March 20, 1928. 1,663,184

R. D. STOKES

RAILROAD GATE

Filed Feb. 15. 1927 2 Sheets-Sheet 1

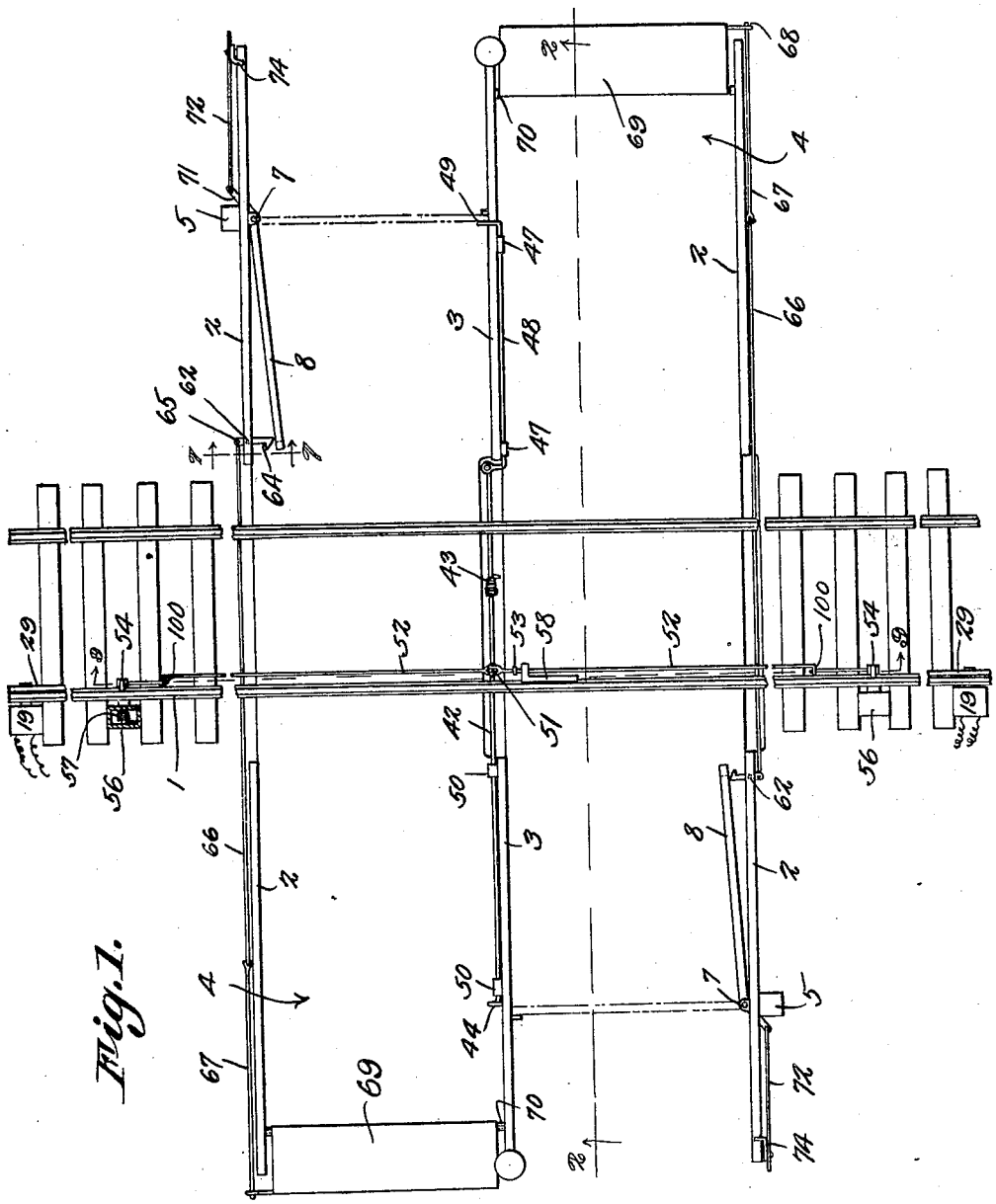

Fig. 1.

