

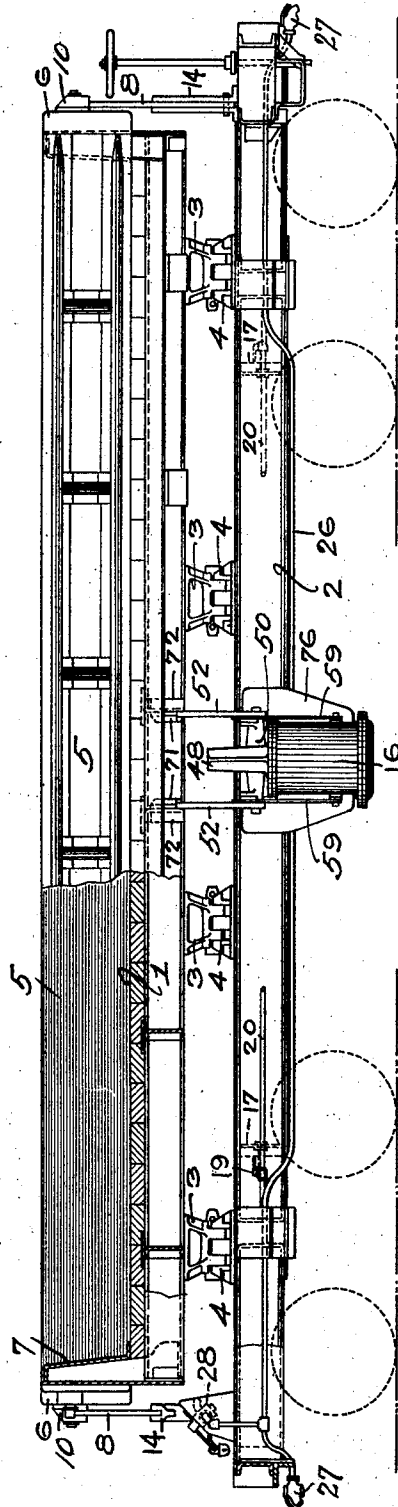
A. CHRISTIANSON.
DUMPING CAR.
APPLICATION FILED JAN. 3, 1911.

Patented May 13, 1913.

6 SHEETS—SHEET 1.

1,061,818.

FIG. 1



WITNESSES.

J. R. Keller
John F. Hill

INVENTOR.

Andrew Christianson
by Kay & Dutton, attys
by Herman Kay

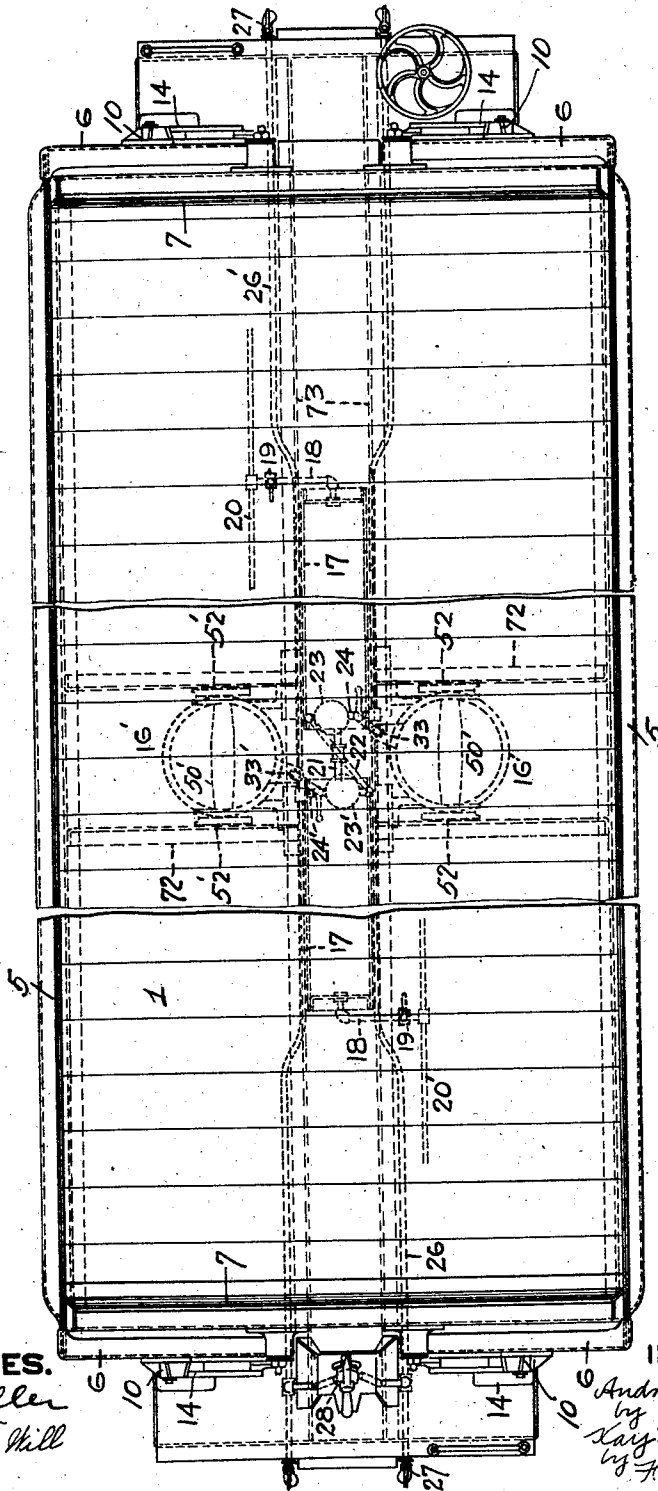
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6 SHEETS—SHEET 2.

1,061,818.

FIG. 2



WITNESSES.

J. R. Keller
John F. Hill

INVENTOR.

