Dec. 8, 1925.

1,564,554

R. T. GIFFORD

CHECK DEVICE

Filed July 26, 1924

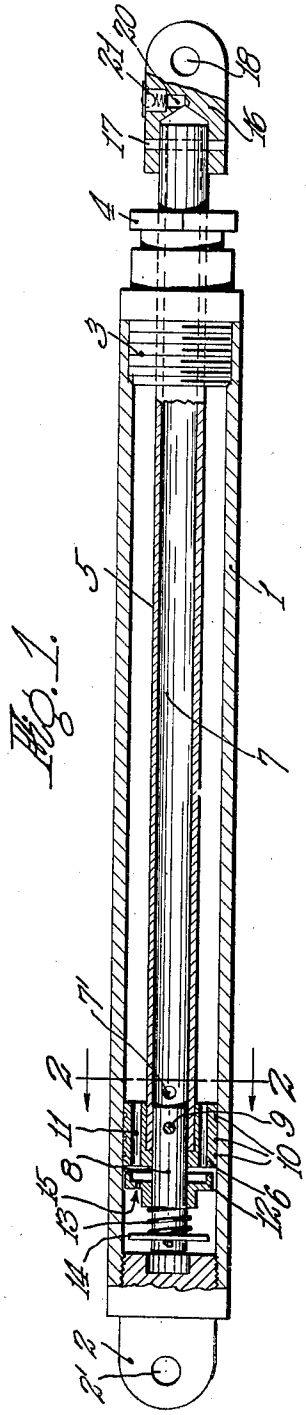


Fig. 1.

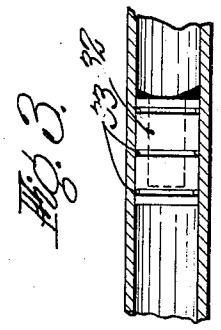


Fig. 3.

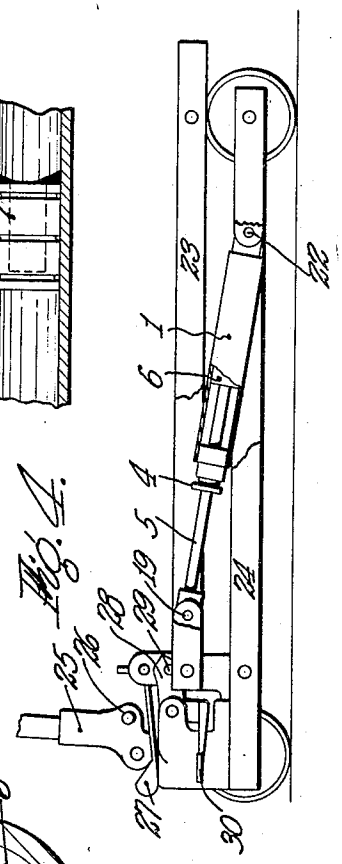


Fig. 4.

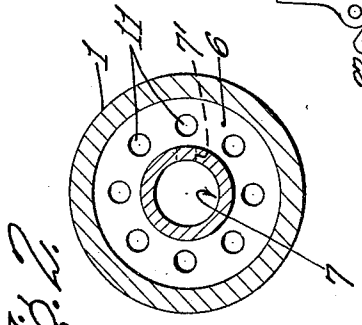


Fig. 2.

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UNITED STATES PATENT OFFICE.

RICHARD T. GIFFORD, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO EDWARD N. WHITE, J. LEWIS WYCKOFF, AND GEORGE R. BURKHARDT, TRUSTEES, DOING BUSINESS AS COWAN TRUCK COMPANY, OF HOLYOKE, MASSACHUSETTS.

CHECK DEVICE.

Application filed July 26, 1924. Serial No. 728,415.

To all whom it may concern:

Be it known that I, RICHARD T. GIFFORD, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Check Devices, of which the following is a specification.