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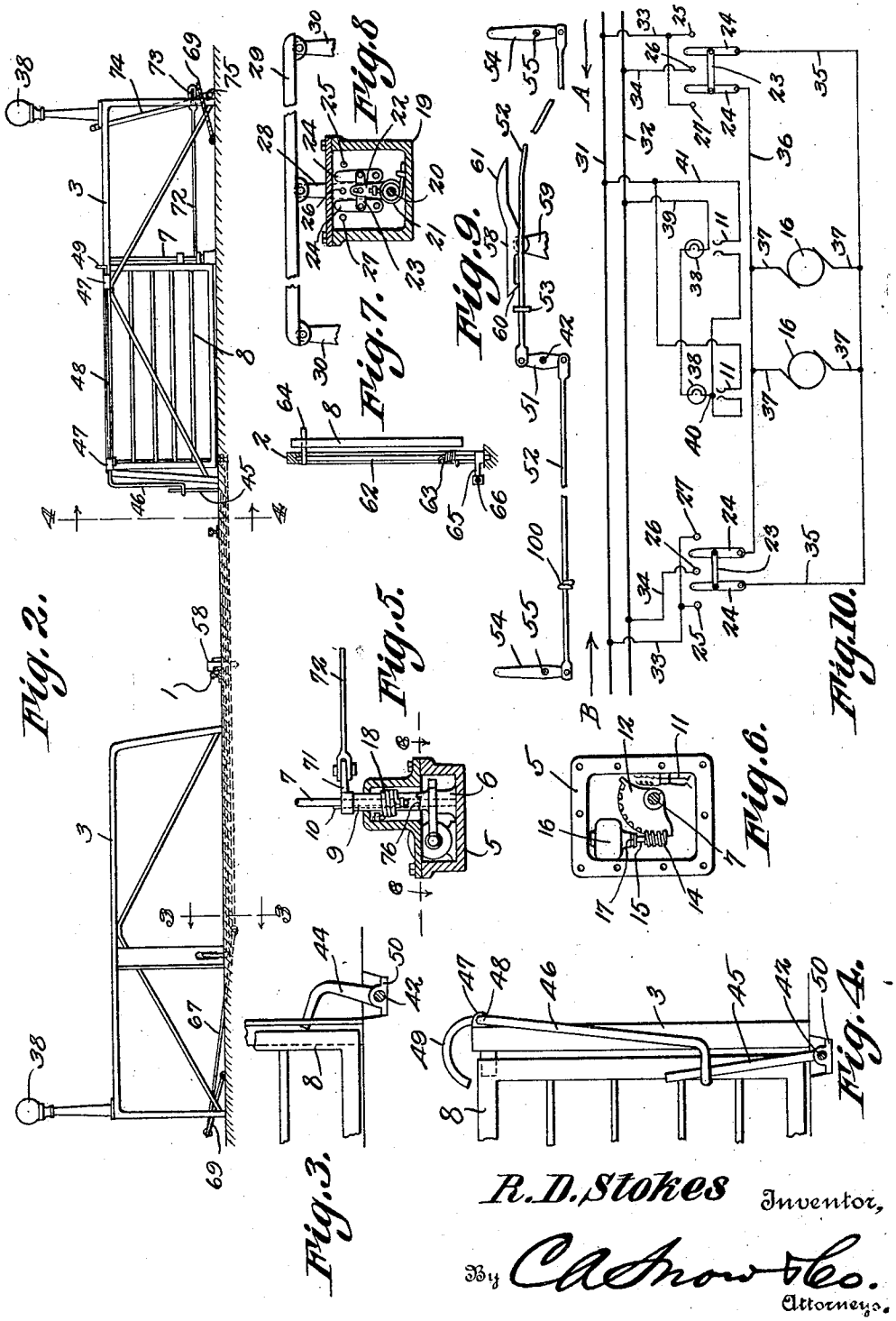

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8

Fig. 9.

Fig. 10.

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UNITED STATES PATENT OFFICE.

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RAILROAD GATE.

Application filed February 15, 1927. Serial No. 168,361.