Andrew Christianson
by
Karg & Dotten, Attys
by
A. Warren Karg

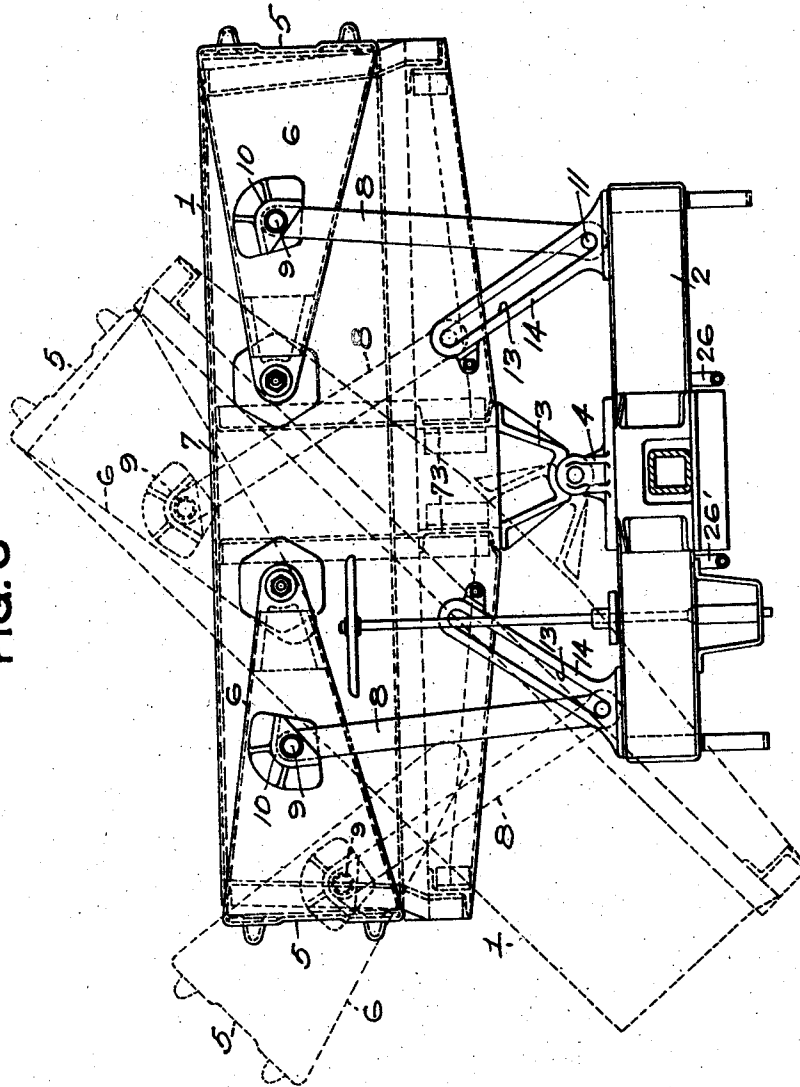
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FIG. 3



WITNESSES.
J. R. Keller
John F. Hill

INVENTOR.
Andrew Christianson
by Kay & Dotten, Attys
by F. Hansen, Kay

A. CHRISTIANSON.
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6 SHEETS—SHEET 4.

FIG. 4

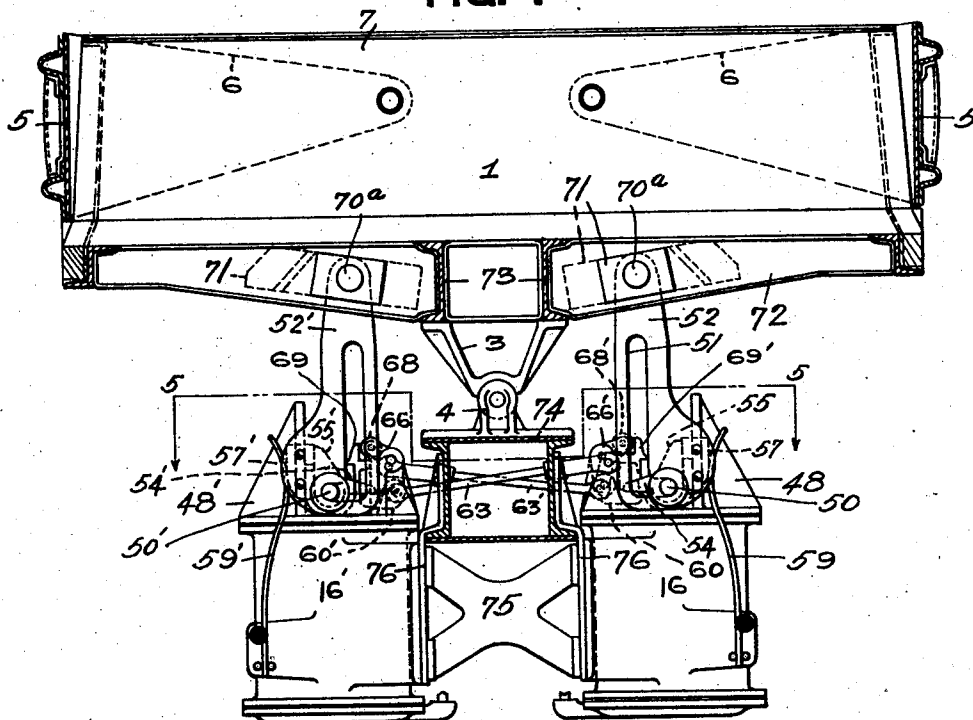
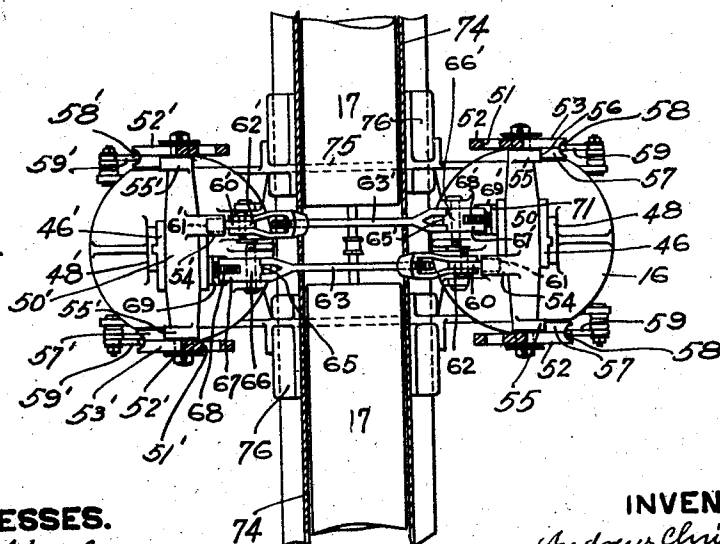


FIG. 5



WITNESSES.
J. R. Keller
John F. Hill

INVENTOR.
Andrew Christianson
by Lay & Dutton, attys
by F. H. H. Lay

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6 SHEETS—SHEET 5.

