April 15, 1930. E. W. SCHELLENTRAGER 1,755,077

DOOR LOCKING MECHANISM FOR COKE QUENCHING CARS

Filed May 31, 1924 4 Sheets-Sheet 1

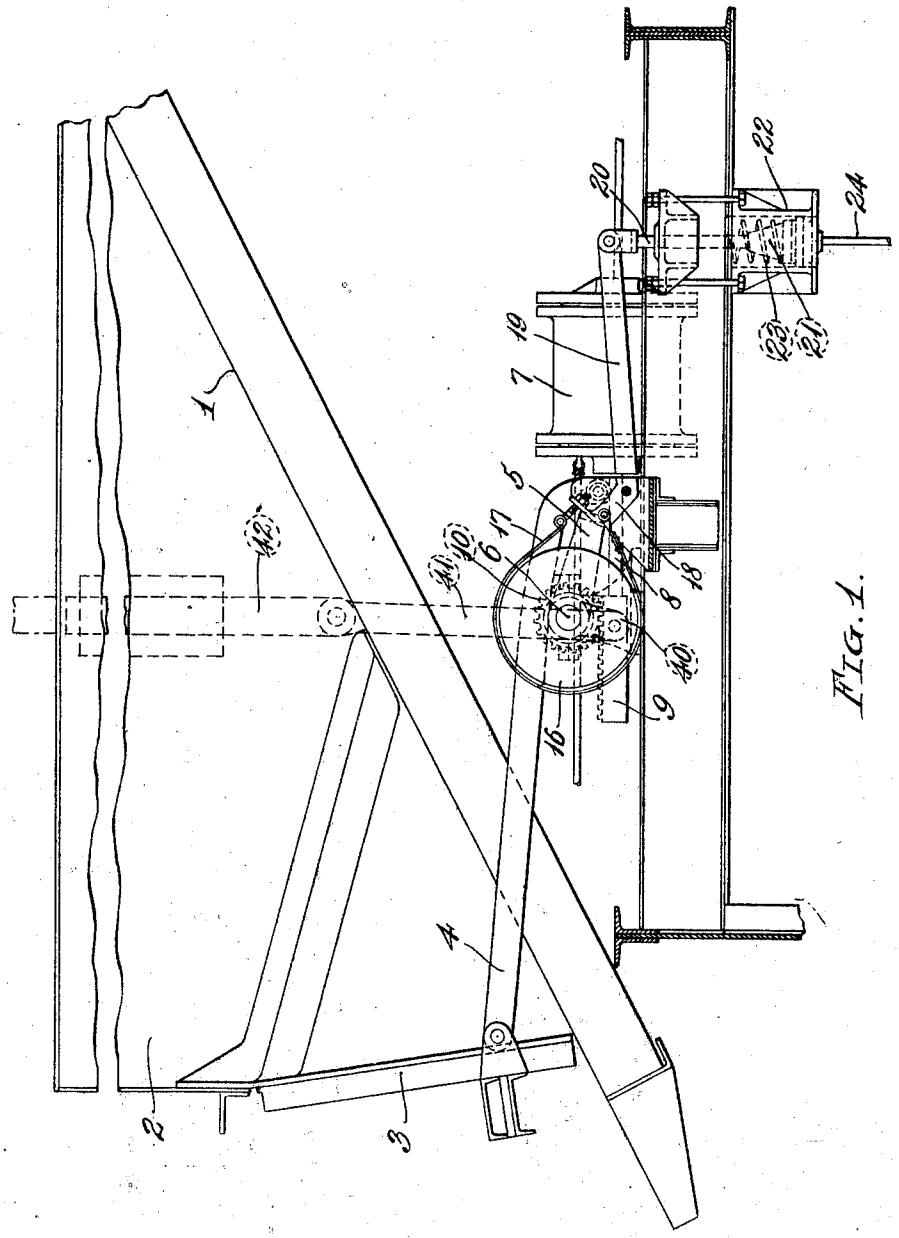


FIG. 1.