This invention aims to provide novel means for controlling highway gates at a railroad crossing.

Figure 1 shows in top plan, a device constructed in accordance with the invention, parts being broken away;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 2;

Figure 5 is a sectional view of the operating mechanism for the gates;

Figure 6 is a section on the line 6—6 of Figure 5;

Figure 7 is a section on the line 7—7 of Figure 1;

Figure 8 is a sectional elevation showing the switch mechanism;

Figure 9 is an elevation showing the train-actuated portion of the means for latching the gates closed;

Figure 10 is a circuit diagram.

The numeral 1 marks a railroad track. Outer barriers 2 and an intermediate barrier 3 are disposed transversely of the track 1. The barriers 2 and 3 define highways 4 crossing the track 1. Casings 5 are located by the barriers 2, at any desired distance from the railroad track 1. There are bearings 6 in the bottoms of the casings 5. Gate shafts 7 are located adjacent to the outer barriers 2 on both sides of the track 1. The gate shafts 7 carry horizontally swinging gates 8. The gates 8 close from the outer barriers 2, across the highways 4, and against the intermediate barrier 3, as shown in dot and dash lines in Figure 1. Sleeves 9 are splined at 10 to the gate shafts 7 to rotate therewith, and to slide therealong. The sleeves 9 are journaled in the upper parts of the casings 5. The lower ends of the gate shafts 7 are journaled in the bearings 6. Torsion springs 18 surround the sleeves 9. The ends of the torsion springs 18 are connected to the sleeves 9 and to the casing 5.

Switches 11 are located in the casings 5. The switches 11 are adapted to be closed by engagement with gears 12 rotatable on the gate shafts 7. There are cooperating clutch elements 76 on the gears 12 and on the sleeves 9. The gears 12 mesh with worms 14 on the shafts 15 of reversible electric motors 16 located in the casings 5. Friction clutches 17 are interposed in the shafts 15. The friction clutches 17 permit an operative driving connection between the worms 14 and the gears 12, but when the movement of the gears 12 is stopped forcibly, the clutches may slip, thereby to prevent the motors 16 from being choked back unduly, and becoming overheated.

Housings 19 are located along the track 1 on opposite sides of the highways 4. Shafts 20 are supported for rotation in the housings 19. Torsion springs 21 surround the shafts 20. The shafts 20 have upstanding arms 22. The torsion springs 21 are connected to the housings 19 and to the arms 22. Cross links 23 are pivoted intermediate their ends to the arms 22. The links 23 are pivoted at their ends to switch arms 24 which, at their lower ends, are pivotally mounted on the housings 19. This is shown best in Figure 8. The switch arms 24 are adapted to cooperate with switch points 25, 26 and 27 on the housings 19. The shafts 20 have arms 28 located externally of the housings 19. The upper ends of the arms 28 are pivotally connected with the intermediate portions of train-actuated members 29 located along the track 1, the members 29 being pivoted to pivotally mounted supports 30.

Main conductors 31 and 32 are shown in Figure 10. Conductors 33 are connected to the conductors 31 and to the switch points 25 and 27. Conductors 34 connect the conductor 32 with the switch points 26. One switch arm 24 of each pair is joined to the corresponding switch arm of the other pair by a conductor 35. The remaining switch arms of each pair are joined by a conductor 36. The reversing motors 16 are connected in parallel, as shown at 37, with the conductors 35 and 36. Signals 38, such as bells or the like, are located adjacent to the highways 4. The signals 38 are interposed in a conductor 39 that is joined to the conductor 32. The conductor 39 is connected at 40 to a looped conductor 41 which is joined to the conductor 31. The switches 11 are interposed in the conductor 41.

