

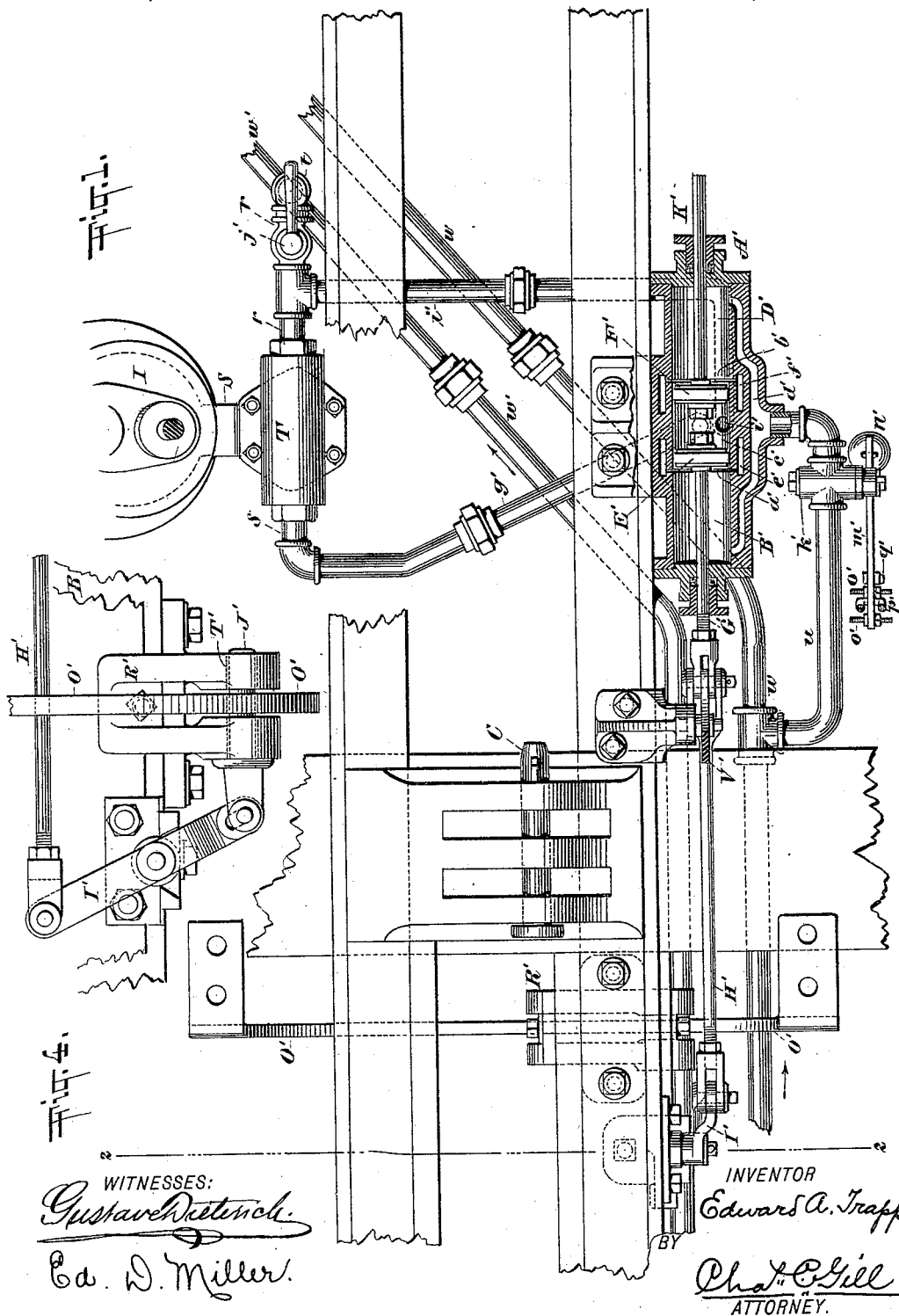
(No Model.)

5 Sheets—Sheet 1.

E. A. TRAPP.
DUMPING CAR.

No. 493,317.

Patented Mar. 14, 1893.



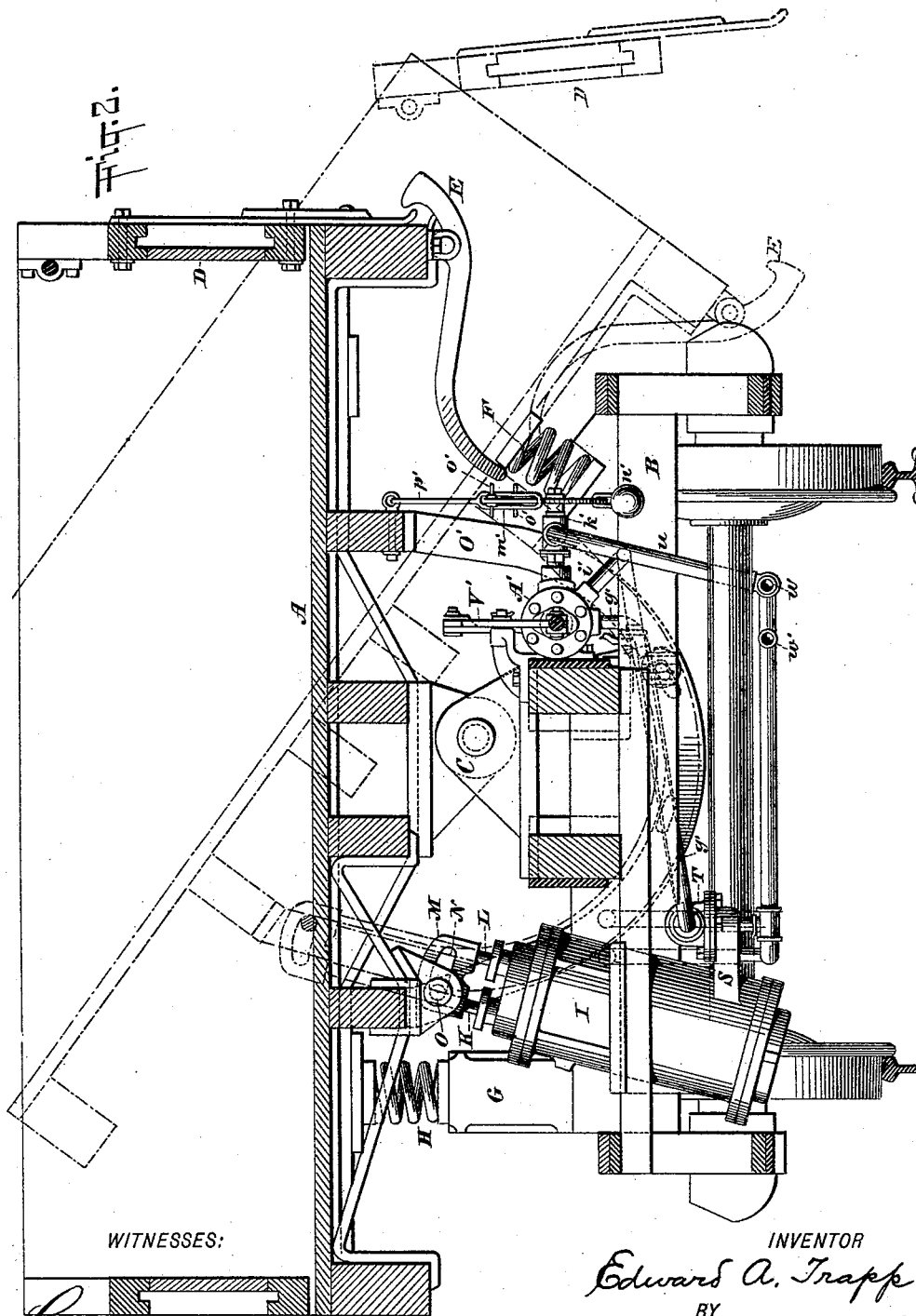
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5 Sheets—Sheet 2.