This invention relates to improvements in liquid check or dash pot devices of the type having a cylinder for containing liquid and in which a piston is reciprocably carried and is restricted in its reciprocating movement in one direction to effect a checking action.

The invention finds one advantageous use in connection with elevating trucks where it is desired to cushion or retard the elevating platform with respect to the frame when the former is released for a descending movement.

Heretofore checking devices of this character have consisted of a cylinder closed at both ends and having its piston rod sliding through a stuffing box at one end thereof. These have not been found to be satisfactory for several reasons. First, as the piston advances forwardly in its checking movement the rod entering the cylinder displaces the contents thereof, which displacement tends to build up a pressure at the non-checking end of the cylinder and causes leaks through or by the stuffing box. Secondly, it is impossible to completely fill the cylinder with liquid as is desirable for uniform checking effect throughout the length of the cylinder owing to the liquid displacement of the piston rod which reciprocates in and out of said cylinder.

One object of the present invention is the provision of an overflow chamber in communication with the non-checking side of the cylinder wherein the liquid flowing past the piston, and displaced by the advancing piston rod is received, thereby avoiding the building up of any pressure as the piston rod enters the cylinder. Supplementing the action of said overflow chamber is the provision of means to vent the overflow chamber and cylinder to atmosphere at all positions of the piston, which permits the ready flow of liquid in and out of said overflow chamber at all times and prevents trapping of air in said piston or building up of the objectionable pressure adjacent the stuffing box previously mentioned.

A further object of the invention is the provision of a device having means whereby the checking cylinder may be completely filled with liquid so as to produce a uniform checking action through the stroke of said piston.

Other objects and advantages will be apparent from the following description and accompanying drawings in which:—

Fig. 1 is a longitudinal, sectional, elevational view taken through the check device;

Fig. 2 is a cross sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view of the hollow piston rod and having a float piston therein; and

Fig. 4 is an elevational view at small scale showing the check device applied to an elevating truck.

The invention will now be described with particular reference to its application to an elevating truck but it will be understood that it is readily adapted to any other apparatus where it is desired to check the movement of two relatively movable parts.

The check device comprises generally a cylinder 1, having its opposite ends closed by a head member 2 that is provided with a pivot bearing 2′ and a stuffing box 3 of usual and well known form. The member 2 and stuffing box 3 are preferably secured to the cylinder by interfitting screw threads as shown to provide air tight non-leakable joints but may be securely fixed thereto by any other suitable means. A packing gland 4 of usual form and having an opening therethrough to receive a piston rod 5 is associated with the stuffing box in the usual manner to provide a substantially non-leakable joint around the rod during its reciprocating movement therethrough.

For convenience in disclosing the invention and to facilitate a clear understanding thereof the end of the cylinder closed by the head 2 will be referred to as the rear or checking end, while its other end will be known as the non-checking or forward end.

The piston rod 5 is preferably hollow and tubular in form as shown, to provide an internal overflow chamber 7. A port 7′ extending through the wall of said tube 5 provides a means of communication between the interior of the cylinder and chamber 7 for the purpose later to be described.

A piston 6 carried by the rear end of the rod 5 is provided with an axial bore for receiving a solid extension 8 of the piston rod 5 while a pin 9 extending through the piston 6, rod 5 and extension 8 holds and secures the parts together. The piston 6 is preferably provided with a plurality of circumferential grooves 10, as shown, to serve as sealing grooves between the piston and the wall of the cylinder.

Ports or openings 11 extend through the piston 6 and connect the interior of the cylinder at both sides of the piston. These ports allow the passage of liquid through the piston as it moves along the cylinder, and are preferably so sized as to allow a free passage of liquid therethrough, whereby the piston is not restricted to any appreciable degree by these ports in its reciprocating movement to the non-checking end of the cylinder.

