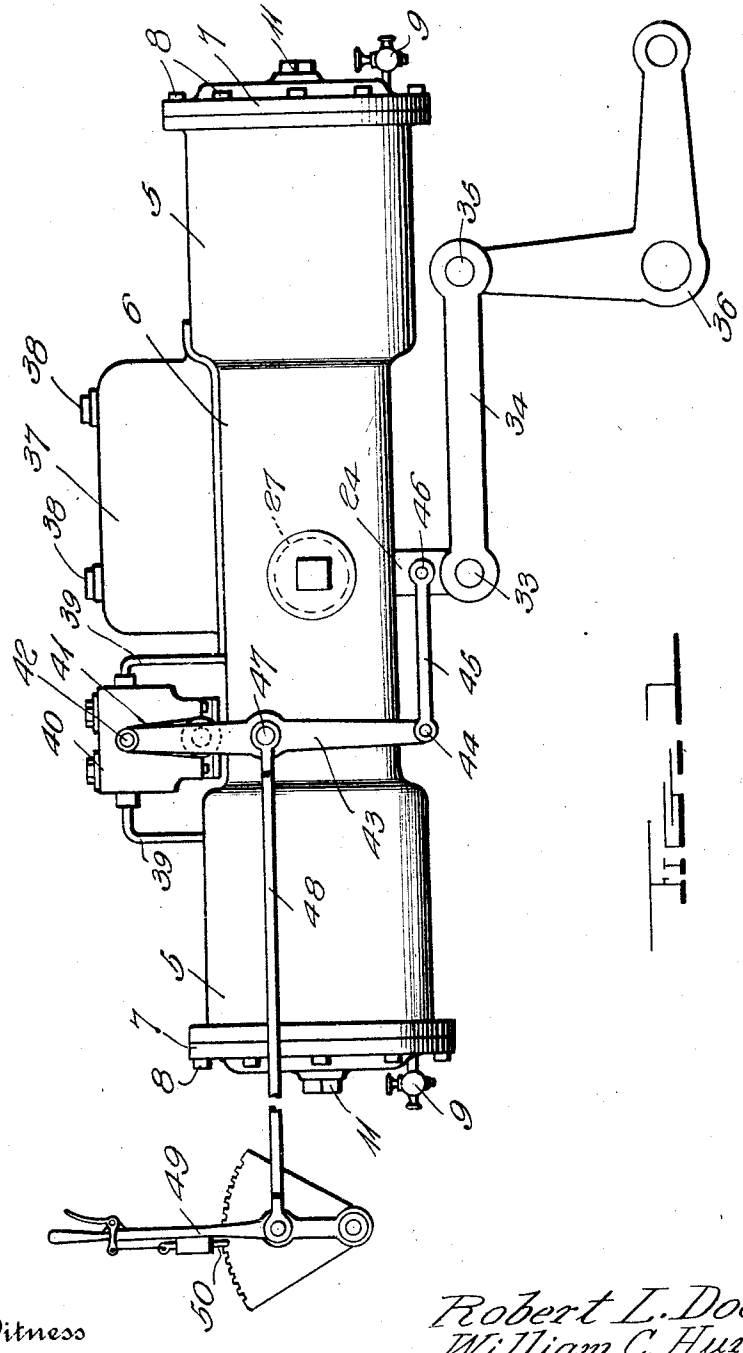
Oct. 9, 1928. 1,687,366

R. L. DOOLITTLE ET AL

REVERSE GEAR ACTUATOR

Filed July 1, 1926 3 Sheets-Sheet 1



Witness

Inventors