E. A. TRAPP.
DUMPING CAR.

No. 493,317.

Patented Mar. 14, 1893.



WITNESSES:

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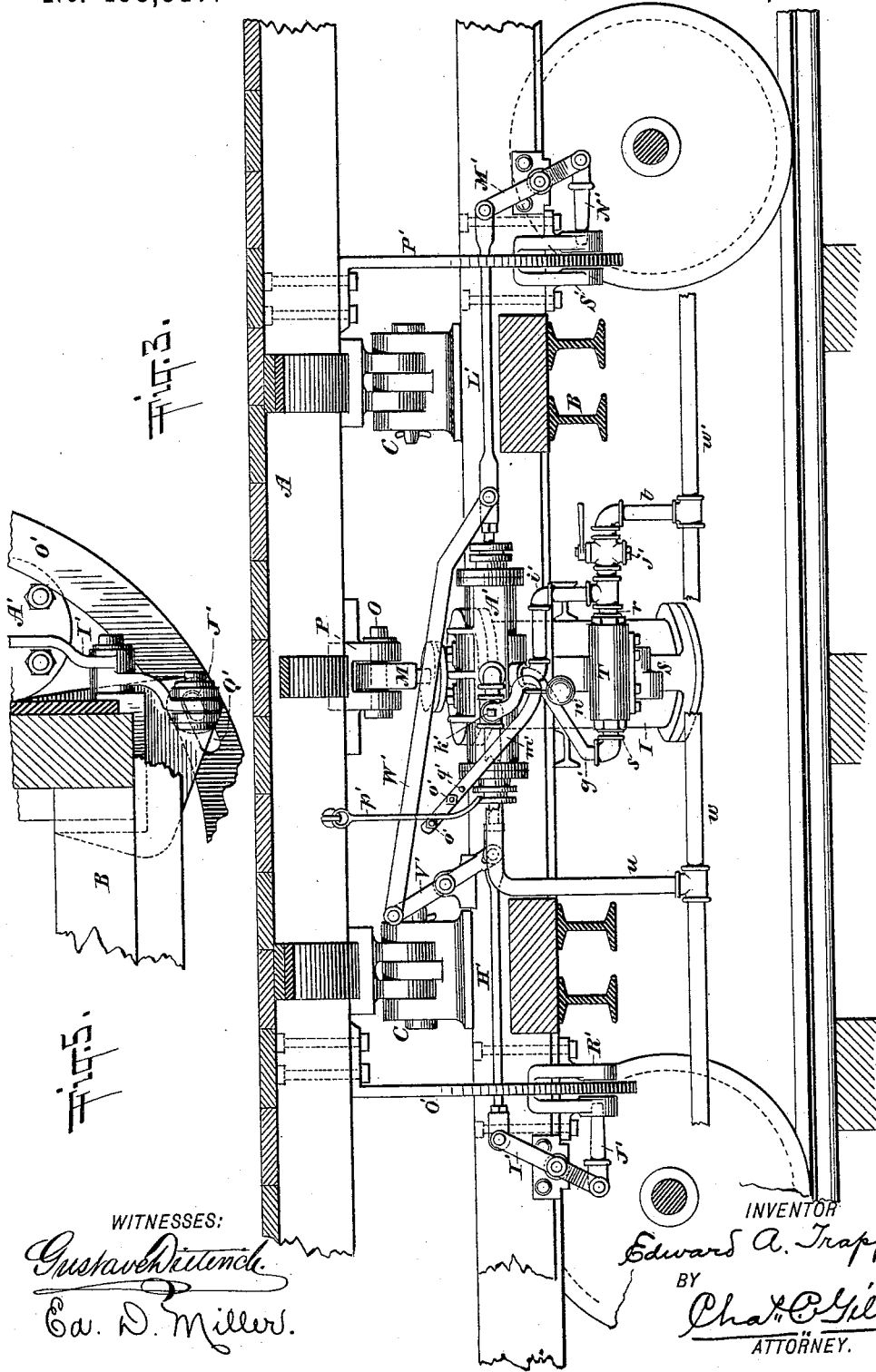
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E. A. TRAPP.
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No. 493,317.

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5 Sheets—Sheet 4.