A valve 12 is slidably mounted on the rod extension 8 and is adapted to overlie the ports 11 of the piston so as to prevent the passage of liquid through the piston during its checking movement. A bleed opening 15 extending through the valve is provided to allow a restricted flow of liquid from the checking side of the cylinder through the piston to the other side during a checking movement of the piston. This opening may be varied in size to vary the amount of liquid that may flow therethough and thus the escapement of liquid can be made to control the speed at which the piston may move in its checking action.

A collar 14 is fixed to the rod extension 8 and a compression spring 13 encircles the rod 8 between the said collar and valve 12 that tends to hold the valve against the piston 6, or rather, to insure a quick closing action of the valve as the piston arrives at the non-checking or forward end of the cylinder.

An eye or rod end 16 is fixed to the outer or forward end of the piston rod 5 by means of a drive pin 17. A pivotal opening 18 in the rod end is adapted to receive a pivotal pin for connecting the check device to the platform of an elevating truck as will later appear.

A passageway or port 20 is provided in the upper side of the member 16 that communicates with the hollowed out overflow chamber 7 of the piston rod 5 and serves to vent the hollow piston rod to atmosphere. As the said chamber 7 is in communication with the cylinder through the port 7′ at the non-checking side of the piston it will be seen that the interior of the cylinder is at all times or positions of the piston vented to atmospheric pressure.

A dust cap indicated at 21 may be inserted in the port 20 to prevent the entrance of foreign matter into the hollow piston rod and cylinder. The dust cap 21 is preferably of the type having a spring pressed ball that engages an opening in the upper side of the cap, such dust caps being usually constructed and arranged to permit the free passage of air but restricting the entrance of foreign matter. The cylinder may be filled with liquid by means of the said port 20.

When the device is used in connection with an elevating truck the piston rod eye 16 is pivotally connected by means of the pivot pin 19 to the elevation frame 23 of the said truck while the head 2 at the opposite end of the cylinder is pivotally connected by means of the pivot pin 22 to the frame 24 of said truck, all as shown in Fig. 4. As will be noted, the said check device when so mounted upon a truck lies at an angle with respect to the horizontal which locates the vent port 20 at a point elevated above the level of the liquid within the cylinder, whereby the cylinder is adequately vented without the liability of the liquid running out.

The truck illustrated is of common type having the platform 23 arranged for an elevating movement with respect to the frame 24 by links, wedges or the like. The swinging handle 25 pivoted to the truck head is provided with the pin 26 that engages with the lifting hook 27 pivoted to the elevating platform for raising the platform. A locking latch 28 pivoted in the head engages with a pin 29 carried by the platform for locking the same in an elevated position while a treadle 30 cooperates with the locking link to release the platform for a lowering movement.

In operation and during the movement of the platform from its lowered position to the elevated position shown in Fig. 4, the liquid within the cylinder and chamber 7 of the rod flows through the ports 11 of the piston 6 and between the valve 12 and face of the piston 6. The tension of the spring 13 is easily overcome by the weight of the liquid in the cylinder and the passage of the liquid from the checking to the non-checking side of the cylinder is practically unrestricted during the elevating movement of the platform and piston. As the platform reaches its elevated position, the locking latch 28 functions to lock the platform and the valve spring 13 moves the valve in abutment with the piston whereby the ports in the piston are covered up, cutting off all but a restricted intercommunication of the cylinder at opposite sides of the piston.

When it is desired to release the platform for a descending movement the treadle 30 is pressed to disconnect the locking mechanism. When released, the platform is checked or retarded in its descending movement by the restricted movement of the piston as

it moves towards the rear or checking end of the cylinder. The piston is retarded in its checking movement by the restricted flow of liquid through the bleed hole 15 of the valve that may be so proportioned as to allow the piston to travel at any speed desired.

As the piston is moved to the rear of the cylinder by the platform, the piston rod enters the cylinder and displaces the liquid. Since the rod is hollow to provide an overflow chamber and has a port connecting the chamber 7 and interior of the cylinder, the liquid displaced by the rod may flow into the chamber, and due to the venting of this chamber 7 to atmosphere no building up of pressure or trapping of air will occur in the cylinder due to the displacement by the piston rod.

