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OPENING AND CLOSING MECHANISM FOR
GATES, DOORS, AND THE LIKE

Denver Miller, Modoc Point, Oreg.

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The purpose of this invention has been to design simple and efficient means adapted to be automatically operated by a vehicle during movement of the latter to effect the opening and closing of a gate, garage door, or the like, as the vehicle approaches such a gate or door, and departs therefrom, after passing through the space normally closed by such gate or door.

The invention involves certain fluid pressure operated means for effecting the above functions in respect to a door or gate. The invention takes the form of instrumentalities by which the gate or door is opened when the vehicle or automobile approaches from one direction and is closed after the vehicle passes the gate or door and leaves the point of location of the latter. The invention also contemplates provisions for operating the gate or door when the vehicle approaches the same from either of opposite directions, to open said gate or door, and for closing the gate or door as the vehicle leaves the point of location of the door or gate when departing from such location in either direction.

For a full understanding of the invention reference is to be had to the accompanying drawing, in which:

Figure 1 is a sectional view through a driveway or road illustrating the invention wherein the gate or door is operated by instrumentalities adapted to be actuated when the vehicle approaches the gate or door from either direction, and leaves the gate in either direction, whereby to open and close the gate.

Figure 2 is a sectional view showing the normal operative position of the cylinder, piston, valve, and actuating parts forming one of the units of the gate or door operating mechanism.

Figure 3 is a detail incomplete view showing one of the valve units and cylinder and piston units employed at each side of the gate according to the construction of Figure 1.

Figure 4 is a detail view of the rack bar and gear members employed for operation of the gate.

Figure 5 is a detail view of one of the valves of the special valve unit shown in Figure 3.

Referring first to Figure 1, there is illustrated a gate 1a, which will be understood to be any suitable type of gate for any desired purpose, and the term "gate" as employed herein contemplates therein the equivalent term "door" or any similar closure. Thus, the invention may be employed for operating a farm gate, a railroad gate, a gate or door at the entrance of a garage or any like instrumentality. The gate 1a, as seen in Figure 1

is journaled in any suitable base member, and is carried by and rotatable with a gear 4 that meshes with a rack 5 that extends some distance in opposite directions from the gate.

Cylinders 40 and 41 are located at opposite sides of the gate 1a. One end of the rack 5, illustrated in Figure 4, is rigidly connected to a piston 42 mounted in the cylinder 40. The other end of the rack 5 is similarly connected to a piston 43 mounted in a cylinder 41. Movement of the rack 5 in either direction by the pistons 42 and 43 will cause rotation of the gear 4 and a movement of the gate 1a carried by the gear 4 to an open or closed position.

Similar actuating cylinder and piston units A and B are respectively provided for the cylinders 40 and 41 to effect movement of the pistons 42 and 43 for moving the gate 1a to open or closed positions in a manner to be described. The unit A is provided with an operating member 44 receivable within a cylinder 46. The unit B is likewise provided with an operating member 45 receivable within a cylinder 47. The operating members 44 and 45 and the cylinders 46 and 47 are of the same construction.

Plates 17 and 18 are pivotally connected to and extend in opposite directions from each of the operating members 44 and 45. The operating members 44 and 45 are normally in upwardly projected positions, as shown in Figure 1, for downward movement by a vehicle wheel passing over the plates 17 and 18.

Referring now to Figure 2 illustrating the construction of both units A and B, each unit comprises a cylinder 46 having a horizontal dividing partition 49 mounted therein. The partition 49 is provided with a valve 50 normally held closed by a spring 51 acting on a lever 52 pivoted at 53. In the upper portion of the cylinder 46 is disposed a freely movable piston 54 rigidly secured to or formed integrally with the respective operating member 44 or 45 which it is adapted to be operated by. In the cylinder 46 below the partition 49 is a piston 55 adapted to be propelled upwardly by the spring 56. A conduit 57 leads from the upper chamber of the cylinder 46 of unit A to a control valve unit 58 adjacent to the unit B.

A similar conduit 59 leads from the upper chamber of the cylinder 47 of unit B to a control valve unit 60 adjacent to the unit A. A short conduit 61 leads from the lower chamber of the cylinder 46 of unit A to the upper portion of the control valve unit 60. A like conduit 62 leads from the lower chamber of the cylinder 47 to the upper portion of the control valve unit 58. A con-

duit 63 connects the control valve unit 60 with the left hand end of the cylinder 40 and a conduit 64 connects the control valve unit 58 to the right hand end of the cylinder 41. The control valve units 58 and 60 are seen best to be of the construction shown in Figure 3 being alike in formation. The control valve unit 60 has an inwardly opening valve 65 and an outwardly opening valve 66, the same being true for the valve unit 58. The two valves 65 and 66 are connected to move together by a bridge piece 67 and Figure 5 shows that valve 65 is removable from its stem 66a. The operation of the system of construction in Figures 1 to 5 inclusive is as follows:

As the vehicle approaches the gate 1a in the direction of the arrow a, Figure 1, depresses the member 44 of the actuating unit A, the valve 50 opens and the pressure medium above partition 49 is forced to the lower chamber of the cylinder 46 compressing the spring 56. The reaction effect of the spring 56 now closes the valve 50 and the pressure medium below the valve 50 passes out through the conduit 61 to the valve control unit 60 entering the latter by opening the valve 65. This causes closing of the valve 66 interconnected with the valve 65. The fluid thus must now flow through the conduit 63 to the cylinder 40 and operate the piston 42 and piston rod and rack parts to open the gate 1a. As this takes place, the fluid pressure medium in the cylinder 41 is forced from said cylinder through the conduit 64 into the valve control unit 58 causing closing of the valve 65 in said unit and opening the valve 66 to permit the fluid to evacuate from the member 58 through the conduit 57 to enter the upper chamber of the cylinder 46 and raise the piston 54 with its operating member 44 so that the latter is conditioned for a subsequent operation. The above operation is necessary because a fixed amount of liquid is employed in the system for the purposes of a fluid pressure medium actuated in the manner specified.