E. A. TRAPP.
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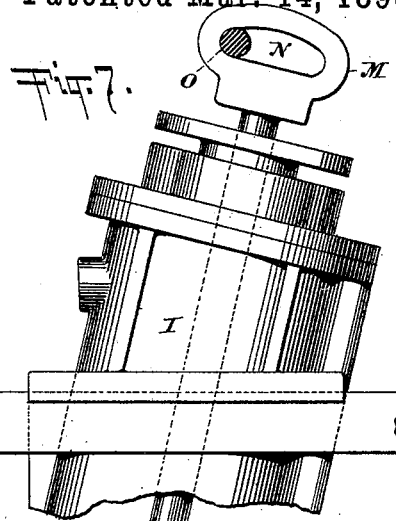
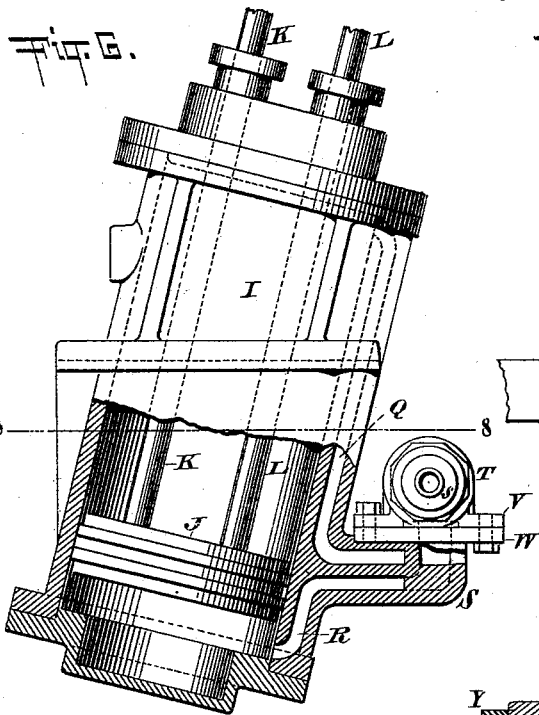


Fig. 8.

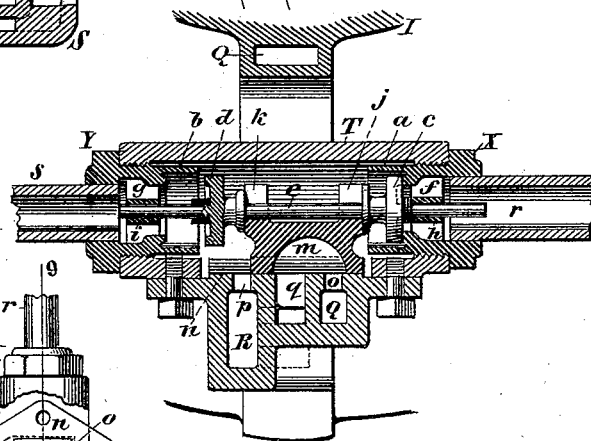
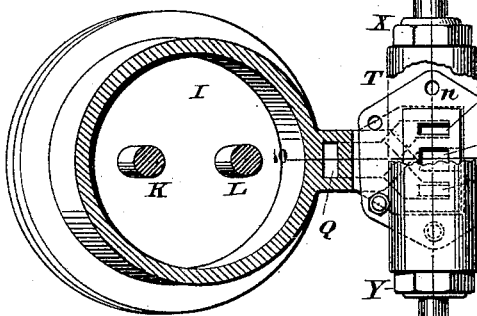
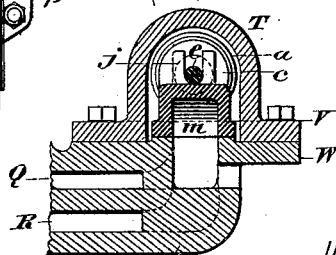


Fig. 10.



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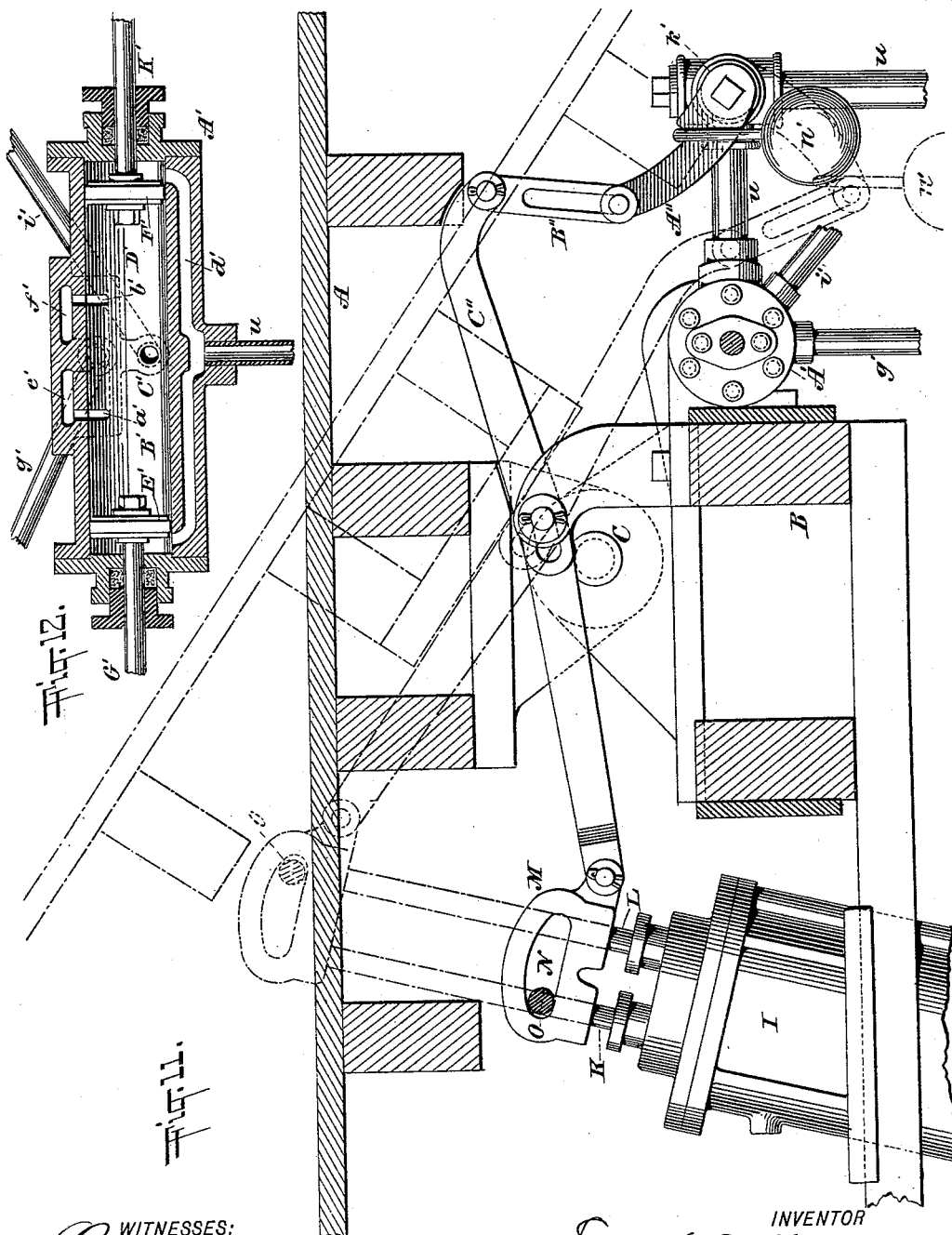
(No Model.)