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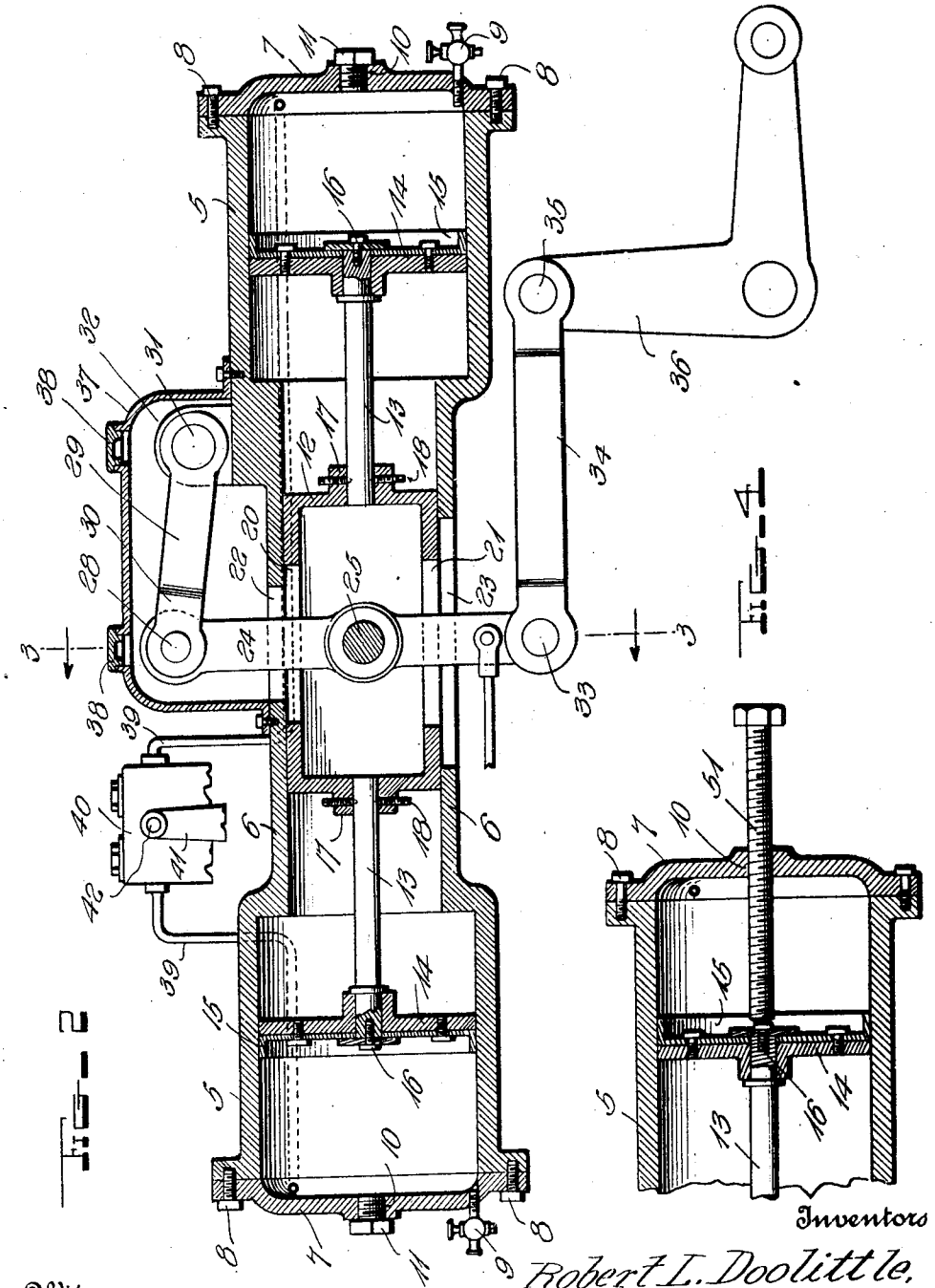
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REVERSE GEAR ACTUATOR

