

Jan. 27, 1925.

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C. P. ASTROM ET AL

DUMPING CAR

Filed May 11, 1923

2 Sheets-Sheet 1

Fig 1

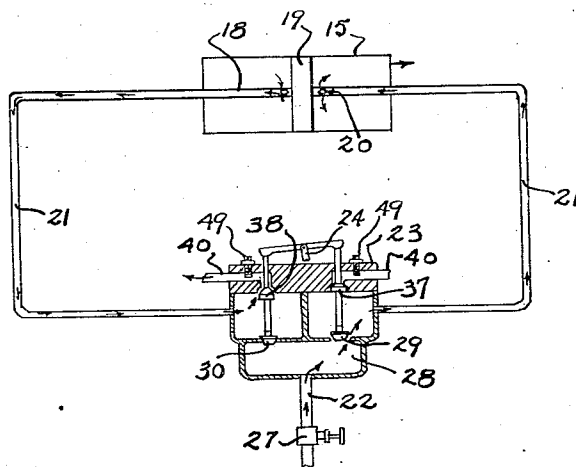
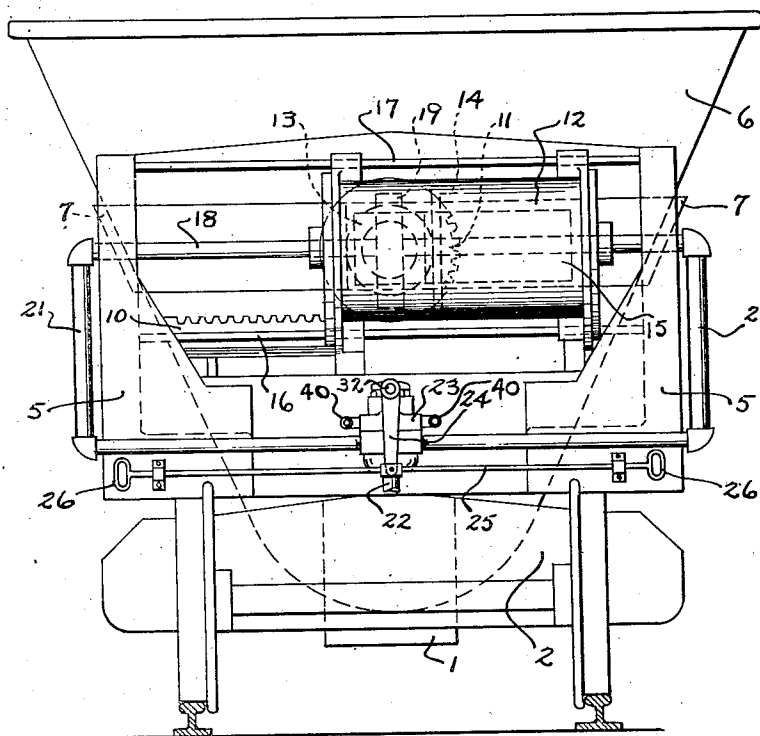