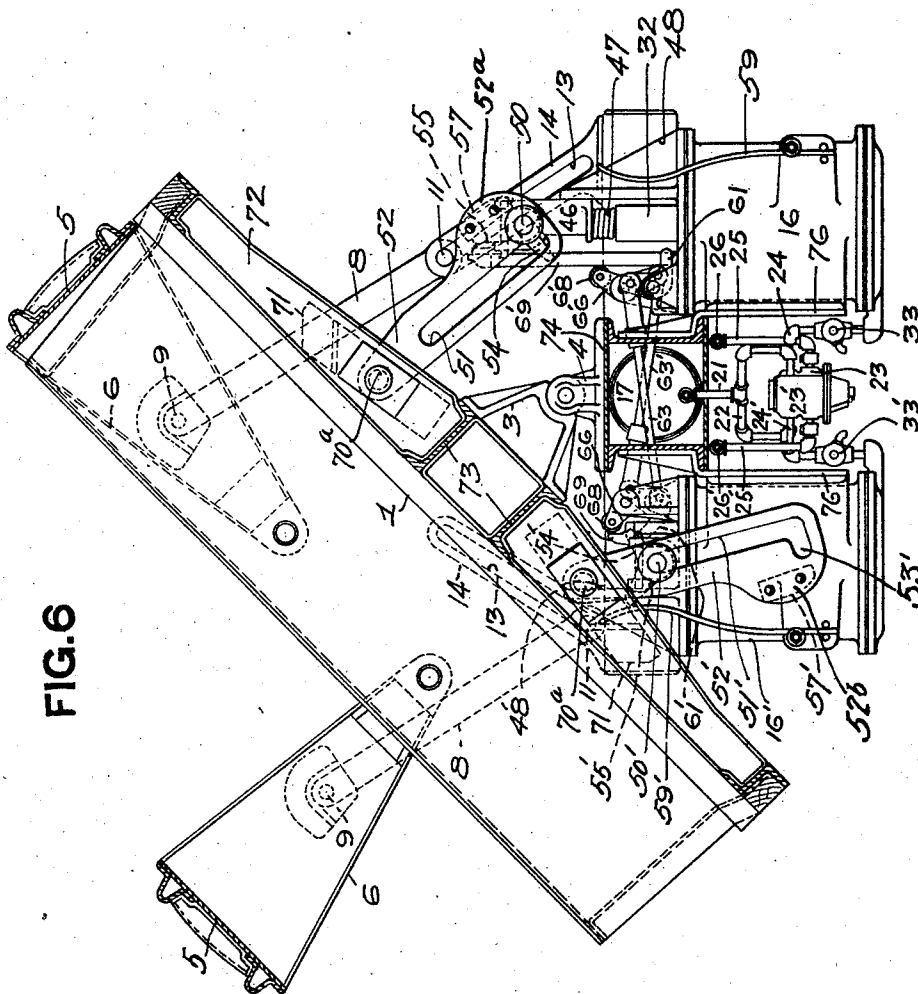


FIG. 6

WITNESSES.

J. R. Keller
John F. Hill

INVENTOR.

Andrew Christianson
by Kay & Dotten, Attys
W. Warren Kay

A. CHRISTIANSON.
DUMPING CAR.
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6 SHEETS-SHEET 6.

FIG. 7

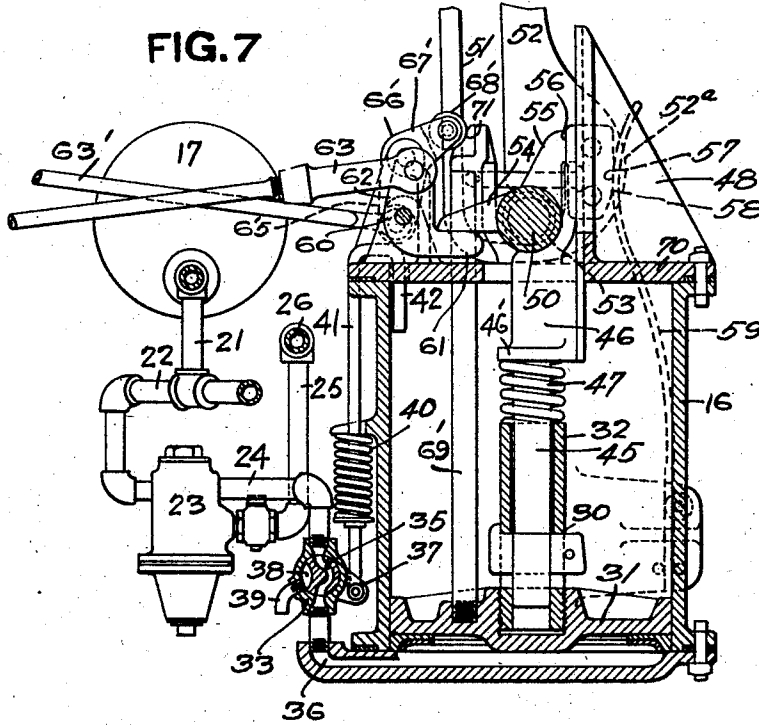
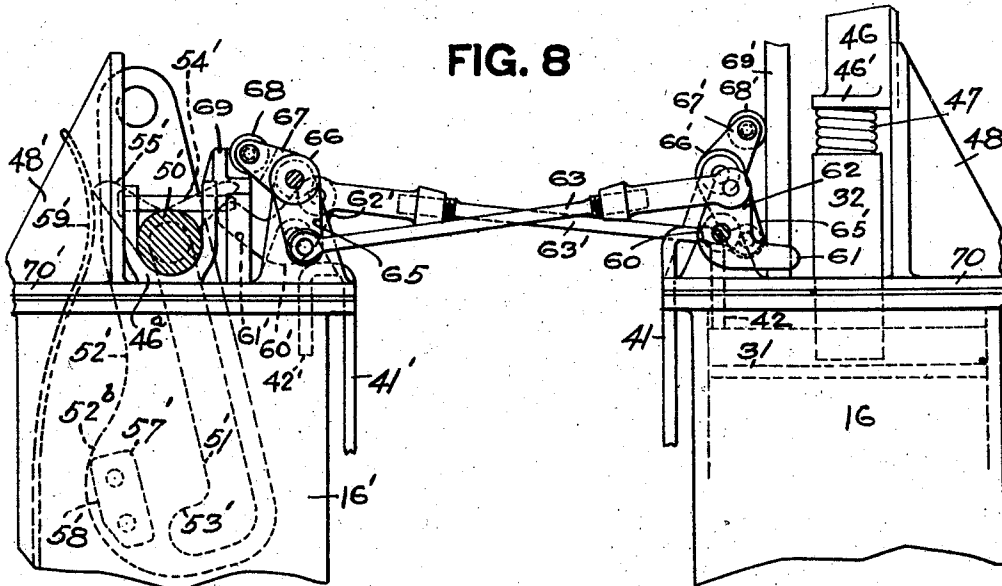