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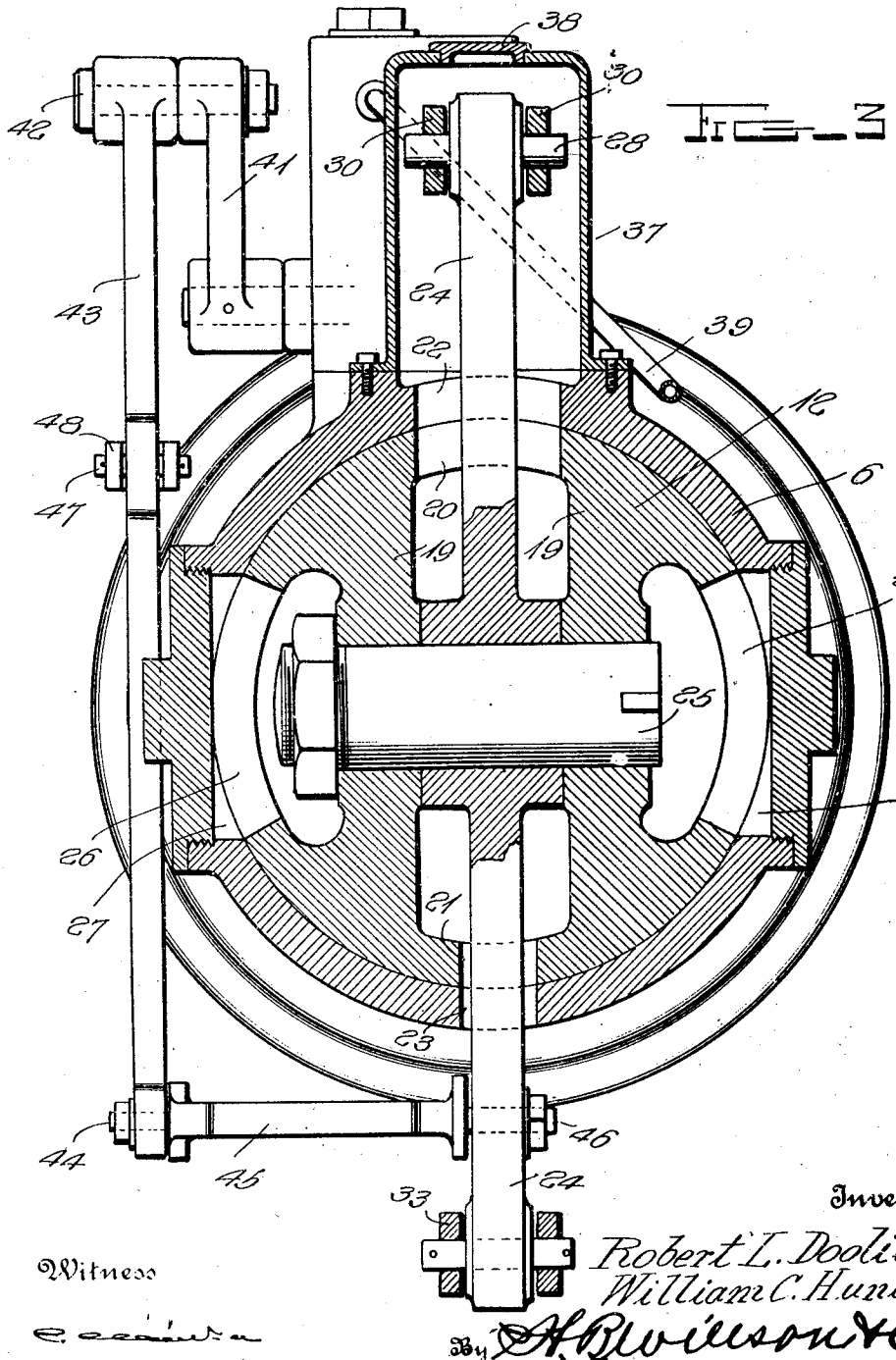


Fig. 3

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UNITED STATES PATENT OFFICE.

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REVERSE-GEAR ACTUATOR.

Application filed July 1, 1926. Serial No. 119,915.

The invention relates to improvements in fluid controlled mechanisms including an assemblage of cylinders and pistons for shifting some movable part of another mechanism and while the principal application of the invention is for the purpose of controlling a locomotive reverse gear, it is by no means restricted to this field of use.

One object of the invention is to provide an improved mechanism in which novel provision is made for obtaining the necessary movement of the part to be shifted without the necessity of moving the pistons the same distance, thereby effecting a saving in fluid pressure and greatly diminishing the wear on cylinders, pistons and piston packings, over that which obtains when the pistons must travel a greater distance, and the invention also permits the mechanism to be manufactured in a much smaller size than those in which the pistons must travel the entire distance which the shiftable part is to be moved.

Another aim is to provide a mechanism of the class set forth in which the movable parts are so encased as to be effectively protected against weather conditions, grit, dust and other foreign matter.

A still further aim, is to make novel provision whereby the pistons may be held against movement under the unbalanced fluid pressure which would exist in the cylinders and could not be controlled by the engineer in case of a break or severe leakage in either of the fluid supply pipes leading to the cylinders. Were it not possible to so hold the pistons, the valve gear would be shifted to one extreme or the other, and if shifted to reverse position, the locomotive could not be driven forwardly and vice versa.