Should it be desirable to use the device in such a manner that it will be disposed substantially in a horizontal plane, I provide means for preventing the liquid from flowing out the vent port that comprises, as shown in Fig. 3, a float piston or slug 32 that is carried within the chamber 7 of the piston rod. The said float piston 32 is preferably arranged to slide freely within the chamber and is provided with sealing grooves, circumferentially disposed thereon as shown in Fig. 3. This piston is arranged to float on the liquid contained within the chamber and is adapted to be moved therealong by the liquid as its level is changed by a movement of the piston 6 between checking and non-checking positions. The outer side of said plug 32 being always subject to atmospheric pressure, will insure a floating action of the plug upon the liquid in said hollow piston rod 5. It is preferably desired that the relative diameter of the flat piston and interior bore of the chamber be such that liquid is prevented from flowing past the said piston and out the vent hole.

Many changes may be made in the form and practice of the invention without departing from the scope thereof and I therefore prefer to be limited by the appended claims rather than by the foregoing description.

What I claim is:

1. A liquid checking device comprising a closed cylinder adapted to be filled with liquid, a piston for reciprocatory movement in said cylinder and having a hollow piston rod movable in and out of said cylinder, a communicating port between the interior of said piston rod and said cylinder at the rear of the piston chamber whereby the interior of said rod may serve as an overflow chamber for the liquid in said cylinder displaced by said piston rod.

2. A liquid checking device comprising a closed cylinder adapted to be filled with liquid, a piston for reciprocatory movement in said cylinder and having a hollow piston movable in and out of said cylinder, a communicating port between the interior of said piston rod and said cylinder chamber whereby the interior of said rod may serve as an overflow chamber for the liquid in said cylinder displaced by said piston rod, the interior of said piston rod having a vent open at all times to atmosphere pressure.

3. A liquid checking device comprising a closed cylinder adapted to be filled with liquid, a piston for reciprocatory movement in said cylinder and having a hollow piston movable in and out of said cylinder, a communicating port between the interior of said piston rod and said cylinder chamber whereby the interior of said rod may serve as an overflow chamber for the liquid in said cylinder displaced by said piston rod, the interior of said piston rod having a vent open at all times to atmosphere pressure, and a floating plug snugly fitting the interior of said hollow piston and tending under the pressure of atmosphere to lie against the liquid in said piston.

4. A liquid checking device comprising a closed cylinder adapted to be filled with liquid, a piston for reciprocatory movement in said cylinder and having a hollow piston movable in and out of said cylinder, a port near one end of said piston rod offering a free communication between the interior of said piston and said chamber and a vent near the other end of said rod offering communication between the interior of said rod and the atmosphere.

5. A liquid check device comprising, a cylinder adapted to be filled with liquid, a piston working in said cylinder having a valve for restricting the flow of liquid from one side to the other of said piston when moving in one direction and allowing a free flow of liquid past said piston when moving in the other direction, a hollow piston rod for said piston having a port connecting the interior of said rod with said cylinder chamber whereby an overflow chamber is provided in said hollow piston rod to receive the fluid from said cylinder in compensating for the displacement of said piston upon the checking stroke thereof, the interior of said piston rod being vented to atmosphere.

6. A liquid check device comprising, a cylinder adapted to be filled with liquid, a piston working in said cylinder having a valve for restricting the flow of liquid from one side to the other of said piston when moving in one direction and allowing a free flow of liquid past said piston when moving in the other direction, a hollow piston rod for said piston having a port connecting the interior of said rod with said cylinder chamber whereby an overflow chamber is

provided in said hollow piston rod to receive the fluid from said cylinder in compensating for the displacement of said piston upon the checking stroke thereof, the interior of said piston rod being vented to the atmosphere above the level of the liquid in said cylinder.