FIG. 8



WITNESSES.

J. R. Keller
John F. Hill

INVENTOR.

Andrew Christianson
by Kay & Satten, attys
by F. H. Hays

UNITED STATES PATENT OFFICE.

ANDREW CHRISTIANSON, OF BUTLER, PENNSYLVANIA, ASSIGNOR TO STANDARD STEEL CAR COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DUMPING-CAR.

1,061,818.

Specification of Letters Patent.

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Application filed January 3, 1911. Serial No. 600,563.

To all whom it may concern:

Be it known that I, ANDREW CHRISTIANSON; a resident of Butler, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Dumping-Cars; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to dumping cars and particularly that class of such cars which employ tilting bodies and displaceable sides. Its object is to provide an improved dumping car having simple and improved means for raising the displaceable sides or doors when the box or body is tilted, and more especially having an improved arrangement and construction of body tilting mechanism including fluid pressure cylinders; and to provide an improved fluid pressure system carried on each car of a train and adapted to both dump the tilting box and return it automatically to normal position, the said system being set in action either on each individual car, or collectively in the cars of a train from a single point, such as the engine.

To these ends my invention contemplates, generally, a tilting box or body of any desired type carried pivotally on the trucks or preferably on a truck frame extending between the wheels at the opposite ends of the car, and displaceable side members which are pivotally carried on the ends of the box or body by an arm pivoted thereto, each arm being raised in dumping by a link pivoted to the arm and supported upon the truck frame, the link on the opposite side of the car being guided upwardly by a pin in a slotted bracket attached to the truck frame.

My invention also contemplates, generally, a box tilting device comprising fluid pressure cylinders oppositely disposed on the truck frame, supporting and dumping arms pivoted to the car body above the cylinders and each provided with engaging means comprising preferably a slot having an off-set near its lower end, and a pin or like element carried by the piston and playing in said slot to tilt the box toward the opposite side when the pin is positioned in the off-set by suitable means, or to allow for tilting toward the same side by the opposite cylinder when the dumping arm is moved by suitable means hereinafter de-

scribed to permit of the pin traveling upwardly in the slot.

My invention also comprises, generally, such improved means connecting each of the pistons to the supporting and dumping mechanism carried by the opposite piston and adapted to be actuated to release the said opposite dumping mechanism to permit of the dumping toward the opposite side.

My invention also contemplates an improved fluid pressure system for actuating the cylinders and novel mechanism cooperating therewith by which the pistons are automatically returned to initial or lowered position when the box is dumped. This arrangement or construction includes preferably an air reservoir carried on the car, and adapted to be maintained at the required pressure automatically by a check valve controlling a connection with the train air-brake pipe, an auxiliary train air-pipe, a triple valve connected to and operated by the same, and a connection leading from said air reservoir to the cylinder, and controlled by said triple valve, being set in action when it is desired to dump the car toward the opposite side, and another valve controlling said connection and automatically actuated by the piston when the dumping movement is completed to exhaust the air beneath the piston, the said valve being automatically moved to restore the connection between the triple valve and the cylinder when the piston returns to normal position.

In the accompanying drawings illustrating one embodiment of my invention, Figure 1 is a side elevation of a railroad car partly in section illustrating diagrammatically my invention as applied thereto. Fig. 2 is a plan view of the same. Fig. 3 is an end view illustrating the car side raising mechanism. Fig. 4 is a vertical section taken near the center of the car and illustrating the dumping mechanism in normal position. Fig. 5 is a transverse section looking downwardly on the line 5-5 Fig. 4. Fig. 6 is a view similar to Fig. 4 illustrating the position of the dumping mechanism when the tilting body is in dumping position. Fig. 7 is a detail view on an enlarged scale, partly in vertical section, of a fluid pressure cylinder and its connections, and Fig. 8 is a like view illustrating the

connecting and releasing mechanism extending across the car between two cylinders.

5 The car illustrated is provided with the body or box 1 centrally pivoted on the truck frame 2 by means of the pivot brackets 3 attached to the car body 1 and the like brackets 4 carried by the truck frame 2.

10 My invention in a number of its essential features is applicable to cars of widely varying types and it will be understood that much of the showing in the accompanying drawings is diagrammatic merely; and that the construction of car, its method of pivoting, and the device for raising the displaceable sides can be varied widely or at will without in any manner affecting the automatic and improved means employed for tilting the body.