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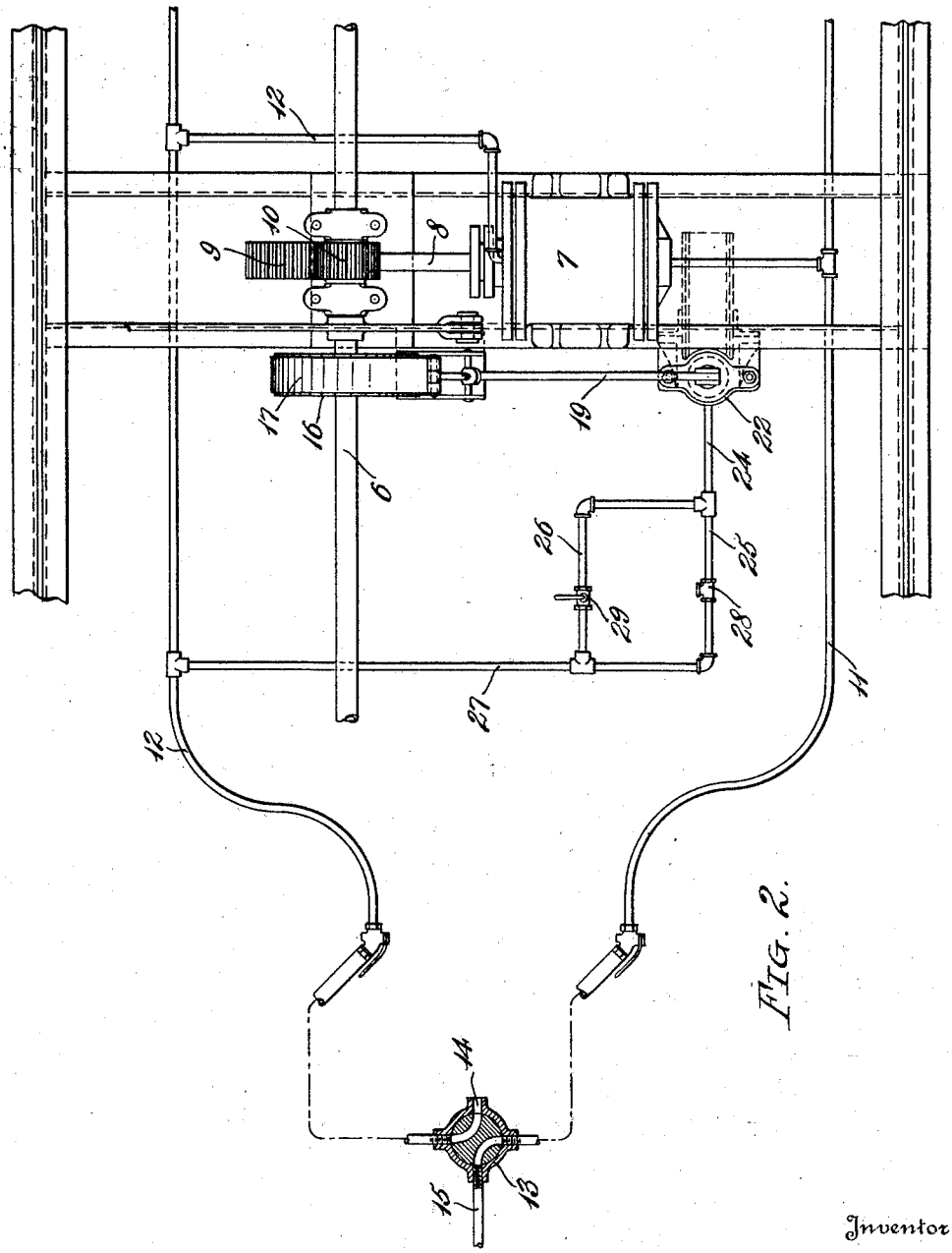


FIG. 2.