A shaft 42 is supported for rotation as indicated at 50, and extends along the intermediate barrier 3. The shaft 42 is provided at one end with a latch 44 which cooperates with one of the gates 8 to hold it closed. A torsion spring 43 is disposed about the intermediate portion of the shaft 42. The

shaft 42 has an arm 45 which cooperates with an arm 46 on a shaft 48 journaled for rotation, as indicated at 47, on the barrier 3, the shaft 48 having a latch 49 adapted to cooperate with the other gate to hold it closed. A cross arm 51 is connected to the shaft 42. The inner ends of operating rods 52 are connected to the cross arm 51. The operating rods 52 extend in opposite directions along the track 1. One of the operating rods 52 has a keeper 53. The operating rods 52 are pivoted to arms 54 on shafts 55 journaled in casings 56 disposed along the track 1 on opposite sides of the highways 4. The arms 54 are so located that they may be engaged by a passing train. Torsion springs 57 are connected to the shafts 55 and are located in the casings 56. A latch 58 is pivotally mounted intermediate its ends, as at 59, and is located at the intersection of the railroad track and the highway. One end of the latch 58 is beveled at 60 for cooperation with the keeper 53. The other end 61 of the latch 58 is adapted to be engaged by a passing train.

Vertical shafts 62 are journaled in the outer barriers 3. Shafts 62 are under the control of torsion springs 63. The shafts 62 are provided at their upper ends with beveled latch arms 64 adapted to cooperate automatically with the gates 8 to hold the gates closed, when the gates are controlled by an operation as hereinafter explained. The shafts 62 are supplied at their lower ends with arms 65 pivoted to rods 66. Pitmen 67 are pivoted to the rods 66 and are pivoted at 68 to operating members or treadles 69 which are pivotally mounted at 70 for vertical swinging movement, at the outer ends of the barriers 2—3, the treadles 69 being located on opposite sides of the railroad track 1. The sleeves 9 on the gate shafts 7 are provided near to their lower ends with arms 71 united with connecting rods 72, pivotally, the rods 72 having a lost motion pivotal connection at 73 with hand levers 74 located near to the outer ends of the barriers 2 on opposite sides of the track 1, the hand levers 74 being pivotally mounted at their lower ends, as shown at 75.

There is a slip connection 100 in one of the rods 52. The purpose of this may be explained best by a concrete example. When the train, moving in the direction of the arrow A in Figure 10, operates the right-hand lever 54 in Figure 9, and produces a certain result (hereinafter described) the train can operate the left hand lever 54 in Figure 9 and telescope the left hand rod 52 at 100, without undoing the result produced by the operation of the right hand lever 54. The left hand rod 52 is shown at its fixed maximum length in Figure 9.

The circuits shown in Figure 10 of the drawings are so simple that they will not be traced out in detail in explaining the operation of the device.

Suppose that the gates 8 are open and that a train is moving in the direction of the arrow A in Figure 10. The train engages the train-actuated member 29 at the right hand end of Figure 10, and by means of the arm 28, rotates the shaft 20, and puts the spring 21 under torsion, the arm 22 and the link 23 swinging the switch arms 24 at the right hand end of Figure 10 into engagement with the switch points 26 and 27. The circuits of the motors 16 are closed, and the motors are put into operation. When the motors 16 are put into operation, the worms 14 drive the gears 12 and move them in a counter-clock-wise direction in Figures 5 and 6. The clutch 76 that connects the gear 12 with the sleeve 9 is so constructed that the sleeve 9 is not rotated by the action of the motor and the clutch when the gear 12 moves counter-clock-wise, as aforesaid, but the sleeve 9 and the shaft 7 are turned counter-clock-wise by the action of the spring 18, which is under torsion, the sleeve 9 and the shaft 7 following the gear 12 as it turns counter-clock-wise, and the gates being closed into the dot and dash position of Figure 1, by the action of the springs 18. Referring to Figure 6 it will be seen that when the gear 12 turns counter-clock-wise, under the action of the motor 16, as aforesaid, to permit the spring 18 to close the gate 8, the gear 12 closes the switch members 11 together and puts the signals 38 into operation, thereby to admonish persons on the roadway that a train is approaching.