20 The displaceable side members 5 extend lengthwise of the car body 1 at its side and are carried on brackets or arms 6 pivotally mounted on each end 7 of the car box 1. The arms 6 are preferably in the form of brackets of V-shape and rigidly carrying each car side or door 5, although any other form of arm may be employed if desired. Each arm 6 is pivoted to a link 8, the pivot 9 preferably being reinforced by a pocket piece 10 on the bracket 6. The link 8 is arranged to extend in a nearly vertical direction to the truck frame 2, so that when the car body is in normal horizontal position the link 8 will just fail to bear upon the said truck frame or any part rigid therewith, and thereby tend to raise the door or side 5. Each link 8 is provided at its lower end with a pin 11 which plays in the slot 13 of the bracket 14 rigidly attached to the truck frame 2 and extending upwardly at an inward incline therefrom to act as a guide for the link 8 and permit the dumping of the box toward the opposite side in each case. Thus, as illustrated in dotted lines in Fig. 3, 45 when the tilting body is turned over by the dumping mechanism to be hereinafter described, the link 8 on the side raised assumes the position illustrated in dotted lines to the right of the center of Fig. 3 or in Fig. 6. The lower end of the link 8 on the side depressed cannot move downwardly owing to its engagement with the end of the slot in the bracket 14, but is free to pivot about said end in said slot, and 55 acts to raise the side member 5 as illustrated in said figure, so as to permit of the dumping action. When the car body is returned to position the displaced car side is allowed to return to normal position, the link 8 and inclined bracket guide 14 tending to some extent to hold the sides in place against accidental displacement; although these parts perform no function whatever in maintaining the car body in alinement.

65 The dumping cylinders 16 and 16' are

preferably positioned at or near the middle of the car as illustrated in Figs. 1 and 2 and disposed oppositely to each other, although it will be understood that a greater number of cylinders than the two illustrated might be employed if necessary, and that their relative position could be varied to some extent without in any manner affecting the spirit of my invention. The dumping cylinders 16 and 16' are actuated from a fluid pressure reservoir 17 carried preferably on the middle of the truck frame 2 as illustrated in Figs. 2 and 6 and connected by means of the pipe 18 provided with a check valve 19 to the main train air pipe or air brake pipe 20. The check valve 19 provides for the automatic maintaining of the air pressure within the reservoir 17 when this pressure is lowered by using the air in the reservoir 17 to actuate the cylinders. The connecting pipe 21 leads from the reservoir 17 to the cross pipe 22 connected with the triple valves 23 and 23', which are connected respectively with the cylinders 16 and 16' by the pipes 24 and 24'. The triple valves 23 and 23' (diagrammatically illustrated) are connected by means of the pipes 25 and 25', respectively, with the auxiliary train pipes 26 and 26'. The said train pipes are provided at the ends of each car with the couplings 27, 27', and with the exhaust valve 28, preferably at one end.

The cylinder 16 is provided with the piston 30, consisting of the piston head 31 and the piston rod 32. The pipe 24 is provided with the exhaust valve 33, and the pipe 24' with the valve 33'. The valve 33 in normal position has the pass 35 maintaining the connection between the pipe 24 and the port 36, and is controlled by the lever arm 37 adapted when raised to open the by pass 38 and put the port 36 in communication with the exhaust 39. The valve 33 is maintained in normal position by the compression spring 40 around the valve rod 41, which is pivoted to the lever 37 and provided with the off set or hooked arm 42 extending into the cylinder 16.

Disregarding for the present the working of the box moving mechanism proper, the operation of the piston actuating and controlling device is as follows: When it is desired to dump the car toward the left hand side in the drawing the pressure in the auxiliary train pipe 26 is reduced by opening the valve 27 at the end of the car; or if it is intended to dump all the cars of the train embodying my invention, the train pipe 26 may be exhausted by an engineer's valve on the engine, in which case all the cars will be dumped simultaneously. The reduction of pressure within the train pipe 26 sets in action the triple valve 23, as is well understood by those skilled in the art, and opens communication between the reservoir 134

17 and the cylinder 16 below the piston head 31 and through the connecting passage, consisting in the embodiment shown of the pipes 21, 22, and 24 and the port 36. The piston 30 is then quickly raised, sufficient air pressure being transferred to the cylinder 16 to raise the piston its full stroke and dump the car. As soon as the piston head 31 strikes the arm 42 of the valve rod 41, the said valve rod is raised against the resistance of the spring 40 and the incoming air at pressure in the pipe 24 is shut off from the port 36, the said port being connected with the exhaust 39. This results in quickly exhausting the air within the cylinder 16. The piston 30, however, is maintained in raised position by the tilted body or box 1 and connecting dumping mechanism to be described below. As soon as it is desired to return the box 1 to normal position, the dumping having been completed, the opposite cylinder 16' is actuated by reducing the pressure within the auxiliary train pipe 26' in either of the ways described above, and the box righted. This permits the piston 30 to return downwardly to its initial position, at the same time releasing the hook 42 of the valve rod 41 and permitting the coil spring 40 to return the valve 33 to the position illustrated in Fig. 7.

It is evident from a consideration of the operation of the valve 33 that only so much air is admitted in dumping to the cylinder 16 as will suffice to raise the piston 30 its full stroke, as the valve 33 is then immediately actuated to open the exhaust and cut off the admission of air. The valve in effect performs a similar function automatically to that performed by an engineer's check valve on the locomotive. When communication is resumed between the pipe 24 and the port 36 the said pipe will have been cut off from the reservoir 17 by the action of the triple valve 23, as is well understood in this art.

By my invention I provide box tilting or dumping mechanism connecting the cylinders, or more properly the pistons with the tilting box 1, which performs the double function of tilting the box 1 and of supporting it securely in horizontal position when not tilted. It is apparent, therefore, that means must be provided for releasing the supporting and dumping connections between the opposite cylinder 16' and the box 1 when the box is tilted through the actuation of the cylinder 16. The piston rod 32 is of sleeve form, as shown clearly in Fig. 7, and contains the stem 45 extending downwardly from the cross head 46. The compression spring 47 is coiled around the stem 45 and confined by the piston rod 32 and spring plate 46'. The cross head 46 travels upwardly along the cross head guide 48 bolted to the cylinder-head 70, and adapted

to take the side thrusts of the weight of the box 1 and its contents in dumping, the opposite cylinder 16' being provided with a like cross head 46' and guide 48' as illustrated in Figs. 4 to 8.