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DOOR LOCKING MECHANISM FOR COKE QUENCHING CARS

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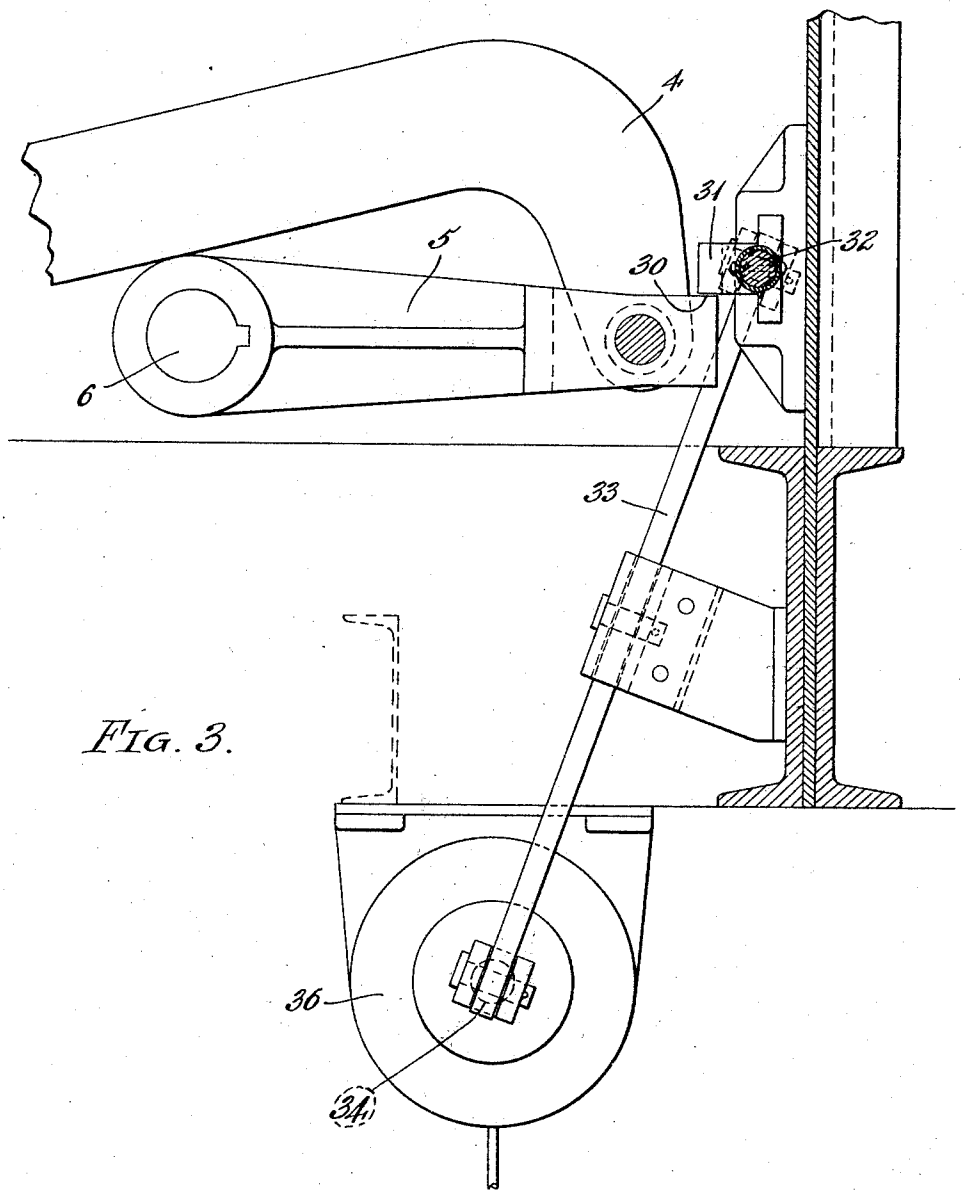


FIG. 3.