Figure 1 is a side elevation of a fluid controlled mechanism constructed in accordance with our invention and designed primarily for controlling a locomotive reverse gear.

Figure 2 is a central, vertical, longitudinal sectional view through the cylinder, piston and cross head assembly, and associated parts.

Figure 3 is a traverse sectional view on the correspondingly numbered line of Fig. 2.

Figure 4 is a detailed vertical section illustrating the manner in which one of the pistons may be held against movement toward the outer end of its cylinder.

In the drawings above briefly described, the numerals 5 designate two longitudinally spaced cylinders connected by a cross head guide 6, which guide is preferably tubular and may be either separate from or integral with the inner ends of said cylinders, and the relative diameters of cylinders and guide as shown in Figure 2, preferably though not necessarily exist. The cylinders 5 are provided with cylinder heads 7 at their outer ends, detachably secured in place by any desired means such as the screws 8. These cylinder heads preferably carry pet-cocks 9, and for a purpose to appear, each of said cylinder heads is formed with a central opening 10 normally closed by a screw plug 11.

A cross head 12 is slidably mounted in the guide 6 and is rigidly secured to a pair of piston rods 13 whose outer ends are secured to pistons 14 slidably received in the cylinders 5, each piston has suitable packing, such as a cup leather 15. By preference, the pistons are detachably mounted upon the piston rods 13, by any suitable means such as the screws 16.

In the present disclosure, the cross head 12 is in the form of an elongated hollow cylinder, the end walls of said cylinder having bosses 17 apertured to receive the piston rod 13, which rod may be secured in the bosses by said screws or other desired means 16. Two parallel, spaced webs or walls 19 are disposed within the hollow cross head 12 and are preferably integral with the cylindrical wall and the end walls thereof, and said cylindrical wall is formed with upper and lower longitudinal slots 20 and 21 which communicate with the space between said webs or walls 19. These slots 20 and 21 register with other slots 22 and 23 formed longitudinally in the cross head guide 6.

A vertical lever 24 passes through the slots 20—22 and 21—23 and through the space between the webs or walls 19, the ends of said lever projecting respectively above and below the guide 6. Substantially at its center, this lever is pivoted to the webs or the like 19 by a bolt 25, and the cylindrical wall of the cross head 12 is formed with openings 26 giving access to this bolt when the cross head is in position to bring said openings 26 into registration with other openings 27 in the guide 6. This arrangement of openings is only illustrative of one way in which the

pivot 25 may be made accessible, permitting disconnection of the lever 24 from the cross head and removal of said cross head in case any repairs or replacements are necessary. When the pivot 25 is withdrawn, and lever 24 is disconnected from other parts which will hereinafter be described, said lever may be upwardly withdrawn from the remainder of the mechanism.

The upper end of lever 24 is pivoted at 28 to one end of a substantially horizontal link 29, said link being preferably forked at 30 to receive said upper end of lever 24. The end of this link opposite the fork, is pivoted at 31 upon one end of the cross head guide 6, the latter being provided with upstanding lugs 32, in the present disclosure, to which the pivot connects said link.

The lower end of lever 24 is pivoted at 33 to one end of the link 34, and the other end of this link is pivoted at 35 to a member 36 to be shifted from one position to another. In the present showing, this member 36 may be considered as an adjusting device for a locomotive reverse gear.

By the general construction and arrangement of parts above described, it will be seen that a rather slight piston travel and consequent travel of the cross head 12, will move the end of the lever 24 carrying the pivot 33, a relatively slight amount. Thus, the member 36 may be shifted to the required extent without the necessity of having the piston and cross head moved to the same extent. Thus, saving in fluid pressure utilized to shift the piston is effected. Also, wear upon pistons, cylinders, cross head, cross head guide and piston packings, is reduced to the minimum, providing a mechanism of exceptionally long life. It will also be observed that the general construction is such that practically all working parts are effectively protected against weather conditions, grit, etc. In this connection, attention may be directed to the fact that a protecting covering 37 is preferably employed for the link 29, the upper end of the lever 24 and the pivots 28 and 31. This covering may be provided with any adequate means 38 permitting lubrication of the pivots 28 and 31 and if desired, other lubricating means (not shown) could be provided to be supplied with oil upon removal of the means 38.