The pivot pins 50 and 50' are engaged by the cross heads 46 and 46' respectively and play in the slots 51 and 51' of the dumping arms 52 and 52' respectively. The dumping arms are provided with the off-sets 52^a and 52^b respectively, the slots 51 and 51' have the corresponding off-sets 53 and 53' extending substantially at right angles to the longitudinal portions of said slots and receiving the pins 50 or 50', respectively, in the normal position of the body 1 as illustrated in Figs. 4 and 7.

The pin 50 has a latch 54 rigid therewith and provided with a cam 55 which abuts against the inner cam face 56 of a lug 57 illustrated as bolted to the off-set portion 53 of the dumping arm 52. The opposite face 58 of the lug 57 is engaged, when the arm 52 is in lowered position, by the spring 59 attached to the cylinder 16. The spring 59 acts to maintain the dumping arm 52 in nearly vertical position as illustrated when the dumping body is horizontal so that the pin 50 is in engagement with the off-set 53 of the slot 51.

The bell crank lever 60 is pivotally supported upon the cylinder 16 and has a lower arm 61 normally engaging the latch 54. Its upper arm 62 is pivotally connected to the tension rod 63 extending across the car to pivotally connect with the lower arm 65 of the bell crank lever 66. The upper arm 67 of the said lever 66 is provided preferably with a roller or pin 68 engaged by the upwardly movable cam rod 69 of the cylinder 16'. The cylinder 16 is of course likewise provided with the cam rod 69', which is attached to the piston head 31 and extends upwardly through the cylinder head 70, being provided at its upper end with the cam face 71 engaging with the roller 68' carried by the upper arm 67' of the bell crank lever 66', which is pivotally supported, as upon the cylinder head 70, and has its lower arm 65' pivotally connected to the tension rod 63' corresponding to the tension rod 63, and extends across the car to engage with the upper arm 62' of the bell crank lever 60 having its lower arm 61' in engagement with the latch 54'.

It will be noted that the above described parts are symmetrical in the preferred form of my invention, the two tension rods 63 and 63' connecting conversely corresponding bell crank levers at their opposite ends.

The dumping arms 52 and 52' are pivotally connected to the dumping box 1 on opposite sides of the central pivot bracket 3, being preferably arranged in pairs as illustrated in Figs. 1 and 5, each arm 52 of a 130

pair being at opposite ends of a pivot pin 50. The upper pivots 70^a of the arms 52 are preferably carried by the brackets or straps 71 attached to the cross bearer 72 of the dumping box body 1. The pivot brackets 3 are fastened to the center sill 73 of the box 1 and the pivot brackets 4 to the longitudinal member or hollow center sill 74 of the truck frame 2, within which is carried the air reservoir 17. The cylinders 16 and 16' are conveniently carried by the bracket 75 supported by the suspender bracket 76 attached to the sill 74.

The operation of my improved dumping apparatus is as follows: When air is admitted below the piston head 31, as described above, the said piston head is raised, carrying with it the sleeved piston rod 32 and cam rod 69'. The cam face 71 in engagement with the roller 68' immediately operates the bell crank lever 66' to actuate the tension rod 63'. This operation is complete before the cross head 46 is moved upwardly, on account of the compressibility of the spring 47 about the stem 45. The tension rod 63' draws to the right in the figures, the upper arm 62' of the bell crank lever 60' thereby raising its lower arm 61' to move the latch 54'. The dog or cam 55' is thereby depressed, and forces the lug 57' and with it the dumping arm 52' outwardly. This effects the movement outwardly of the off-set portion 53' of the slot 51' to position the pin 50' within the lower end of the longitudinal portion of said slot. The spring 47 has by this time been compressed to the full extent provided for, and the stem 45 of the cross head 46 has reached the piston head 31 so that the dumping arm 52 is actuated upwardly by the moving piston 30 to dump the box 1, assuming at the end of its travel the position illustrated in Figs. 6 and 8. The dumping arm 52' is permitted to move downwardly by the pin 50' traveling upwardly within the slot 51'. The box 1 is now completely dumped and its contents emptied, the cylinder 16 being exhausted as described above. When it is desired to right the box 1 the auxiliary train pipe 26' is exhausted and air admitted to the cylinder 16' to raise the pin 50' abutting against the upper end of the slot 51'. This returns the box to normal position, the opposite dumping arm 52 and cross head 45 being carried downwardly. The cylinder 16' is exhausted automatically when the end of its stroke is reached and returns by gravity to initial position. The parts are then again in the position illustrated in Fig. 4, the spring 59' having returned the dumping arm 52' to position the pin 50' within the off-set portion 53' of its slot. The cross head guides 48 and 48' take the side thrusts of the cross head due to the weight of the box 1 when the car is dumped toward the opposite

side in each case, so that the construction is a durable and strong one as well as substantially automatic in operation, as the only manual operation consists in exhausting the train pipes 26 and 26', respectively.

What I claim is:

1. In dumping cars having a tilting body, the combination of oppositely disposed fluid pressure cylinders provided with pistons, dumping mechanism connecting each of said pistons and the tilting body and adapted to normally support the same in horizontal position and means actuated by each of said pistons when set in action to release the dumping mechanism of the opposite piston and permit dumping toward the opposite side.

2. In dumping cars having a tilting body, the combination of oppositely disposed fluid pressure cylinders provided with pistons adapted to be independently set in action, dumping mechanism connecting each of said pistons to opposite sides of the tilting body and normally supporting said body in horizontal position, and releasing mechanism between said cylinders and adapted to be actuated by the initial movement of each of said pistons when set in action to release the dumping mechanism of the opposite cylinder, the further movement of said piston operating to dump the body toward the opposite side.

3. In dumping cars the combination with a truck frame and a tilting body thereon, of means for supporting said body in horizontal position arranged on opposite sides of the truck frame, a fluid pressure cylinder provided with a piston cooperating therewith and adapted to raise said supporting means on one side to tilt the body, and mechanism connecting said piston to the supporting means of the opposite side to release the same on the initial movement of said piston.