Fig 5

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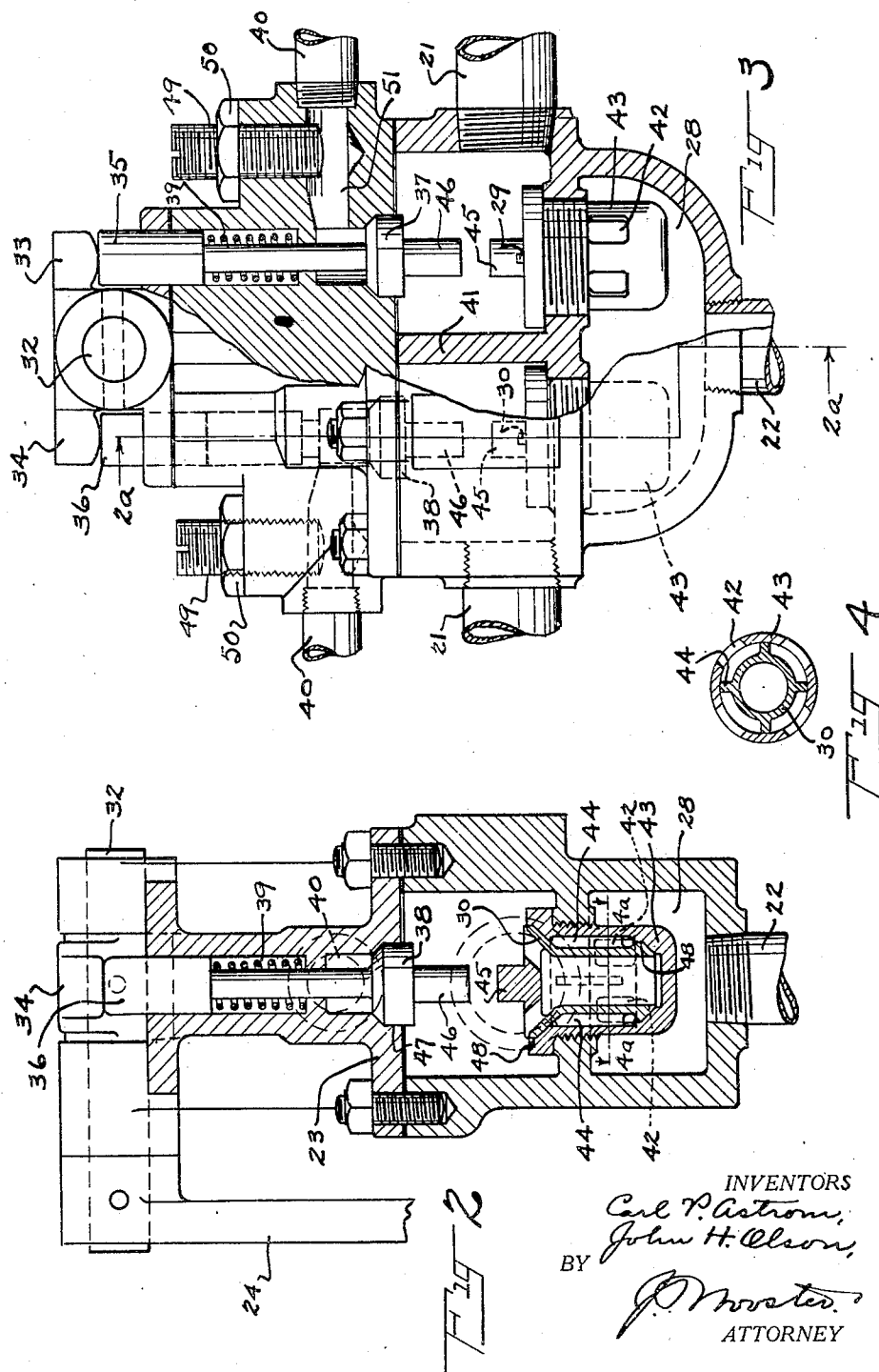
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2 Sheets-Sheet 2



Patented Jan. 27, 1925.

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UNITED STATES PATENT OFFICE.

CARL P. ASTROM, OF EAST ORANGE, NEW JERSEY, AND JOHN H. OLSON, OF NEW YORK, N. Y., ASSIGNORS TO M. H. TREADWELL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DUMPING CAR.

Application filed May 11, 1923. Serial No. 638,277.

To all whom it may concern:

Be it known that we, CARL P. ASTROM, a citizen of the United States, and JOHN H. OLSON, a subject of the King of Sweden, and residents, respectively, of East Orange, in the county of Essex and State of New Jersey, and New York city, county and State of New York, have invented certain new and useful Improvements in Dumping Cars, of which the following is a specification.

This invention relates to dumping cars and has for its object to provide an improved and simplified checking mechanism particularly applicable to fluid actuated cinder or hot metal cars wherein it is desired to effectively control both the dumping and return movements of the car body, which may at one time be top heavy when loaded or due to skull, and at another time, bottom heavy.

Heretofore it has been common practice to provide a separate checking mechanism cooperating with the power cylinder, and in order to reduce the cost and simplify the mechanism, we have devised the invention shown in this application wherein the actuating fluid pressure is automatically controlled so as to provide a controlled checking pressure on one side of the piston while applying power on the other side, thus dispensing with a separate checking cylinder but yet retaining all of the advantages of safety and regulation heretofore found only where checking devices separate from the power cylinder have been employed.

The invention is applicable either to the type wherein the cylinder is stationary and the piston moves or to the type herein illustrated wherein the piston is stationary and the cylinder moves to actuate the car body. According to this invention as specifically illustrated herein, the cylinder has the usual fluid pressure supply, such as steam or air connected to each side of the piston and supplied from a common source through a novel form of admission and exhaust valve mechanism, partly automatic and partly manual. The operating mechanism comprises a manually controlled lever or the like, so constructed that when the train pipe pressure is on, both sides of the piston are automatically charged with fluid pressure without actuation of the lever. To operate

the cylinder, the lever is actuated so that the supply of pressure is cut off from one side of the cylinder while at the same time a regulated exhaust from that side is opened, thus permitting the pressure on the other side to actuate the cylinder. If the operator lets go of the lever, both sides of the cylinder are immediately opened to the full train pipe pressure so that although the movement once commenced may continue, no harm is done, inasmuch as such continued movement will be against the full train pipe pressure and compression. Reversal is effected by reversing the action of the lever.