5 Sheets—Sheet 5.

E. A. TRAPP.
DUMPING CAR.

No. 493,317.

Patented Mar. 14, 1893.



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UNITED STATES PATENT OFFICE.

EDWARD A. TRAPP, OF PATERSON, NEW JERSEY.

DUMPING-CAR.

SPECIFICATION forming part of Letters Patent No. 493,317, dated March 14, 1893.

Application filed December 27, 1892. Serial No. 456,498. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. TRAPP, a citizen of the United States, and a resident of Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Dumping-Cars, of which the following is a specification.

The invention relates to improvements in dumping cars of the class in which the tilting car body is operated by compressed air, and pertains especially to the dumping cylinder and its connections with the car body, the latch cylinder having a special arrangement of ports and connected with means for locking the car body in its horizontal position, the operating valve intermediate the latch cylinder, and dumping cylinder, and an automatic cut-off valve in the pipe supplying the latch cylinder and adapted to be actuated by a moving part of the car or its connections to cut off the supply of air after the piston in the dumping cylinder has completed a portion of its stroke, all as hereinafter more specifically described and pointed out in the claims.

Referring to the accompanying drawings which illustrate a car constructed in accordance with and embodying the invention:—Figure 1 is a top view of a portion of the truck of same, and illustrating in a practically detached view, partly broken away and partly in section, the compressed air apparatus by which the tilting car body is operated. Fig. 2 is a vertical transverse section of same on the dotted line 2—2 of Fig. 1, and illustrating by full lines the car body in its horizontal position, and by dotted lines the position said body assumes when tilted to dump its load. Fig. 3 is a vertical longitudinal section through the car body and truck and illustrating in side elevation the compressed air connections and apparatus which constitute the essential features of the invention. Fig. 4 is an enlarged detached side elevation of a portion of the mechanism for locking the car body in its horizontal position, this figure representing the locking devices in position securing the car body, while in Fig. 3 the said devices are shown in their outward positions releasing the car body. Fig. 5 is an enlarged detached vertical section of a portion of the truck, and partly broken away, showing in end elevation the said devices for locking the car body in

its horizontal position. Fig. 6 is an enlarged detached side elevation, partly in section, of the dumping cylinder. Fig. 7 is an enlarged detached side elevation, partly broken away, of a modified form of said dumping cylinder. Fig. 8 is a horizontal section through the dumping cylinder on the line 8—8 of Fig. 6, and showing one half of the operating slide valve cylinder removed to disclose the ports. Fig. 9 is an enlarged vertical longitudinal section of the operating valve cylinder on the dotted line 9—9 of Fig. 8, and illustrating a portion of the side of the dumping cylinder. Fig. 10 is a vertical transverse section, on the dotted line 10—10 of Fig. 8, of the operating valve cylinder with the extension containing the ports leading to the dumping cylinder. Fig. 11 is a vertical transverse section through the car and illustrating in elevation the compressed air mechanism by which the car body may be operated, this figure representing on an enlarged scale a modified arrangement of connecting devices for cutting off the compressed air from the main supply pipe after the piston in the dumping cylinder has completed a portion of its stroke; and Fig. 12 is a central longitudinal section through the latch cylinder and showing a slightly different arrangement of the ports from that illustrated in Fig. 1.

In the drawings, referring particularly to Figs. 2 and 3, A designates the car body and B the truck frame; and, as will be observed, the car body is pivotally mounted upon the said frame by means of bearings C, C, which permit the car body to tilt to one side, to the position indicated by dotted lines in Fig. 2, for the purpose of discharging its contents.

The car body A may be of any desirable form and construction, and in itself forms no essential part of the invention sought to be protected hereby. It will be found essential, however, to provide one side of the said car body with a hinged door D, and locking device E, in order that when the car body is tilted to one side, as indicated, the latch or locking device E will be freed and the door D will swing outward to the position indicated by dotted lines in Fig. 2, and permit the contents of the car to escape. Upon the return of the car body A to its normal or horizontal position, indicated by solid lines, the door D

will swing inward on its support and close the car, the latch E, at such time automatically locking the door in its closed position. The truck frame B will be provided at one side
5 with the coiled spring F to receive the first contact of the car body when tilted, and upon the opposite side of the truck frame will be provided the elevated frame G, having a coiled spring H, to receive the opposite side of the car body when the latter is returned to its
10 horizontal position, as illustrated in Fig. 2.

The truck frame B does not in itself form any important feature of the invention sought to be protected hereby, and it is sufficient that
15 said frame be of suitable construction to support the car body A and the compressed air apparatus by which the car body is locked in its horizontal position or freed preparatory to its being tilted by means of the dumping
20 cylinder and its connections.

The dumping cylinder, lettered I, is supported by the truck frame B at one side of its longitudinal center, and at a suitable inclination to permit it to conveniently and
25 properly tilt the car body A. The cylinder I contains a customary piston J and this is provided with two piston rods lettered K, L, respectively, which pass upward through suitable glands in the head of the cylinder I and carry the head M which, as illustrated in Figs.
30 2, 7 and 11, is provided with an elongated slot or opening N adapted to loosely receive the horizontal pin O connected by means of a casting P with the car body. The pin O represents a connection between the car body
35 and the dumping cylinder and the purpose of the head M and elongated slot or opening N is, as illustrated in Fig. 2, to permit the piston rods K, L, to have a direct reciprocating movement under the action of the compressed air in the dumping cylinder I while the car body A has a pivotal movement carrying the pin O on the arc of a circle. It is
45 important in this class of cars that the parts be rigid and firmly secured and to this end I have provided means by which the dumping cylinder may be rigidly secured to the truck frame B and the rods K, L, have a direct reciprocating movement in said cylinder, and
50 in order that the cylinder I and rods K, L, may thus be rigidly secured, and the car body A have a positive tilting movement on the centrally placed pivots, I provide the head M, having the elongated slot or opening N. As
55 will be observed, by reference to Fig. 2, the pin O connecting the dumping cylinder and car body is at the left hand end of the elongated slot or opening N when the car body is in its horizontal position, and when during
60 the use of the car the said rods K, L, are driven upward and the car body tilted to one side, the pin O will travel to the right hand end of the said elongated slot or opening N, the length of the travel of the pin O in the said slot N being sufficient to permit the car
65 body to have its tilting movement without strain on the piston rods.