4. In dumping cars the combination with a tilting body, of oppositely disposed fluid pressure cylinders provided with pistons, and dumping connections between each of said pistons, and the tilting body and adapted to support the same normally in horizontal position, a rod carried by each of said pistons, bell crank levers actuated thereby, and tension rods connecting the same and adapted to release the dumping mechanism of the opposite piston when one of the cylinders is set in action.

5. In dumping cars the combination with a tilting body and truck frame supporting the same, of dumping means oppositely disposed beneath said tilting body and adapted to hold the same normally in horizontal position and including fluid pressure cylinders provided with pistons, a cross head actuated by each of said pistons when separately set in action, but movable relatively thereto on

the initial movement of the piston, a cam rod carried by each piston, a bell crank lever actuated thereby, and mechanism connecting the same to the opposite dumping means to release the same on the initial movement of the said piston and permit the body to be dumped toward the opposite side.

6. In dumping cars, the combination with a tilting body and a truck frame supporting the same, of supporting dumping means oppositely disposed beneath said tilting body and adapted to hold the same normally in horizontal position, said dumping means including a fluid pressure cylinder provided with a piston, a cross head actuated by said piston, but movable relatively to said piston on the initial movement thereof, a connection between said cross head and the tilting body, a cam rod carried by said piston, a lever actuated thereby, a rod connected to said lever, and an arm actuated by said rod and adapted to release the opposite supporting means on the initial movement of aforesaid piston to permit the tilting body to be dumped toward the opposite side.

7. In dumping cars the combination with a truck, a tilting body, and means for supporting said body, of a fluid pressure cylinder provided with a piston, a cross head actuated by said piston, a spring between said cross head and said piston adapted to yield on the initial movement of the piston, and means connecting said piston to said supporting means to release the same on said initial movement and permit the tilting of the body, the said cross head being actuated by said piston on its further movement to tilt the body.

8. In dumping cars the combination with a tilting body and a truck carrying the same, of a fluid pressure cylinder having a piston, dumping connections between said piston and said tilting body including a cross head actuated by said piston, said piston having a hollow piston rod, and said cross head having a stem movable within said rod, a compression spring arranged between said stem and said rod, and permitting their relative movement on the initial movement of the piston, supporting means cooperating with aforesaid dumping connection to maintain the tilting body in normal position, and mechanism connecting said piston to said supporting means to release the same when the piston is actuated.

9. In dumping cars the combination with a tilting body and a truck frame carrying the same, of a fluid pressure cylinder carried by said truck frame, supporting means connecting said cylinder to said body and provided with a cross head actuated by said cylinder, a piston within said cylinder provided with a sleeve, a rod rigidly attached to the piston head, a stem on said cross head movable in said sleeve and a spring opposing

said motion, supporting means oppositely arranged relative to the point of support of said body and adapted to maintain the same in normal position, and releasing mechanism actuated by said rod to release said supporting means on the initial movement of the piston, said stem abutting against the piston head to raise the supporting mechanism above the same and dump the car toward the opposite side on the further movement of the piston.

10. In dumping cars the combination with a truck, of a fluid pressure cylinder and a tilting body supported thereon, a cross head reciprocally movable by said cylinder, and an arm pivoted to said body and pivotally connected to said cross head, substantially as described.

11. In dumping cars the combination with a tilting body and a truck pivotally supporting the same, of fluid pressure cylinders positioned on opposite sides of the point of pivotal support and provided with pistons, an arm pivotally connected to each of said pistons and connected to said tilting body, and means for disengaging said pivotal connection of one of said arms when the body is raised by the opposite cylinder, substantially as described.

12. In dumping cars the combination with a truck of a body tiltably supported thereon, a fluid pressure cylinder, a cross head reciprocally movable by said cylinder, an arm pivoted at its upper end to said tilting body and provided with a disengaging connection with said cross head, and a cross head guide carried by said cylinder and adapted to take the side thrust of the cross head when raised in engagement with said arm.

13. In dumping cars the combination with a tilting body, and a fluid pressure cylinder supported thereon, of a dumping arm pivoted to the body and provided with a slot, a piston in said cylinder, and a pin actuated thereby and movable in said slot.

14. In dumping cars the combination with a tilting body, of a fluid pressure cylinder, a dumping arm pivoted to the body and provided with a longitudinally extending slot having a transverse off-set, a cross head actuated by said cylinder and a pin carried by said cross head and movable in said slot.

15. In dumping cars the combination with a tilting body, of a fluid pressure cylinder having a piston and a pin reciprocally movable thereby, an arm pivotally connected to said body and provided with a longitudinally extending slot having an off-set adapted to be engaged by said pin, and means for maintaining said pin in engagement with said off-set when dumping the body toward the opposite side and permitting said pin to travel in said slot when dumping toward the same side.

16. In dumping cars the combination with

a truck and a tilting body pivotally carried thereon, fluid pressure cylinders positioned on opposite sides of said truck frame and provided with pistons, arms pivoted to opposite sides of said tilting body and provided with longitudinal slots having off-sets near their lower ends, engaging means for engagement with said off-sets reciprocally movable by said pistons, and mechanism adapted to be actuated by each of said pistons for disengaging said engaging means carried by the opposite piston when the tilting body is dumped toward the opposite side.

17. In dumping cars, the combination of a truck frame, a tilting body thereon, fluid pressure cylinders oppositely disposed relative to said body, dumping arms connected to said body, pistons in said cylinders and pins carried by said pistons adapted to actuate said arms and provided with latches, bell crank levers movable by said pistons respectively, and oppositely disposed pivoted arms each connected to one of said bell crank levers to actuate the opposite latch and move its pin to permit the car to be dumped.

18. In dumping cars the combination with a tilting body of oppositely disposed fluid pressure cylinders provided with pistons, dumping arms connected to said body and having longitudinally extending slots provided near their lower ends with off sets, pins carried by said pistons movable in said slots and provided with latches and cams actuated by said latches, cam faces on said dumping arms adapted to engage with said cams, and mechanism actuated by each of said pistons to move the latch carried by the opposite pin and thereby disengage the same from the off-set in its slot to permit the car to be dumped.