The invention further comprises various features of novelty in the detailed arrangement and cooperation of parts, all of which will be understood from the description of the accompanying drawings, wherein—

Figure 1 is an elevation of a side dump tilting and laterally moving type of car embodying the invention,

Figure 2 is a vertical section on the line 2^a—2^a of Fig. 3 of one of the valve mechanisms,

Figure 3 is a vertical section transverse to Fig. 2,

Figure 4 is a section on the line 4^a—4^a of Fig. 2, and

Figure 5 is a diagrammatic view.

1 represents an underframe mounted on railway trucks and provided with usual coupling equipment used on cars of this type. At the end of the underframe are supporting pedestals 5 raised somewhat above the top of the frame and these pedestals have their upper faces formed as transverse tracks on which the car body is supported in such manner as to permit the body to move laterally and simultaneously tilt, in either direction. A car body 6 of the slag or cinder ladle type is shown carried by a frame 7 provided at each end with trunnions resting on the respective pedestals 5. Each pedestal has a rack and meshing therein are gears 11 rolling on the racks 10. The power mechanism for operating the car body comprises a cylinder 15 mounted on the pedestal 5 and reciprocating between the horizontal guides 16 and 17. The drawing shows the cylinder in position for moving to the left and dumping to the left. For a reversal in

dumping, pin 14 may be removed, block 13 moved to the other end of box 12 and pin reinserted to hold the block at the opposite end of said box as is well known in the art and as described for example, in my Patent No. 928,837, dated July 20, 1909. Within the cylinder 15 is the stationary piston 19 and hollow piston rod 18, and at each side of the piston 19 are ports 20 through which pressure fluid, such as air or steam, for example, is admitted to and exhausted from the cylinder. Each end of the rod 18 is connected by a pipe 21 from the valve box 23 with the pressure supply line 22. A shut off valve 27 is located in the supply line 22. A control lever 24 is connected with the transverse rod 25 having an operating handle 26 at each end whereby the dumping operation and exhaust may be controlled from either side of the car.

The valve box 23 is preferably a casting constructed of two or more parts, as indicated in Figures 2 and 3, and is provided inside with three chambers, one of which, 28, is shown in Figures 2, 3 and 5 at the bottom connected with the supply line 22, while above this chamber are two similar chambers separated by the wall 41 and each connected through the pipe 21 with an opposite side of the piston. Check valves 29 and 30 are arranged to be automatically opened when the pressure on the lower side exceeds that on the upper so that on opening the valve 27, line pressure is simultaneously and automatically supplied to both sides of the piston. The check valves 29 and 30 which are almost balanced, are sensitive requiring a minimum of movement and operating pressure, and prevent slamming on the seats. By varying the diameter at the top or bottom of the valve the degree of balance possessed by the valve may be varied and hence its sensitivity.

The control mechanism for the exhaust valves 37 and 38 comprises a shaft 32 connected with the lever or member 24 and provided with oppositely extending lever arms 33, 34 adapted to push down upon the exhaust valve stems 35 or 36, according to the direction in which the shaft 32 is moved by the lever 24 from handles 26. Surrounding each exhaust valve stem is a spring 39 cooperating with the valve box at its lower end and with a collar on the valve stem at its upper end, so that in event the control lever 24 is released, or breaks, the spring 39 being under compression raises and closes its exhaust valve. The numeral 40 designates the exhaust pipes. Each check valve 29 and 30 is provided with guide ribs 44 and is adapted to move within cage 43 which has a plurality of holes 42 arranged to permit the passage of fluid pressure to the spaces between the guide ribs where the

pressure is adapted to act upon the inclined top portion of the check valve and raise it whenever the pressure above each valve is reduced. Each check valve is provided with beveled seats adjacent each end, and the inside of the valve has one or more holes there-through which lessens the weight of the valve, lowers its inertia, increases its sensitivity, and provides additional port opening whereby pressure fluid may pass around the lower end of the valve and up through it as well as up outside at the top. This construction gives increased port opening with little movement of the valve. The sensitivity of the valve may therefore be controlled by changing its weight, and also by changing its degree of balance, or the ratio between the diameter at the top and bottom of the valve. A projection 45 on each check valve is adapted to cooperate with a downward projection 46 on each exhaust valve, so that as an exhaust valve is opened the check valve is held closed. It will be noticed that from the beveled seat of each exhaust valve extends a vertical wall 47 having a sliding fit with the exhaust valve, and likewise on the check valve are similar vertical walls 48 above each beveled seat. With the separation indicated between the projections 45 and 46 these vertical wall portions prevent the exhaust and check valve on one side both being open with its resultant waste of fluid supply pressure. If desired, a compression spring may be wound around the projections 45 and 46 as an additional means of holding the check valve closed whenever the exhaust valve is open, and the use of such an additional spring is helpful to assist the spring 39 in rapidly closing the exhaust valve.

