forward part of the platform D rests, are preferably so connected to the bottom of the cage as to incline inward from bottom to top when the platform D is in its normal position, the first effect of this outward pull exerted

through the arms H H is to lift the cage until the arms F pass the vertical and begin to descend. From that time on, until the forward end of the platform D reaches its lowest position, the lower end of the car descends, and as the descent is preferably as rapid as the ascent of the cage the lower end of the platform is thus momentarily kept from rising, though the upward motion of the body of the cage continues, or may do so. As soon as the center of gravity of the combined car and tilting platform passes over and beyond the bearings $f' f'$ the rollers attached to the tilting arms are thrust against the parts n^3 of the guides N, which cause the descent of the outer end of the tilting platform to be gradual. As soon as the platform D begins to tilt forward the car K moves forward, and its wheels k^5 enter the recesses d^7 , as shown in Fig. 7, and rest therein until the platform resumes its horizontal position, when they roll back onto the sections $e^4 e^4$ and $e^5 e^5$ of the track. As soon as the front end of the car K has tilted far enough forward, the eye L attached to its end-gate K' is engaged by the hook m , attached to the rod M, and thus prevented from moving farther downward, and as the downward movement of that end of the body of the car continues it drops away from the end-gate, and the contents, being left free to escape, are dumped. When the guide is constructed in the preferred manner the car is kept in the dumping position until the cage stops. The descent of the cage causes the arms H H to push the platform back into its original position.

The rollers h of the arms H H preferably rest against the parts n^3 of the guides during the descent of the cage until the common center of gravity of the tilting platform and car passes back of the bearings $f' f'$, when they again bear upon the parts $n^2 n^2$, which prevent the platform from falling back suddenly into its original position.

When the cage returns to the bottom of the pit with its empty car, the bottom of the cage strikes the bumpers A A and the ends of the cross-bars $e^2 e^2$ and $e^3 e^3$ of the frame E strike the tops of the landing-blocks B B, &c. The bumpers allow the car to descend to the position shown in Fig. 6, and the landing-blocks, by preventing the frame E from descending after striking them, cause the frame E and the car resting thereon to assume the position with reference to the platform D in which they are represented in Fig. 6. During this change of position the frame E is kept from moving horizontally by the bars $e e$, the side pieces $d^4 d^4$, $d^5 d^5$, and $d^6 d^6$, and the vertical guides d^8 .

Where I speak of parts being pivotally connected, I desire to be understood as including connections in which the pivot turns in a bearing as well as those in which the pivot is the bearing upon which another part turns.

Where I speak of the position of a connection being back of or in front of a center of

gravity, I do not wish to be understood as meaning directly back of it, but simply that whether to one side or not of the center of gravity in question it is either farther back or farther forward, as the case may be, from the center of gravity of the part when such part is in its normal position.

I claim—

1. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; and one or more arms linking said platform, in front of its center of gravity, to the bottom part of said cage; substantially as described.

2. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; and one or more arms pivotally connected to said platform, in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; substantially as described.

3. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; and a rest for the rear part of said platform; substantially as described.

4. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms linking said platform, in front of its center of gravity, to the bottom part of said cage; one or more tilting arms, connected to said platform back of its center of gravity, and extending forward and means supporting the outer ends of said tilting arms; substantially as described.

5. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms linking said platform, in front of its center of gravity, to the bottom part of said cage; one or more tilting arms, connected to said platform back of its center of gravity, and extending forward; and means linking said tilting arm or arms to the top part of said cage, and keeping them substantially horizontal when said platform is tilted; substantially as described.

6. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; one or more tilting arms connected to said platform back of its center of gravity, and extending forward and means supporting the outer ends of said tilting arms; substantially as described.

7. In a dumping cage, a tilting platform; means linking said platform back of its cen-

ter of gravity, to the top part of said cage; one or more arms pivotally connected to said platform, in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; one or more tilting arms, connected to said platform, and means linking said tilting arm or arms to the top part of said cage and supporting their outer ends, substantially as described.

8. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; a rest for the rear part of said platform; and one or more tilting arms connected to said platform back of its center of gravity, and extending thence forward; substantially as described.

9. In a dumping cage a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; a rest for the rear part of said platform; one or more tilting arms connected to said platform back of its center of gravity; and means linking said tilting arm or arms to the top part of said cage, and supporting their outer ends when said platform is tilted; substantially as described.