19. In dumping cars the combination with a tilting body of oppositely disposed fluid pressure cylinders provided with pistons, dumping arms connected to said body and having longitudinally extending slots each provided near its lower end with an off-set, pins carried by said pistons movable in said slots and provided with latches and cams actuated by said latches, cam faces on said dumping arms adapted to engage with said cams, resilient means for maintaining said pins within said off-sets when the body is in normal horizontal position, and mechanism actuated by each of said pistons to move the latch of the opposite pin and thereby move the opposite dumping arm to disengage its pin from the off-set in its slot and thereby permit dumping by movement of said pin within said slot.

20. In dumping cars the combination with a tilting body and oppositely disposed fluid pressure cylinders, of arms pivoted to said body, pins reciprocally movable by the cyl-

inder pistons, cams carried by said arms and said pins respectively and adapted to interchange, means for maintaining said pins in engagement with the lower portions of said arms, and mechanism actuated by each of said pistons to move the cams of the opposite piston and disengage said pins from the lower portion of said arms, substantially as described.

21. In dumping cars the combination with a tilting body of fluid pressure cylinders oppositely disposed and provided with pistons, arms pivoted to said body and pins connected to said pistons and said arms respectively and adapted to normally support said body in horizontal position, cam faces carried by said arms and pins, means for normally maintaining said pins in engagement with said arms, and mechanism actuated by said piston for moving said cam faces of the opposite arm and pin to disengage the same.

22. In a dumping car, the combination with a tilting body and a truck centrally supporting the same, of means for supporting said body on one side, a fluid pressure cylinder oppositely positioned relative to said supporting means and provided with a piston, a crosshead actuated thereby, a yielding connection between said cross head and piston, mechanism connecting said piston and said opposite supporting means and adapted to release the same on the movement of said piston, and connections between said cross head and tilting body to tilt the same on the further movement of said piston.

23. In a dumping car, the combination with a tilting body and a truck centrally supporting the same, of fluid pressure cylinders oppositely disposed relative to the point of support and having pistons, cross heads actuated thereby respectively and having yielding connections therewith, dumping mechanism connecting each of said cross heads with the tilting body, and releasing mechanism actuated by each of said pistons to release the dumping mechanism of the opposite cross head and permit dumping toward the opposite side.

24. In dumping cars the combination with a tilting body of oppositely disposed fluid pressure cylinders, pistons therein and cross heads movable by said pistons, dumping arms connected to said body and engaging means connecting the arms to said cross heads, a yielding connection between each of said cross heads and pistons, a rod rigidly carried by one of said pistons, a bell crank lever engaged by each of said rods and means actuated thereby for disengaging the connection between the opposite cross head and dumping arm, substantially as described.

25. In dumping cars, the combination with a truck, and a car body tiltably supported

thereon, of releasable means normally supporting said body on one side of its point of tiltable support, a fluid pressure cylinder having a piston connected to said tilting body on the opposite side of the point of tiltable support, and means connecting said piston and said supporting means to release the same when the piston is actuated to permit the tilting of the body.

26. In dumping cars the combination with a tilting body of releasable means normally supporting said body, a fluid pressure cylinder having a piston, an arm having a pivotal connection with said piston and connected to said tilting body, and connections between said piston and said supporting means to release the same when the piston is actuated, substantially as described.

27. In dumping cars the combination with a tilting body and a truck pivotally supporting the same, of a fluid pressure cylinder carried on said truck and provided with a reciprocally movable piston and a dumping arm pivoted to said tilting body, and having a pivotal connection with said piston, substantially as described.

28. In dumping cars the combination with a source of air at pressure, a dumping cylinder provided with a piston, a connection between said air source and one end only of said cylinder, a valve controlling said connection, a valve controlled train air pipe controlling said valve, a cut-off valve in said connection provided with a by-pass, and means actuated by said piston to cut off the admission and open the exhaust through said by-pass at the desired point in the stroke, and means arranged to return said valve to initial position on the return of the piston.

29. In a dumping car the combination with a source of air at pressure and a cylinder provided with a piston adapted to actuate the dumping device, of a connection from the source of air to one end only of the cylinder, valve means for controlling said connection to admit air therethrough and actuate said piston, a by-pass valve in said connection, a valve rod connected thereto and actuated by said piston near the end of its stroke to cut off said connection and open the cylinder exhaust through the by-

pass, and means for automatically returning said valve to open said connection.

30. In a dumping car the combination with a cylinder provided with a piston adapted to actuate the dumping device, of a connection from the source of air to the cylinder, means for controlling said connection to admit air therethrough and actuate said piston, a by-pass valve in said connection, a valve rod connected thereto and provided with an off-set in the path of said piston, and a spring adapted to return said valve rod to normal position.

31. In dumping cars, the combination with a tilting body and displaceable side members, of an arm carrying each of said side members and pivoted to the body, a link pivotally connected to said arm, and a guide fixed to the truck and controlling the motion of said link.

32. In dumping cars, the combination with a tilting body and displaceable side members, of an arm carrying each of said members and pivoted to the body, a link pivoted to said arm and provided with a pin, and an upwardly extending bracket fixed to the truck and having a slot within which said pin is movable, substantially as described.

33. In dumping cars, the combination with a tilting body having displaceable side members, of arms pivoted to the body and carrying said side members, links pivoted to said arms and provided with pins at their lower ends, and arms carried by the truck provided with longitudinal slots engaging with said pins.

34. In dumping cars, the combination with a tilting body having displaceable side members, of arms pivoted to the body and carrying said side members, links pivoted to said arms and provided with pins, and arms fixed to the truck, each extending upwardly at an incline toward the tilting axis of the body and provided with a longitudinal slot engaging with one of said pins.

In testimony whereof, I the said ANDREW CHRISTIANSON have hereunto set my hand.

ANDREW CHRISTIANSON.

Witnesses:

ROBERT C. TOTTEN,
JOHN F. WILL.