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DOOR LOCKING MECHANISM FOR COKE QUENCHING CARS

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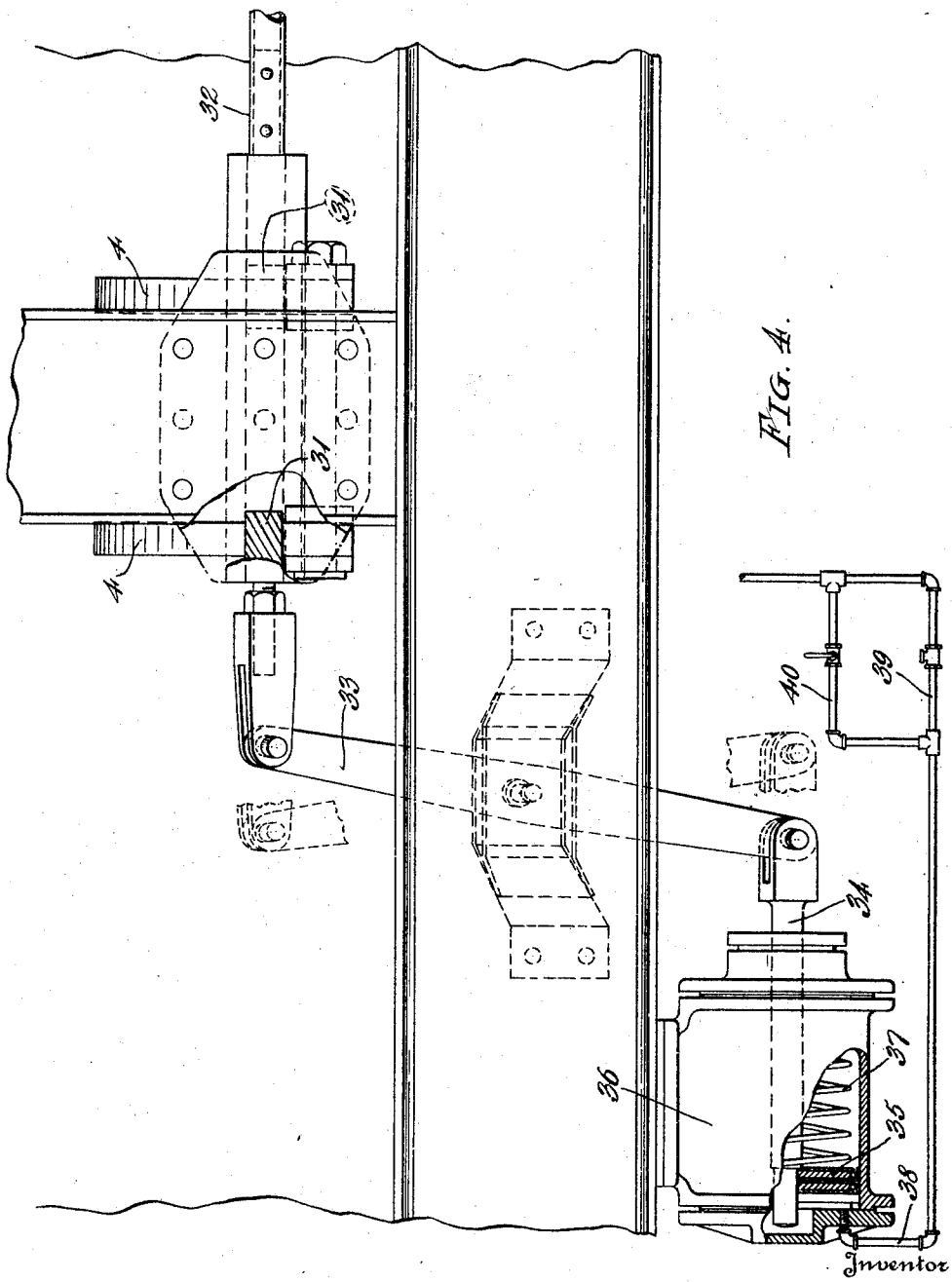


FIG. 4.

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UNITED STATES PATENT OFFICE

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DOOR-LOCKING MECHANISM FOR COKE-QUENCHING CARS

Application filed May 31, 1924. Serial No. 717,143.

This invention relates to door locking or holding means for railway dump cars, such as coke quenching cars or the like.

The invention has for its object to safeguard the operation of certain types of dumping cars where premature or untimely movement of the dumping doors, such as might release all or a part of the load, is undesirable or dangerous.