The train, moving in the direction of the arrow A in Figure 10, engages the right hand arm 54 in Figure 9 and the right hand rod 52 in Figure 9 moves to the right, the cross arm 51 rotating the shaft 42, the latch arm 44 of Figure 3 holding one gate closed, and the arm 45, the arm 46, the shaft 48, and the latch 49 of Figure 4 holding the other gate closed. When the right hand rod 52 in Figure 9 was moved to the right by the train-actuated right-hand lever 54 of Figure 9, the shoulder 53 engaged automatically with the beveled end 60 of the latch 58. The result is that the shaft 42 and the gate latches 44 and 49 remain in the positions to which they have been moved, that is, with the latches 44 and 49 in holding relation with respect to the gates. When, however, the train gets up to the crossing, it engages the end 61 of the latch 58, and the latch 58 is tilted, so that its beveled end 60 is out of engagement with the shoulder 53. The mechanism shown in Figure 9 thus is set free, and, under the impulse of the springs 57 and 43, the parts in Figure 9 are restored to the positions which they occupy in that figure, and the latches 49 and 44 are freed from the gates 8, so that the gates can be

opened, when another step in the operation takes place: and that step will now be described.

The train, having cleared the highway crossing, arrives at the left hand end of Figure 10, and the corresponding train-actuated member 29 is operated, motion being transmitted to the switch arms 24 at the left end of Figure 10, these switch members closing on the points 25 and 26 and the motors 16 being reversely operated. The worms 14 move the gears 12 clockwise toward the position shown in Figure 6, and one of the first things that take place is that the switch members no longer are engaged by the gear 12, but are opened, the signals 38 being made to cease their operation. The gears 12 turn the sleeves 9 and the shafts 7 clockwise, by means of the clutch elements 76, and the springs 18 are put under torsion. The gates 8 are opened, but when they are opened they do not swing into contact with the latch arms 64 of Figure 1. This must be so, because the latch arms 64 are not subject to train control. The way in which they are operated will be explained hereinafter. When the train rides clear of the train-actuated member 29 at the left hand end of Figure 10, the switch members 24 are moved to open position, as shown in Figure 10, by the action of the torsion spring 21 shown in Figure 8: and the entire device is ready for the approach of another train, the gates being opened. What happens when a train moves in the direction of the arrow B in Figure 10 is the same, in substance, as what happens when the train moves in the direction of the arrow A: with the minor difference that the switch arms 24, when closing the circuits of the motor 16, cooperate with the switch points 26 and 27, and not with the switch points 25 and 26.

The device may be operated even though the train control becomes inoperative due to the stripping or breaking of the clutch 76 and gear 18: for, in such an event, a person in a vehicle can tilt the hand lever 74, operate the rod 72, rotate the shaft 7 by way of the arm 71 (Figure 5), the sleeve 9, and the spline 10, the gate engaging automatically with the latch arm 64. The gate, thus, is held open until the vehicle which is traversing the highway moves over the corresponding treadle 69: whereupon the pitman 67, the rod 66, the arm 65, the shaft 62, and the latch arm 64, will be operated to release the gate 8, so that the gate can swing closed under the action of the spring 18.

What is claimed is:—

1. The combination with a track and a highway crossing, of a gate shaft supported for rotation, a highway gate carried by the shaft, a reversible motor, a connection between the motor and the gate shaft and including a clutch, spring means for rotating the clutch in one direction to close the gate, and train-actuated means near the track for operating the motor directly and reversely, thereby to tension the spring means and to open the gate when the motor is operated directly, and to render the clutch rotatably responsive to the spring means, thereby to close the gate, when the motor operates reversely.

2. The combination with a track and a highway crossing, of a movable highway gate, means actuated by a train on the track for opening and closing the gate; means for holding the gate releasably open, said means comprising a shaft supported for rotation and extended along the highway, a slidable member connected to the shaft eccentrically of the shaft, a keeper on the slidable member, a latch movably supported adjacent to the track and comprising a part wherewith the latch automatically engages to hold the gate closed when the slidable member is moved in one direction, train-actuated means for moving the slidable member in said direction, a portion of the latch being engageable by a train to release the latch from the keeper and to permit a movement of the slidable member in the opposite direction, and an opening of the gate, and means for moving the slidable member in the last-specified direction.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

ROBERT D. STOKES.