While I prefer for the purpose of securing great strength and durability to employ two piston rods K, L, as illustrated in Fig. 6, I do
70 not confine the invention to the employment of both of these rods, since, as illustrated in Fig. 7, but one rod need be used, and this rod will have upon its upper end a head M similar to that employed upon the upper end of
75 the rods K, L, as illustrated in Figs. 2 and 7. The operation of the head M secured upon one rod, as illustrated in Fig. 7, is exactly the same as that which is secured upon the rods K, L, shown in Fig. 6, but, where the two rods
80 are employed increased strength and durability are secured.

The dumping cylinder I is provided on one side with the ports lettered Q, R, respectively,
85 the former leading to the upper end of the cylinder and the latter to the lower end thereof, the purpose of the ports R being to admit the compressed air below the piston J for the purpose of moving it and the rods K, L, upward, to tilt the car body A, and the purpose of the
90 port Q being to thereafter admit the compressed air above the piston J at the upper end of said cylinder, for the purpose of returning the same and rods K, L, to their lower positions and pulling the tilted car body to its
95 former horizontal position shown by full lines in Fig. 2. Upon an extension S passing outward from the side of the dumping cylinder I is secured the operating valve cylinder T, the latter having at its lower side the plate V,
100 which is bolted to the corresponding base plate W for the purpose of firmly securing the valve cylinder in place. The valve cylinder T has screwed into its opposite ends the heads X, Y, which, as illustrated more
105 clearly in Fig. 9, have upon their inner ends the short cylinders *a, b*, extending into the cylinder T and receiving the pistons *c, d*, mounted upon a rod *e* arranged longitudinally within the said cylinder T. At the
110 outer ends of the short cylinders *a, b*, are formed the valve seats *f, g*, adapted to receive the outer edges of the pistons *c, d*. The heads X, Y, contain in them the guides *h, i*, for the rod *e*, said guides loosely receiving said rod at its ends and being intended
115 to direct the same during its reciprocating movement under the action of the compressed air. The location of the pistons *c, d*, on the rod *e* is such that when, for example, the piston
120 *c* is in contact with its seat *f*, the opposite piston *d* will be freed from contact with its seat *g* and have passed from within the short cylinder *b*, as illustrated in Fig. 9, and that when the piston *d* during the opposite
125 movement of the rod *e* is in contact with its seat *g* the piston *c* will be free of its seat *f* and have passed entirely from its short cylinder *a*. Upon the rod *e* and between the pistons *c, d*, are the upwardly extending bifurcated arms *j, k*, of the operating slide
130 valve *m*. The valve *m* has a sliding or reciprocating movement on its seat *n*, through which pass the ports lettered *o, p, q*, these

ports being respectively the inlet ports for the upper and lower ends of the dumping cylinder and the exhaust port by which when the air is admitted to one end of the said dumping cylinder the air that may be at the other end thereof may freely exhaust. The port R leading to the lower end of the dumping cylinder I passes through the extension S and, as indicated by dotted lines in Fig. 9, turns to one side and terminates in the port *p* while the port Q leading from the upper end of the dumping cylinder I also extends along the extension S and turns to one side, as indicated by dotted lines to terminate in the port *o*; the port *q* represents the exhaust and is centrally between the ports *o* and *p* and opens to the atmosphere, as shown in Fig. 10. The heads X, Y, located at the ends of the valve cylinder T receive the ends of the pipes *r*, *s*, which, as illustrated in Fig. 1, connect with the branch pipes *t*, *g*'.

The main pipe lines are lettered *w* and *w*', and extend along each car composing the train. The main pipes *w*, *w*' will be connected with the compressed air apparatus provided on the engine, and this apparatus will be under the direct control of the engineer who may by turning a valve direct the compressed air current into either of the said pipe lines for the purpose of tilting the car body and then returning it to its horizontal position.

The latch cylinder is lettered A' and its interior construction is illustrated more clearly in Fig. 1. Within the latch cylinder A' are formed substantially three cylinders, lettered respectively B', C', D', and within these cylinders the piston heads E' and F' have a reciprocating movement toward and from each other under the action of the compressed air, which enters said latch cylinder to free the car body prior to its entrance to the dumping cylinder by which the car body is tilted to discharge its load. The piston head E' is secured to its rod G' and through the rod H' is connected with a rocking lever I' carrying at its lower end the locking pin J'; and the piston head F' is, through its rod K' and connecting rod L', connected with the upper end of the rocking lever M', carrying at its lower end the locking pin N'. As stated above, the piston heads E' and F' have a reciprocating movement toward and from each other and the effect of this movement is through the connecting rods above referred to to draw the upper ends of the rocking levers I', M', toward each other and thus throw the pins J', N', outward, as indicated in Fig. 2, or, when said pistons E', F', move outward from each other, to force the upper ends of the rocking levers I' and M' outward from each other and reciprocate the locking pins J', N' inward toward each other. In Fig. 3 the relation of the connecting rods H', L', rocking levers I', M', and locking pins J', N', is such as they would be given by the inward movement toward each other of the piston heads E', F',

shown in Fig. 1; while the reverse or outward movement of the said heads E', F', would simultaneously alter the relations of the rods H', L', and levers I', M', to an opposite position and throw the pins J', N', inward to the position indicated in Fig. 4. When the locking pins J', N', are in their outer positions, as shown in Fig. 3, the car body is left free to be tilted under the action of the dumping cylinder, and when the said locking pins J', N', are at their inward positions, illustrated in Fig. 4, the car body A will be locked in its horizontal position. To the lower side of the car body A are secured the curved bars O', P', having at one side of their center, as illustrated in Fig. 5, an elongated slot Q', adapted to receive the ends of the pins J', N', when the latter are forced inward. Upon the truck frame B are bolted the bifurcated castings R', S', between whose arms the said curved bars O', P', move during the tilting of the car body, and these castings R', S', are provided with through apertures T', in which the locking pins J', N', may have their reciprocating movement, and in which the said pins while locking the car body are sustained at both ends. The apertures Q' are elongated in order that the ends of the pins J', N', may freely pass through them, and to insure a readiness in the ends of the said pins to engage the said bars O', P', without danger at any time of failure. The connecting rods H', L', are themselves connected by the equalizing levers or rods V', W', as indicated in Fig. 3, the purpose of these rods or levers being to insure a positive simultaneous motion in the rods H', L' and their connecting locking devices at the opposite ends of the car. If for any reason there should be any tendency in the piston heads E', F', to advance or move one ahead of the other, or to have any irregular movement, the rods or levers V', W', will effectually correct the same, and insure the simultaneous outward movement or inward thrust of the locking pins J', N'.