With this end in view, the invention therefore aims to provide improved means for controlling the operation of the doors, so as to restrain or prevent door movement at any other time than when desired, such means either being wholly automatic or, with at least some of the beneficial effects of the invention, by being under the control of an operator of the car or train, in addition to which, or as a distinct improvement, the mechanism may include or embody suitable means for advising the car or train operator of the condition of the doors, whether they are open or closed, or of the latching, holding or restraining means, whether it is effective or ineffective.

Other objects of the invention will be more apparent from the description to follow.

In the drawings, Fig. 1 represents a transverse sectional view through a portion of one form of car provided with the invention, the controlling mechanism being shown in elevation for simplicity of illustration; Fig. 2 is a plan view of the car under body parts, including the door controlling mechanism; Fig. 3 is a detail elevation showing another arrangement of parts embodying the invention; and Fig. 4 is a side view thereof.

The invention is capable of use on any type of railway dump car, but more particularly on cars of the door controlled type. It is most useful where premature or accidental dumping of the load not only may lose or harm the load, but it is possibly dangerous because of the character of the load. For example, coke quenching cars are utilized to carry the hot coke from the retorts to the quenching station and the accidental dumping of a load of hot coke obviously is fraught with danger, aside from the cost of replacing in the car or elsewhere its dumped contents.

For convenience, therefore, and not in any sense as restricting the invention, the drawings show the invention applied to a coke quenching car of the type illustrated in a prior patent to Samson D. Wright, granted September 30, 1919, No. 1,317,253, to which reference may be had for a more complete description if necessary. Said car comprises a suitable wheeled frame supporting a car body of hopper form including a sloping bottom 1 and side walls 2 converging to an outlet closed by one or more doors 3 hinged to the side of the car. The car may have a single chamber closed by one or a plurality of doors, or several compartments closed by separate doors. In any case, the several doors are operated by suitable mechanism, such as a link 4 connecting each door to a crank arm 5 on a shaft 6. Link 4 and the crank arm 5 together form a toggle mechanism which moves beyond center position when the door is closed, the toggle action beyond center serving to normally lock the door closed until the toggle is moved toward straightened position. Shaft 6 may actuate a series of doors simultaneously by like cranks and links, so that a single operating means for the shaft suffices for complete door control. As illustrated shaft 6 is oscillated back and forth to open or close the doors by a fluid pressure piston operating in cylinder 7, the rod 8 of said piston being provided with a rack 9 suitably held in cooperating relation with a gear 10 on shaft 6. Movement of the piston in one direction therefore, opens the doors while retracting piston movement closes them. Obviously door movement may be produced by supplying pressure alternately to opposite faces of the piston or, if desired, only to one face, gravity or a spring being sufficient in some cases to return the door to closed position. Any suitable source of fluid pressure may be used, such as a connection to the train line controlled by an operator at the car, or, as shown a series of cars in a train may each have its cylinder pressure chamber connected on opposite faces of the piston to pipes 11, 12, extending the length of the train and controlled from the engine by a four-way valve 13 communicating with exhaust at 14 and by a pipe 15 with the main reservoir or other fluid pressure supply. One

of the pipes 11, 12, for example pipe 11, supplies fluid pressure to one face of the piston for the door closing operation, while the other pipe, say 12, supplies pressure to its opposite face for the door opening operation. Without other means, to be later described, the doors obviously may be moved to and allowed to remain in either open, closed or any intermediate position, and if the controlling valve is left in a lap position or pressure is relieved from the motive piston the doors obviously may accidentally shift their positions with dangerous or undesired results as before stated.

Also, warping and misalignment of doors due to the sudden changes of temperature in quenching the coke sometimes make it impossible to toggle lock the doors beyond dead center, or, the operator may neglect to complete the closing operation, leaving the doors unlatched.