Two fluid conducting pipes 39 are shown leading from a control valve 40 mounted on one end of the cross head guide 6, and this valve may be of any desired construction, forming no part of the present invention. An operating arm for the valve is shown at 41, said arm being pivoted at 42 to the upper end of a floating lever 43. The lower end of this lever is fulcrumed at 44 to a link 45, which link is pivoted at 46 to the lower end of the lever 24. Between its ends, the lever 43 is pivoted, at 47, to an adjusting rod 48 which is appropriately connected with a reverse lever 49, the latter having appropriate means 50 by which it may be locked in one position or another. By means of the lever 49, the valve 40 may be set to direct fluid pressure to either of the cylinders 5, according to the direction in which the member 36 is to be moved, and when the desired movement of this member has taken place, the parts 45, 44, 43, 42 and 41, will have restored the valve 40 to its closed position. This controlling means for the valve 40 is similar to others heretofore devised and for it, no claim is made in the present application.

In case of breakage or severe leakage in one or the other of the pipes 39, we provide means insertible through the openings 10, upon removal of the plugs 11, so as to engage the pistons and hold them against movement under the influence of pressure from the other pipe 39. These means preferably consist of two screws 51 properly threaded for passage through the openings 10. One or both screws may be utilized, as occasion may demand.

Excellent results are obtainable from the general construction herein disclosed, but it is to be understood that the present disclosure is for illustrative purposes only and that within the scope of the invention as claimed, variations may be made.

Moreover, it is to be understood that such terms as "vertical", "upper" and "lower" are relative rather than limiting.

We claim:—

1. A fluid controlled mechanism comprising two cylinders spaced apart in axial alignment, a cross head guide between said cylinders, a cross head slidably engaged with said guide and formed with an opening leading from one of its sides to its opposite side, a lever passing through said opening of the cross head and projecting in opposite directions from the latter, a link disposed longitudinally of said guide and pivoted at one of its ends to one end of said lever, means pivotally connecting the other end of said link to a part which is stationary with respect to the aforesaid cylinders, means for connecting the other end of said lever with a part to be shifted, a pivotal connection between said cross head and the intermediate portion of said lever, pistons in said cylinders having rods connected with said crosshead, and means for conducting fluid under pressure to the outer ends of said cylinders.

2. A fluid-controlled mechanism comprising two spaced axially alined cylinders having removable heads at their outer ends, a tubular cross head guide between said cylinders, axially alined therewith and joined thereto, one side of said guide having a rel-

atively short longitudinal slot between its ends and an outstanding lug at one of said ends, the opposite side of said guide being formed with a relatively long longitudinal slot; a cross head within said tubular guide consisting of a cylindrical side wall slidably contacting with said guide and having opposed longitudinal slots registering with the slots thereof, end walls integral with the ends of said side wall and having central outstanding bosses formed with openings, and a pair of spaced parallel longitudinal webs within the space bounded by said side wall and said end walls, said webs being disposed at opposite sides of said side wall slots, being integral at their longitudinal edges with said side wall and integral at their ends with said end walls; said webs, said side wall and the aforesaid tubular cross head guide having transversely alined openings, a lever passing through the aforesaid registering slots and between said webs, a pivot bolt passing through the lever and the web openings, said bolt being accessible through the openings of aforesaid side wall and guide, a longitudinally disposed link pivoted at one end to one end of said lever and pivoted at its other end to the aforesaid lug, and pistons in the two cylinders having rods secured in the openings of the above-named bosses.

3. In a fluid-controlled mechanism, two opposed cylinders having openings in their outer ends and screw plugs normally closing said openings, rigidly connected pistons in said cylinders, and means insertible through said openings into contact with both pistons, upon removal of said plugs, to lock said pistons against movement in either direction in case of emergency.

4. In a fluid-controlled mechanism, two opposed cylinders having openings in their outer ends and screw plugs normally closing said openings, rigidly connected pistons in said cylinders, and two screws insertible through said openings into contact with both pistons, upon removal of said plugs, to lock said pistons against movement in either direction in case of emergency.

5. In a fluid controlled mechanism, a cylinder and piston assembly, the heads of the cylinder portion of said assembly being provided with openings, removable means normally closing said openings, and means insertible through said openings into contact with the piston portion of said assembly upon removal of said closing means, to lock said piston portion against movement in either direction in case of emergency.

In testimony whereof we have hereunto affixed our signatures.

ROBERT L. DOOLITTLE.
WILLIAM C. HUNTER.