The gate 1a having been opened and the vehicle having passed through the same, the vehicle next operates the unit B, Figure 1, and effects a reverse movement of the fluid pressure medium to that which has just been described as having taken place in order to effect the opening of the gate. The reverse movement of the pressure medium, of course, effects reverse action of the various parts including the pistons 43 and 42 and the rack 5 interconnecting the same, whereby to close the gate. Now, it is apparent from the foregoing, that the gate 1a may be operated to open when the vehicle approaches in the direction of the arrow b in Figure 1, and subsequently closed, it being understood that under such condition the pistons 43 and 42 are operated in a leftward direction, as seen in Figure 1 for the opening of the gate, and in a rightward direction for the closing of the gate.

The position of the pistons 42 and 43, as shown in Figure 1, is the neutral position thereof, as when the apparatus is in normal condition ready to be operated by a vehicle approaching from either direction.

From the foregoing, it will be seen that the system of construction employed for the gate or garage door operations as proposed herein is relatively simple in that it is composed of few parts, and such parts are easily operated, and will not readily get out of order.

To prevent a second depression of the members 44 or 45, the parts 17 and 18 may be made sufficiently long so that the rear wheels of the vehicle

are upon the plates 17 before the front wheels have left the plates 18.

The same effect may be obtained without elongating of parts 17 and 18 by inserting delay valves in the fluid line for delaying the return of the parts 44, or 45 for a sufficiently long interval of time to permit passing of the rear wheels without causing a second operation of members 44 or 45 during one cycle of operation.

In regard to Figures 1 to 3 inclusive, it should further be noted that the valves 65 and 66 are dimensioned in such a manner as to effect opening of valve 65 and closing of valve 66 when the fluid enters the control valve unit 60 over line 61 and to cause closing of valve 65 and opening of valve 66 when the fluid enters into said unit over line 63. The same applies also in regard to control unit 58.

The springs 51 of units A and B of Figures 1 and 2, are calibrated in such a manner as to hold valve 50 of said units closed when the fluid returns to the upper compartments of cylinders 46 and 47 over lines 57 and 59 respectively, while the weight of the depression members 44 and 45 is such that said members may be, therefore, very easily lifted to their original position as shown in Figure 1 under the pressure exerted upon the fluid in the system by spring 56 of units A and B respectively. In this way, a flow of pressure fluid under the action of the strong spring 56 is possible to effectively perform the operation of the device as set forth hereinbefore.

Certain air openings 70 in the cylinders 11 of units A and B are necessary to permit a perfect functioning of the devices of the present invention as will be obvious to those skilled in the art.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a gate operating mechanism, in combination, a gate, a pair of cylinder and piston units connected with the gate each adapted to open and close said gate, a control valve unit for each cylinder and piston unit, an actuating unit associated with each control valve unit, said actuating unit comprising a vehicle operated member and comprising also a cylinder having upper and lower pressure medium chambers, valve means between said upper and lower chambers, a piston in the upper chamber operable by the vehicle operated member of the unit, a piston in the lower chamber of the actuating unit, spring means to actuate said lower chamber piston and adapted to have energy stored up therein by the passage of a fluid pressure medium from the upper chamber by the said valve into the lower chamber, each control valve unit comprising an inwardly opening valve and an outwardly opening valve, a conduit connecting each actuating unit at the lower chamber thereof with the associated control valve unit at the inlet valve of the latter, conduit means connecting the upper chamber of each actuating unit with the other control valve unit at the outwardly opening valve portions thereof, and a conduit connecting each control valve unit with one end of an associated one of the cylinder and piston units for the purpose described.

2. In a gate operating mechanism of the class described, in combination, a gate, a pair of cylinder and piston units coacting therewith each to open and close the gate, an actuating unit associated with each cylinder and piston unit and comprising a vehicle operated member, a control valve unit intermediate each actuating unit and its associated cylinder and piston unit, each ac-

tuating unit comprising separate chambers for
containing a fluid pressure medium, one chamber
having a piston operated by the vehicle operated
member to force the fluid pressure medium into
5 the other chamber, the other chamber having a
piston and an associated operating spring for the
same adapted to have energy stored up therein
when the vehicle operated member actuates the
piston with which it is connected, said con-
10 trol valve unit being adapted to control the pass-

ing of the fluid pressure medium into and out of
each associated actuating unit and cylinder and
piston unit features, and conduit connections be-
tween each control valve unit and its opposite
actuating unit, and between each control valve 5
unit and the cylinder and piston unit and actu-
ating unit with which the said control valve unit
is associated.

DENVER MILLER.