In any event control of the doors may be secured in any suitable manner, such as by direct control means engaging or effective upon the doors themselves, or by control of the operating mechanism therefor, such as the piston, piston rod, operating shaft, arms, links or other mechanism extending to the doors. The controlling devices may also be of positive form, such as solid locking shoulders or abutments or pawls and ratchets, or may be of friction type, such as a brake, either a friction brake or an electric or electromagnetic brake, which holds or restrains movement of the parts and in that sense locks them. For simplicity of illustration I have illustrated in Figs. 1 and 2 braking means effective upon the door operating shaft and controlled by fluid pressure and particularly by the same fluid pressure supply which actuates the door operating piston. The brake is effective upon a brake drum 16 fixed to any rotating part of the operating mechanism, such as the operating shaft 6, said brake being of simple form and comprising a brake band 17 extending around said drum and having its opposite ends connected to one arm of a bell crank lever 18, the other arm 19 of which is connected to the rod 20 of a piston 21 working in a cylinder 22 and moved in said cylinder in one direction, to wit, the brake applying direction, by a spring 23 and by the gravity effect of its own weight, and moved in the other or brake releasing direction by fluid pressure supplied through the pipe 24.

When the pipe 24 is vented or opened to exhaust, piston 21 moves over to brake applying position, the parts being so proportioned and adjusted by usual band brake adjusting means and being of such size that the braking effect is sufficient to prevent operation of the doors by the motive piston therefor. This is the safety condition in which the doors are effectively locked or held in whatever position they may be and prevents operation of the door moving mechanism until the brake is released by supply of fluid pressure to its piston. Therefore, any suitable means is provided for controlling the flow of fluid pressure to and from the supply pipe 24, such for example, as an ordinary cut-out cock in the pipe 24 at the car and operated manually by an operator at the car. Preferably, however, the valve or other devices for controlling the flow of pressure to pipe 24 are organized in harmonious relation with some of the operating or controlling mechanism on the train or car, such as the train propelling controller, the train brake controller, or, as shown, by the motive means for operating the doors, and preferably so that the operation of the door holding or restraining means is entirely automatic and its harmonious or cooperative relation with the doors may not be disturbed by human intervention. Pipe 24, therefore, communicates by two branch pipes 25, 26 with a pipe 27 connected to the door opening pressure line 12. In one of said branch pipes, say pipe 25, is an ordinary check valve 28 seating toward pipe 12 and permitting free flow of pressure to piston 21, but preventing back flow of pressure to the pipe 12. In the other branch pipe 26 is an ordinary cut-out cock or bleed valve 29 preferably adjustable to control the size of the passage through pipe 26 and to therefore adjust the rate of flow or bleeding of fluid pressure therethrough. With such an arrangement the operation is as follows:

Let it be assumed that the doors are in closed and locked position with zero pressure in pipe 12, a condition reached by setting valve 13 on the engine in the door closing position shown in Fig. 2 to supply fluid pressure to the door closing line 11, after which the valve 13 may be moved to a lap position, as the doors will be maintained in closed position both by the toggle lock and the brake means. The brake or locking mechanism is held applied by the spring 23 and the weight of piston 21 with a braking force sufficient to prevent any possible movement of the doors toward open position. A load may therefore, be placed in the car without liability of its loss or discharge. To dump the load valve 13 is turned to connect pipe 12 to the main reservoir pipe 15, pressure flowing from pipe 12 to both of the cylinders 7 and 22. It cannot however, become effective in cylinder 7 to move the door operating mechanism until the brake is first released, which is accomplished by free flow of pressure past the check valve 28, as will be readily understood. As soon as the brake is released pressure becomes effective in cylinder 7 and the doors are opened. They will remain open so long as pressure is maintained in the pipe 12, and are closed by opening pipe 12 to exhaust and supplying pressure to pipe 11. When that occurs the piston in cylinder 7 is moved over to close the doors quickly but

the bleed cock 29 restricts the evacuation of pressure from the brake operating cylinder. The movement of the brake piston is therefore retarded or held back so that the brake does not become effective until after the doors are fully closed. The bleed cock 29 can be adjusted easily to obtain this result. The mechanism therefore, automatically maintains the brake in holding or locking position at all necessary times and under all essential conditions, automatically relieves the brake prior to any necessary operation of the doors by the operating mechanism therefor, and after return of the doors to closed position delays, but finally completes a full application of the brake mechanism for the doors.