Threaded plugs 49 held in place by lock nuts 50 and extending down into the exhaust passageways 51 afford means for varying the size of the port openings into the exhaust pipes 40, to regulate the body speed, as it cannot move faster under the applied power on the actuating side than the exhaust can escape from the exhaust side past plug 49.

In operation as soon as the valve 27 is opened supply pressure enters the chamber 28, raises both check valves 29 and 30 and fills opposite ends of the cylinder 15 with the same pressure. The supply of pressure fluid to whichever end of the cylinder is to be exhausted enables the motor cylinder to function as a checking mechanism by controlling the rate of exhaust through the valve 37 or 38. As shown in Figures 1 and 5 to exhaust the right side of the piston and cylinder, moving the cylinder to the left, the pressure on the right side of the piston exhausts through the port 20, pipe 21, and exhaust valve 37, which has been held down by movement of the rod 25 to the left enabling the exhaust fluid to escape through

the pipe 40 on the right side of the housing 23. Should the operator carelessly release the handle 26, spring 39 thereupon acts to close the open exhaust valve, and whenever both exhaust valves are closed line pressure is automatically supplied to both sides of the piston 19. When the ladle is top heavy, which is a common occurrence, the operator may move the control lever into its neutral position with the result that the check valves admit pressure to both sides of the piston and the high pressure, building up quickly because of the sensitive check valve, is effective in bringing the ladle to a quick stop. Or when the ladle is top heavy the operator may move the control lever to the extreme opposite position to relieve pressure from one side and still more quickly check the movement of the ladle. In moving the control lever to the opposite position it passes through neutral so the check valve of this invention supplies pressure where needed more quickly than if an ordinary three-way valve, for example, were used. In moving the control lever to either its neutral or its extreme opposite position air is admitted to the back of the piston where the pressure runs up very quickly since the compression was started at high initial pressure, and the check valves respond promptly and the ladle is brought to a quick stop.

Among the advantages of this invention may be included its simplicity of operation whereby pressure fluid is automatically and simultaneously supplied to both sides of the motor piston doing away with the necessity of first moving a control valve to supply one side and then further moving said valve to supply fluid pressure to the other side. By regulating the setting of the plug 49 the desired rate of exhaust and required cushioning effect in the motor cylinder may be obtained. In case of breakage, or other accidental release of the exhaust valve, the spring 39 quickly closes the same, whereupon the check valve on that side opens and enables the pressure to be equalized on both sides of the piston thereby safeguarding the dumping operation. The check valves being automatic in operation prevent the pressure on the exhaust side from backing up in the supply line in case the ladle should start to turn faster in an unbalanced condition. Each check valve is practically balanced having only enough excess area at the top to lift the valve off its seat. It will also be seen that each valve is designed for minimum movement and being balanced requires a minimum of pressure to operate the same, making for greater sensitiveness. Another advantage of the balanced shape to these valves is the prevention of injurious slamming of the valve on its seat. A further advantage is the fact that the movement of

an exhaust valve for one side of the piston is independent of the movement of the check valve controlling the supply of pressure to the opposite side. The thin web supporting the projection 45 on each check valve spans the enlarged top portion of the valve where fluid passageways are provided on each side of the projection 45, and substantially little resistance is offered to the flow of pressure fluid inside the valve.

This invention is not restricted to car bodies dumping on both sides but includes other types of dumping car bodies.

We claim:

1. The combination with a dumping car body, of a cylinder and piston actuating means, an exhaust valve for said actuating means, a member controlling said valve in the dumping movement of the car body, and means for automatically closing said valve and equalizing the pressures on both sides of said piston to check the movement of said car body upon release of said member.

2. The combination with a dumping car body, of a pressure fluid actuating and checking cylinder and piston, means for supplying pressure to one side of said piston, an exhaust valve and control member for the opposite side of the piston, and means adapted to automatically supply pressure to both sides of said piston on release of the control member.

3. In a dumping car, the combination with a dumping car body, of a piston and cylinder for actuating and checking the movement of said car body, means for supplying pressure fluid to both sides of the piston, exhaust valves for relieving pressure on either side of said piston, an operating member for said exhaust valves, and means in cooperation with each valve adapted to close the same upon release of said operating member.