7. A dash pot check comprising, a cylinder having an opening in one end, a hollow piston rod slidable through said opening, a piston carried by said piston rod, the said hollow piston rod being provided with a port whereby the rear side of said cylinder is vented to atmosphere at all positions of said piston in said cylinder.

8. A dash pot check comprising, a cylinder having an opening in one end, of a piston rod slidable in said opening, a piston carried by said rod movable in said cylinder, the said rod having an axial opening extending from the rear side of said piston to atmosphere and a port adjacent the said piston whereby the cylinder at the rear side of the piston is open to atmosphere at all positions of said piston.

9. A dash pot check comprising, a cylinder having an opening in one end, a piston rod slidable in said opening, a piston carried by said rod having axial openings therethrough, a valve movable on said piston rod for covering the openings of said piston rod, the said piston rod being hollow from the rear side of said piston and having a port therethrough adjacent said piston all adapted and arranged whereby the cylinder at the rear of the piston is vented to atmosphere during a checking piston movement and both ends are so vented during a non-checking piston movement.

10. A dash pot check comprising, a cylinder having an opening in one end, of a piston rod slidable in said opening, a piston carried by said rod having axial openings therethrough, a portion of said rod extending forwardly of said piston, a collar on said extension adjacent its end, a valve slidable on said extension for covering the openings in said piston, a spring interposed between said collar and piston to normally hold the valve against the piston, and said piston rod being provided with an axial opening extending rearwardly from the piston and a port adjacent the piston whereby the cylinder at the rear of the piston is vented to atmosphere during a forward piston movement and both ends of the cylinder are so open during a rearward movement thereof.

11. The combination with an elevating truck having relatively movable frames, of a check device comprising, a cylinder pivoted to one frame, a piston rod pivoted to the other of said frames carrying a piston that is slidable within said cylinder, the said rod being hollow and provided with a port adjacent the said piston whereby the cylinder at the rear of the piston is vented to atmosphere at all positions of the piston.

12. The combination with an elevating truck having relatively movable frames of a check device comprising, a closed liquid cylinder pivoted to one of said frames, an eye pivoted to the other of said frames, a piston rod fixed in said eye, a piston slidable within the cylinder fixed upon said rod having axial ports therethru, the said piston rod extending forwardly of the piston and being provided with an axial chamber extending rearwardly of said piston and a port adjacent said piston, a spring pressed valve slidable upon said rod extension for covering said piston ports and having a restricted port therethrough, the said eye being provided with a port communicating with said piston rod chamber, all adapted and arranged whereby the said cylinder at the rear side of the piston is vented to atmosphere at all positions of the piston and both ends are so open during the rearward movement of said piston.

13. The combination with an elevating truck having relatively movable frames of a check device comprising, a closed liquid cylinder pivoted to one of said frames, an eye pivoted to the other of said frames, a piston rod fixed in said eye, a piston slidable within the cylinder fixed upon said rod having axial ports therethru, the said piston rod extending forwardly of the piston and being provided with an axial chamber extending rearwardly of said piston and a port adjacent said piston, a spring pressed valve slidable upon said rod extension for covering said piston ports, the said eye being provided with a vent port communicating with said piston rod opening, a float piston carried in said hollow piston rod to prevent the flow of liquid through the said vent port, all adapted and arranged whereby the said cylinder at the rear side of the piston is vented to atmosphere at all positions of the piston and both ends are so vented during a rearward movement of said piston.

14. A liquid checking device comprising a closed cylinder to be filled with liquid, a piston for reciprocatory movement in said cylinder, the said cylinder at the rear of the piston being vented to atmosphere.

15. A liquid checking device comprising a closed cylinder to be filled with liquid, a piston for reciprocatory movement in said cylinder, all adapted and arranged whereby the said cylinder forwardly of the piston is vented to atmosphere as the piston is moved in one direction while the cylinder at the rear of the piston is vented to atmosphere at all times.

In testimony whereof I have affixed my signature.

RICHARD T. GIFFORD.