Figs. 3 and 4 illustrate another form of the invention in which, as before stated, 4, 5 and 6 represent the toggle link and crank arm and the shaft of the door operating mechanism. The cranks 5 of the several doors in this case are extended appreciably to provide shoulders 30 distributed along the car, one or more at each door, and each of which is adapted for engagement with an abutment or locking bolt 31, the several abutments or locking bolts being attached to and movable with a rod 32 slidable longitudinally upon the car in suitable guides or bearings. Said rod is actuated by a two armed lever 33, one arm of which is connected to one end of rod 32 and the arm of which is connected to the rod 34 of a piston 35 working in a cylinder 36. Supply of pressure alternately to opposite faces of the piston 35 may be controlled manually by suitable cocks or valves or said piston may be actuated by a spring 37 on one face thereof and the supply of fluid pressure to the other face thereof by a pipe 38 with two branches 39, 40, one containing a check valve and the other a bleed cock similar to the check valve 28 and bleed cock 29 before described.

With the arrangement just described, the operation is the same as the form shown in Fig. 1, with the exception that the piston 35 actuates a series of positive locking bolts instead of a brake. Each locking bolt 31, it will be understood, extends only a short distance along the rod 32, so that when lever 33 is in one of its positions, shown in full lines, Fig. 4, the bolts 31 are effective to lock and prevent movement of the door operating mechanism, while when said lever is in its other position, in dotted lines, Fig. 4, the door operating mechanism is released for movement.

In some cases locking or holding means for the doors is unnecessary and satisfactory conditions are reached by merely indicating in any suitable manner to the operator of the car or train what is the condition or position of the doors or the operating mechanism therefor. The indication may be visible, such as a flag, semaphore, light or the like, or audible, such as a bell, horn or whistle. Such visible or audible means may be alone sufficient for the purpose or may be used in conjunction with door controlling or locking means, as shown in Figs. 1 and 3. As illustrated in Fig. 1 the shaft 6 for operating the doors is extended to and beyond one end of the car where it is provided with an arm 40 connected by a rod 41 to actuate a slide 42 movable vertically in guides on the car body, the upper end of said slide being located to be projected as a semaphore above the top of the car when the doors are in open position. With a series of cars so equipped in a train the engineer is able to look back over the train and by observation of the several slides or semaphores 42 upon the cars to determine whether the doors of all cars are in open or closed position. Any other means suitable for the purpose may be employed.

What I claim is:

1. The combination with a dump car provided with a body, a door therefor, and operating means for said door, of means free of association with said door for indicating the position of said door.

2. The combination with a dump car provided with a body, a door therefor, and operating means for said door, of means associated with and actuated by said operating means for indicating to a train operator the position of the door.

3. The combination with a dump car provided with a body, a door therefor, and operating means for said door, of signal means adapted to extend above said car body when said door is open.

4. The combination with a dump car provided with a body, a door therefor, and operating means for said door, of means for maintaining said door in closed position, means for supplying fluid pressure thereto to release said maintaining means, and means for retarding the escape of said fluid pressure from said maintaining means, whereby said door is always closed by said operating means prior to the application of said maintaining means to maintain the door in closed position.

5. The combination with a dump car provided with a body, a door therefor, and operating means for said door, of brake means for maintaining said door in closed position, means for supplying fluid pressure thereto to release said brake, and means for retarding the escape of fluid pressure from said brake means, whereby said door is always closed by said operating means prior to the application of the brake means to maintain the same in closed position.

6. A dump car provided with a body, a door therefor, operating means for said door, means effective upon said operating means for holding the door in any position, yielding means normally tending to render said holding means effective, fluid pressure actuated

means for releasing said holding means, and means for retarding the escape of fluid pressure therefrom to retard operation of the door holding means.

7. A dump car provided with a body, a door therefor, operating means for said door, means effective upon said operating means for holding the door in any position, yielding means normally tending to render said holding means effective, fluid pressure actuated means for releasing said holding means, means for retarding the escape of fluid pressure therefrom to retard operation of the door holding means, fluid pressure operated means for actuating the door operating means, and a common source of fluid pressure supply for said two fluid pressure actuated means.

In testimony whereof I hereby affix my signature.

EUGENE WILLIAM SCHELLENTRAGER.