4. The combination with a dumping car body, of an actuating and checking cylinder and piston, means for simultaneously admitting pressure fluid to both ends of said cylinder and for subsequently exhausting one end.

5. The combination with a dumping car body, of a fluid pressure control mechanism comprising a cylinder and piston arranged to move said car body, a pressure supply pipe for said mechanism, a control valve in said pipe, and additional valve means between said control valve and motor for automatically admitting pressure to both sides of said piston on opening the control valve.

6. The combination with a dumping car body, of a motor cylinder and piston adapted to move the car body, means for supplying pressure to both sides of said piston before dumping, and means controlled independently of the first mentioned

means for exhausting pressure from either side of the piston.

7. The combination with a dumping car body, trunnions on which the same is mounted, a motor cylinder and piston for moving the car body on its trunnions, of means for normally supplying pressure to both sides of said piston, an operating member adapted to relieve pressure on one side of the piston, and means adapted upon release of said operating member to supply pressure fluid to that side of said piston.

8. The combination with a dumping car body, of a motor cylinder and piston adapted to move said car body on its trunnions, branch fluid pressure lines adapted to normally supply pressure to both sides of said piston, and a check valve located in each branch.

9. In a dumping car, a car body, a motor comprising a piston and cylinder, a pipe connecting each end of said cylinder, a valve in each pipe for simultaneously supplying pressure therethrough, an exhaust valve for each pipe, and means preventing opening of a supply valve in a pipe when the exhaust valve for that pipe is open.

10. The combination with a dumping car body, of a motor comprising a piston and cylinder, a branch pipe connecting each end of said cylinder and piston, a valve in each branch for supplying pressure therethrough, an exhaust valve for each branch, and means preventing opening of a supply valve in a branch when the exhaust valve in that branch is open, said means being independent of the supply valve in the other branch.

11. The combination with a dumping car body, of a cylinder and piston actuating the same, a supply pipe for fluid pressure, a branch pipe to each end of the cylinder, an exhaust valve for each branch, and check valves for supplying pressure to said cylinder and arranged to prevent an excess of pressure in said cylinder from backing into said supply line, the action of said valves being independent of the position of said piston.

12. The combination with a dumping car body, of a piston and cylinder, actuating means therefor, means for supplying and retaining pressure fluid on both sides of said piston, an exhaust valve for said actuating means, a manually controlled actuating member for said valve to control the dumping movement of said car body, and means for automatically closing said valve upon release of said member, said last mentioned means being independent of the position of the piston in the cylinder.

13. The combination with a dumping car body, of a cylinder and piston controlling the same, a pressure fluid supply line to one end of said cylinder, a check valve in said

line, an exhaust valve alined with said check valve and adapted to exhaust pressure from the same end of the cylinder, and a stem projecting between said valves and adapted to prevent more than one of them opening at a time.

14. The combination with a dumping car body, of a cylinder and piston controlling the same, a pressure fluid supply line to one end of said cylinder, a check valve in said line, an exhaust valve alined with said check valve and adapted to exhaust pressure from the same end of the cylinder, and a projection attached to one of said valves, extending toward the other to permit only one of them opening at a time.

15. The combination with a dumping car body, of a cylinder and piston controlling the movement thereof, a pressure supply pipe for said cylinder, a valve box to which said pipe is attached, a branch pipe line leading to each end of said cylinder from said valve box, means for controlling pressure supply to each end of the cylinder comprising a pair of check valves within said box, one for each branch, an exhaust valve for each branch, a single control member adapted to actuate either exhaust valve, and means independent of the means for the control of pressure supply in one branch for actuating only one of the valves in the other branch to be open at a time.

16. The combination with a dumping car body, of a cylinder and piston controlling the movement thereof, a member controlling the movement of said car body, and means automatically adapted upon release of said member to retard movement of said car body by admitting pressure to the exhaust end of said cylinder.

17. The combination with a dumping car body, of a motor cylinder and piston adapted to move said car body on its trunnions, branch fluid pressure lines adapted to supply pressure to both sides of said piston, and a substantially balanced check valve located in each branch and adapted to be responsive to small pressure differences.

18. The combination with a dumping car body, of a motor actuating means, an exhaust valve for said actuating means, a lever controlling said valve in the dumping movement of the car body, and means for automatically closing said valve and checking the movement of said car body upon release of said lever, said means including a sensitive check valve having fluid pressure passages inside and out to give a large port opening with minimum valve travel.

Signed at New York in the county of New York and State of New York this 10th day of May A. D. 1923.

CARL P. ASTROM.
JOHN H. OLSON.