As above described, the interior of the latch cylinder A' is composed of or sub-divided into three cylinders B', C', D', the division being caused by the annular ports *a*', *b*', as shown more clearly in Fig. 1. When the pistons E', F', are at their inner positions, they will, as illustrated in Fig. 1, both be within the cylinder C' and uncover the ports *a*', *b*'. Upon one side of the latch cylinder A' is provided the port *d*', which is connected with the air pipe *u* and leads into the opposite ends of the cylinder A'. The air entering the port *d*', from the pipe *u*, passes into the opposite ends of the cylinder A' and drives the pistons E', F', toward each other and into the cylinder C', thus, as above described, freeing the pins J', N', from the curved bars O', P', preparatory to the car body being tilted. As soon as the pistons E', F', have been driven inward into the cylinder C', as shown in Fig. 1, the air passing from the supply pipe *w*, branch *u* and port *d*' into the opposite ends of the cyl-

inder A', escapes through the annular ports
 a', b', into the annular coves e', f', and thence
 into the air pipe g' which, as shown by dotted
 lines in Fig. 1, connects with the said coves and
 passes thence to the pipe s, leading into one
 end of the operating slide valve cylinder T.
 Upon the air entering the slide valve cylinder
 T from the pipe s it will act upon the piston d
 and move it and the rod e with its head c and
 valve m to the left, as illustrated in Fig. 9,
 thereby causing the valve m to uncover the
 port p, through which the air passes into the
 port R, and thence into the lower end of the
 dumping cylinder I, the effect being that the
 air passing into the lower end of the cylinder
 I will move the piston J, with its rods K, L,
 upward and tilt the car body A, while at the
 same time such air as may have been in the
 upper end of the cylinder I, will exhaust
 downward through the port Q, and thence up-
 ward through the port o, and downward
 into the port q, which is the exhaust port for
 the slide valve cylinder T. It will thus be
 plain that the air passing along the supply
 pipe w, which leads to the various cars com-
 posing the train will ascend through the
 branch pipes u of each car, and pass thence
 through the port d', into the opposite ends of
 the cylinder A', driving the pistons E', F', in-
 ward toward each other and releasing the
 locking pins J', N', whereupon the com-
 pressed air will immediately pass through the
 annular ports a', b' into the coves e', f' and
 pipes g', s, whence it passes into the end of
 the cylinder T, and moves the valve m to a
 sufficient extent to permit it, the said com-
 pressed air, to pass into the lower end of the
 dumping cylinder I, for the purpose of rais-
 ing the piston J, and its rods K, L, to tilt the
 car body. After the car body has remained
 in its tilted position long enough for its con-
 tents to have passed therefrom, it is returned
 to its horizontal position by means of the com-
 pressed air, which at such times will be turned
 into the other main pipe line w', whence the
 said air will ascend through the branch pipe t
 and pass into the pipe r, and branch pipe i',
 that portion of the air entering the pipe r hav-
 ing the effect of driving the pistons c, d, and
 valve m, to the opposite position to that shown
 in Fig. 9, whereby the port o, is uncovered to
 the direct action of the air from the pipe r,
 and the ports q, p, are connected by the valve
 m, thus the air is permitted to pass from the
 pipe r downward through the port o into the
 port Q and thence upward through the port Q
 into the upper end of the cylinder I, where it
 will act upon the piston J, and drive the same
 downward and return the car body to its nor-
 mal or horizontal position, the air at the lower
 side of the piston J in the meantime being
 permitted to exhaust upward through the
 ports R, p, and downward through the regu-
 lar exhaust port q. During the action of the
 air passing through the pipe r, to return the
 car body to its former horizontal position, the
 air also passes through the pipe i' into the

middle of the cylinder C' (see Fig. 1) and
 drives the pistons E', F', outward from each
 other toward the opposite ends of the latch
 cylinder A', whereby the locking pins J', N',
 are moved inward toward each other and
 against the bars O', P' preparatory to said
 pins shooting through the elongated aper-
 tures Q' in said bars O', P', as soon as the
 latter have moved sufficiently for the said
 apertures to come into line with said pins.

The slide valve cylinder T is of novel con-
 struction and forms a part of the invention
 sought to be protected hereby, and while its
 general operation will be understood from the
 foregoing description, it should be noted that
 the pistons c, d, have a definite movement in
 the short cylinders a, b, prior to the air being
 permitted to reach the ports leading from said
 cylinder T to the dumping cylinder I. It will
 be observed upon reference to Fig. 9, that if
 the air is permitted to enter the pipe r, it will
 first act on the piston c and move the same
 along the short cylinder a a definite distance
 before it can completely enter the interior por-
 tions of the said cylinder T and the purpose
 of this arrangement is to enable the piston c
 and rod e to move the valve m from over the
 port o and cover the port p, prior to the main
 body of the air being able to enter the cylin-
 der. After the valve c, for instance, moves to
 the inner edge of the short cylinder a, the
 valve m will by that period have uncovered
 the port o and connected the ports p, q, where-
 upon, upon the further movement of the pis-
 ton c beyond the inner edge of the short cyl-
 inder a, the main body of the air under its
 full pressure, may pass through the port o,
 and into the port Q, for the purpose above de-
 scribed. The short cylinders a, b, provided
 in the ends of the operating valve cylinder T,
 thus prevent the main body of the air from
 entering the cylinder T prior to the time when
 the ports leading therefrom or thereto are
 properly covered or uncovered by the slide
 valve m. The air entering through the pipes
 r, s, thus first effects the proper placing of the
 valve m with relation to the ports and then
 fully enters the cylinder T and passes through
 the uncovered port leading therefrom to the
 dumping cylinder I. From the foregoing de-
 scription it will be observed that there are
 two main pipe lines w, w', and that when it
 is desired to tilt the car body to discharge its
 load, the engineer in his cab will turn the com-
 pressed air into the main pipe line w, leading
 to all the cars of the train, and that the air
 from the main pipe line w, will ascend through
 the branch pipe u of each car of the train and
 thence pass into the opposite ends of the latch
 cylinder A', and drive the piston valves E',
 F', inward to unlock or free the car body,
 whereupon the air will continue its course
 through the ports a', b', pipe g' and pipes s,
 into the end of the slide valve cylinder T, whence
 it will uncover the port p and connect the
 ports o, q, thus allowing the air to pass through
 the port R, into the lower end of the cylinder I,