10. In a dumping cage a tilting platform; means connecting said platform to said cage; one or more tilting arms connected to said platform; and means linking said tilting arms to the top part of said cage, and supporting their outer ends when said platform is tilted; substantially as described.

11. In a shaft, substantially vertical cage guides, extending substantially from top to bottom of that portion of the shaft in which the cage runs; one or more tilting guides, each having a lower section open at the bottom, and inclining upward and outward, and each having an upper substantially vertical section opening into the lower section, and the lower end of each lower section being located near the dumping point; a cage running in said cage guides, having a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms linking said platform, in front of its center of gravity, to the bottom part of said cage; and one or more tilting arms connected to said platform back of its center of gravity, and extending forward, and engaging said tilting guide or guides; substantially as described.

12. In a shaft, substantially vertical cage guides, extending substantially from top to bottom of that portion of the shaft in which the cage runs; one or more tilting guides,

each having a lower section open at the bottom, and inclining upward and outward, and each having an upper substantially vertical section opening into the lower section, and the lower end of each lower section being located near the dumping point; a cage running in said guides; a tilting platform in said cage; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms connected to said platform, in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; and one or more tilting arms pivotally connected to said platform back of its center of gravity, and extending forward, and engaging said tilting guide or guides; substantially as described.

13. In a shaft substantially vertical cage guides extending substantially from top to bottom of that portion of the shaft in which the cage runs; one or more tilting guides; a cage running in said cage guides; a tilting platform in said cage; means linking said platform, back of its center of gravity, to the top part of said cage; one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; and one or more tilting arms connected to said platform, and extending forward and engaging said tilting guides; substantially as described.

14. In a shaft substantially vertical cage guides extending substantially from top to bottom of that portion of the shaft in which the cage runs; one or more tilting guides, each having a lower section open at the bottom, and inclining upward and outward, and the lower end of each, being located near the dumping point; a cage running in said cage guides, having a tilting platform; means linking said platform, back of its center of gravity, to the top part of said cage, one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform, and one or more tilting arms connected to said platform back of its center of gravity, and extending forward and each engaging one of said tilting guides, and each having its outer end supported by means linking it to the top part of said cage; substantially as described.

15. In a shaft substantially vertical cage guides extending substantially from top to bottom of that portion of the shaft in which the cage runs; one or more tilting guides; a cage running in said cage guides, having a tilting platform, means linking said platform back of its center of gravity to the top part of said cage; a rest for the rear part of said platform; one or more arms pivotally connected to said platform in front of its center of gravity, and pivotally connected to the bottom part of said cage farther forward than to said platform; and one or more tilting

arms connected to said platform back of its center of gravity, and extending forward and each engaging one of said tilting guides, and each having its outer end supported by means
5 linking it to the top part of said cage; substantially as described.

16. The combination in a dumping cage of a tilting platform, means linking said platform, back of its center of gravity, to the top
10 part of said cage, means linking said platform in front of its center of gravity, to the bottom part of said cage; a pair of tilting arms pivotally connected to said platform; means linking said tilting arms to the top
15 part of said cage; a pair of vertical guides, guiding said cage; and another pair of guides located at about the dumping point, each having a part inclining outward and upward, and each engaging one of said tilting arms,
20 and each having at the upper end of its inclined portion, a passage permitting a continued ascent of said tilting arms; substantially as described.

17. The combination in a dumping cage of
25 a tilting platform having on each side three side pieces, each of the two foremost, on each

side, having its rear edge recessed; six sections of rails attached to the top of said platform; a frame vertically movable within said platform; and sections of rails carried by
30 said frame, and, together with said other rail sections completing a track across said platform, when said frame is in its highest position, and being below said other rail sections
35 when said frame is in its lowest position; substantially as described.

18. The combination in a cage of a tilting platform; hangers G G, linking said platform to the top of said cage; arms FF, whose
40 upper ends are pivotally connected to said platform, in front of its center of gravity and whose lower ends are keyed to a bent transverse shaft, journaled in bearings attached to or formed in the sides of the bottom of the cage.
45

Witness my hand this 20th day of June, 1895.

RENO D. O. JOHNSON.

Witnesses:

G. D. FISHER,
W. H. BOEHMER.