for the purpose of elevating the piston J, and tilting the car body, while the air above said piston J is exhausting through the port Q, port o, port q, and that after the car body has discharged its contents the air is turned into the pipe *w'*, which also leads to all the cars of the train and conducts the air to the branch pipes *t* of each car, whence the air passes into the pipes *r* and *i'* that passing into the pipes *r* entering the cylinder T, and returning the valve *m* to its former position, uncovering the port o, and connecting the ports q, p, the effect being that the body of the air will pass through the port o, into the port Q and drive the piston downward to return the car body to its normal or horizontal position; while at the same time the air from the pipe *t* which enters the pipe *i'* and cylinder A', drives the pistons E', F', to the outer opposite ends of the latch cylinder A', and throws the locking pins J', N', inward to lock the car body in its horizontal position.

It is obvious that by means of valves *j'*, *k'*, of any suitable construction placed in the branch pipes leading from the main supply pipes *w*, and *w'*, any one or more cars of the train may be cut off from connection with the compressed air and hence, as a matter of illustration, if every alternate car of the train had its valves *j'*, *k'*, turned to close the branch pipes the air would pass through the main supply pipes *w*, *w'*, and leave said alternate cars unaffected, while the remaining cars of the train would be subjected to the force of the air and their car bodies would be tilted to dump their loads and be then returned to their horizontal position in the manner above described.

I have described above the full equipment of apparatus which may be used in connection with compressed air for locking the car body in its horizontal position, unlocking the same, preparatory to its being tilted, tilting the car body, and controlling the action of the air, and in addition to the above equipment of the compressed air apparatus, I provide means for the economical use of the air, and to this end I provide in the pipe *u*, leading from the main supply pipe *w*, the automatic cut-off valve *k'*, which is operated by mechanism intermediate the stem of said valve and a moving part of the car or its body. The object of the valve *k'* is to cut off the supply as soon as sufficient air has passed into and through the latch cylinder A' to effect the elevation of the piston J, and the tilting of the car body. One form of mechanism for operating the valve *k'* is illustrated in Fig. 3, and a further form therefor is illustrated in Fig. 11. In Fig. 3 it will be observed that the stem of the valve *k'* has secured upon it the lever *m'* which is bowed at its lower portion and supports the weight *n'*, the latter carrying the loop which straddles the lever *m'*, and is adapted to slide thereon. The upper end of the lever *m'* is provided with the removable transverse pins *o'* passing through

apertures in the said lever, and serving to retain the upper end of the lever between the opposite sides on the suspending rod *p'*, secured to the car body, as illustrated more clearly in Figs. 2 and 3. When the car body is in its horizontal position, as illustrated by solid lines in Figs. 2 and 3, the lever *m'*, will be in the position shown, the counter-balance weight *n'* being at its lower bowed end while its upper portion is held in an elevated position by the rod *p'*, and, at such time the valve *k'*, is fully opened to permit the passage of the air from the pipe *w* and pipe *u*, into the latch cylinder A'; but when the car body is being tilted downward to the position illustrated by dotted lines in Fig. 2, the rod *p'* will depress the lever *m'* and cause the same to close the valve *k'*, thus shutting off at the proper time the air from the latch cylinder A'. During the first portion of the tilting movement of the car body the lever *m'* will remain unaffected by reason of the fact that the opening between the opposite sides of the lower portion of the rod *p'* allows a certain downward movement in the car body before the pressure comes upon the upper end of the lever *m'* to depress the same, and hence the valve *k'* is not closed immediately upon the car body starting to tilt, but only after it has moved downward a definite distance and sufficient air has entered the dumping cylinder I to, by its expansion, complete the operation of tilting the car body. When the car body has been tilted and the lever *m'* turned downward, the weight *n'* will slide along the main body of the lever *m'* and come into contact with the abutting lugs *q'*, where it will rest and retain the lever *m'* in its downward position and the valve *k'* in its closed position. After the contents of the car body have been discharged, and the air is admitted to the main supply pipe *w'* and its connections to move the piston J, in the dumping cylinder I, downward, and the car body A to its horizontal position, the movement of the car body will draw the rod *p'* upward and through said rod elevate the outer portion of the lever *m'*, and thus cause the weight *n'* to slide backward to its former position, as shown in Fig. 3, and the valve *k'* to open. The valve *k'* is thus an automatic cut-off valve operated by connections intermediate its stem, and some moving part of the car, and this valve is useful in that it cuts off the air from the latch cylinder A', as soon as simply enough of the air has been admitted to the dumping cylinder to effect the tilting of the car body. The particular point in the movement of the car body or of the piston J in the dumping cylinder I at which the air should be cut off from the latch cylinder A' will be determined by the character of the cars, the weight of the material and possibly the quality of air, and hence it will be unnecessary for me to give any particular moment at which the valve *k'* should close, but, under usual conditions, I would deem it proper to cut off the air after

the piston J had completed about three-fifths of its stroke. The air in the dumping cylinder I, would, after the valve *k'* had been closed, expand sufficiently to continue the movement of the piston J and car body A. By cutting off the air by means of the valve *k'* I am enabled to effect the dumping of all the cars of the train with a much smaller consumption of air than would be possible if the cut-off valves were not employed, and the cutting off of the air from each car after the piston J has completed a portion of its stroke enables me with a given quantity of air, much less than would be required if the valve *k'* were omitted, to effectually and positively dump all the cars of the train.

When any one of the cars is to be cut off from the action of the compressed air altogether the valves *j'*, *k'* as above described, are entirely closed, and at such time I withdraw the pins *o'* and permit the lever *m'* to hang downward with the weight *n'* upon it and free of the rod *p'*.

In Fig. 11 is shown a modified arrangement of levers for operating the cut-off valve *k'*, and in this figure it will be observed that the stem of the valve *k'* carries an arm *A''* which, by means of a slotted link *B''* is connected with one end of the rocking lever *C''*, whose other end is pivoted to the head M secured on the piston rods of the dumping cylinder. In the arrangement of devices presented in Fig. 11 the valve *k'* is operated at the proper time by the moving head M, instead of by means of devices directly connected with the car body. It will be understood therefore that the invention is not confined to any particular arrangement of levers connected with the cut off valve *k'*, nor to their connection with any particular moving part of the car. The rocking lever *C''* is slotted at its center to permit a sliding motion on its pivot, or it may be slotted at the pivot securing its end to the head M, as may be preferred; the slot at either point specified would allow the due and proper movement of the parts.

Fig. 12 illustrates a slightly modified form of latch cylinder A', the modification consisting simply in having the ports *a'*, *b'*, extended a part of the distance around the cylinder, as shown, instead of entirely around the same, as indicated in Fig. 1.

The features of the latch cylinder and cut-off valve above described are not confined to a car in which the body tilts, since they are applicable to a car having an inclined bottom and discharge doors, the latter being operated by compressed air mechanism, as described in my application for patent filed April 20, 1892, and bearing Serial No. 429,854.

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

1. The car having a pivotally mounted body, combined with the compressed air dumping cylinder secured to the truck frame, the air connections leading to both ends of said cylinder, the piston and rod within said cylinder,

and the head on the upper end of said piston rod and having the elongated opening for connection with the car body, substantially as and for the purposes set forth.

2. The car having a pivotally mounted body, combined with the compressed air dumping cylinder secured to the truck frame, the air connections leading to the upper and lower ends of said cylinder, the piston in said cylinder, the piston rods connected with said piston, and passing upward through the head of said cylinder, and the head carried on the upper ends of said rods and having the elongated opening to receive a pin connected with the car body, substantially as and for the purpose set forth.

3. The car having a pivotally mounted body, combined with the dumping cylinder secured to the truck frame and connected through its piston rod with the said body, the air connections leading to the ends of said cylinder, and an automatic cut-off valve in said air connections, and intermediate mechanism between said valve and a moving part of the car whereby the action of the latter will operate said valve to cut off the air supply at a predetermined point; substantially as and for the purposes set forth.

4. The car having the pivotally mounted body, the dumping cylinder for tilting said body and returning it to its horizontal position, the latch cylinder, pipe connections leading to the opposite ends and to the middle thereof, the pistons within said latch cylinder connected through levers with the locking devices, the ports sub-dividing said latch cylinder into three sections and the pipe leading from said ports to the dumping cylinder, the arrangement of ports being such that the pistons in the latch cylinder have a positive simultaneous movement toward and from each other under the action of the air; substantially as and for the purposes set forth.

5. The car having a pivotally mounted body, combined with dumping cylinder supported by the truck frame and having its piston rod connected with said body, the operating slide valve cylinder containing the pistons *c*, *d*, short cylinders *a*, *b*, and slide valve *m*, the ports *o*, *p*, the ports Q, R, leading respectively from said ports *o*, *p*, to the opposite ends of the cylinder I, the exhaust port *q*, and air connections leading from the main pipe line to the opposite ends of the said slide valve cylinder; substantially as set forth.

6. The car having the tilting car body, combined with the dumping cylinder supported by the truck frame and having its piston rod connected with said body, the extension S connected with the side of said cylinder, the ports Q, R, leading from the opposite ends of the said cylinder and passing through said extension, the operating slide valve cylinder mounted upon said extension and containing the ports *o*, *p*, connected with said ports Q, R, and the exhaust port *q*, the slide valve within said valve cylinder, air connections lead-

ing to the opposite ends of said valve cylinder, the pistons *c, d*, connected by a rod with the said slide valve, and means for permitting the air to first move the said slide valve sufficiently to uncover the proper port prior to the main body thereof entering the interior of said valve cylinder; substantially as set forth.

7. The car having the tilting car body, combined with the dumping cylinder having its piston rod connected with said body, and the latch cylinder containing inlets at its middle and opposite ends and outlets intermediate said inlets, the pistons in said latch cylinder and adapted to have a simultaneous motion toward and from each other, the rods *H', L'*, connected with said pistons, the rocking levers connected with the ends of said rods *H', L'*, the locking pins connected with the lower ends of said levers, and the curved bars secured to the car body and having the openings *Q'* to receive said pins; substantially as set forth.

8. The car having the tilting body, combined with the dumping cylinder whose piston rod is connected with said body, the latch cylinder containing inlets at its middle and ends and outlets intermediate said inlets, the pistons in said latch cylinder adapted to have a simultaneous motion toward and from each other, the rods connecting said pistons with the means for locking the car body in its horizontal position, and the equalizing levers connecting said rods; substantially as set forth.

9. The car having a tilting body, combined with the dumping cylinder whose piston rod is connected with said body, the latch cylinder,

air connections leading thereto and therefrom to the dumping cylinder, and a cut-off valve in the pipe leading to said latch cylinder and adapted to be operated by a moving part of the car, substantially as set forth.

10. The car having the tilting body, combined with the dumping cylinder whose piston rod is connected with said body, the latch cylinder, the operating slide valve cylinder containing the slide valve and ports, pipe connections from the main pipe line to said latch cylinder and from the latch cylinder to the slide valve cylinder, connections from the slide valve cylinder to the opposite ends of the said dumping cylinder, and the cut-off valve in the pipe supplying the latch cylinder, and adapted to be operated by a moving part of the car; substantially as set forth.

11. In a transportation car, the cylinder sub-divided into three cylinders of the same bore and having air connections at its center and opposite ends and outlets intermediate said center and ends, combined with the pistons in said cylinder and adapted to have a simultaneous movement toward and from each other, connections intermediate said pistons and an operative part of the car or its mechanism, and an automatic cut-off valve in the pipe supplying said cylinder; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 22d day of December, A. D. 1892.

EDWARD A. TRAPP.

Witnesses:

CHAS. C. GILL,
ED. D. MILLER.