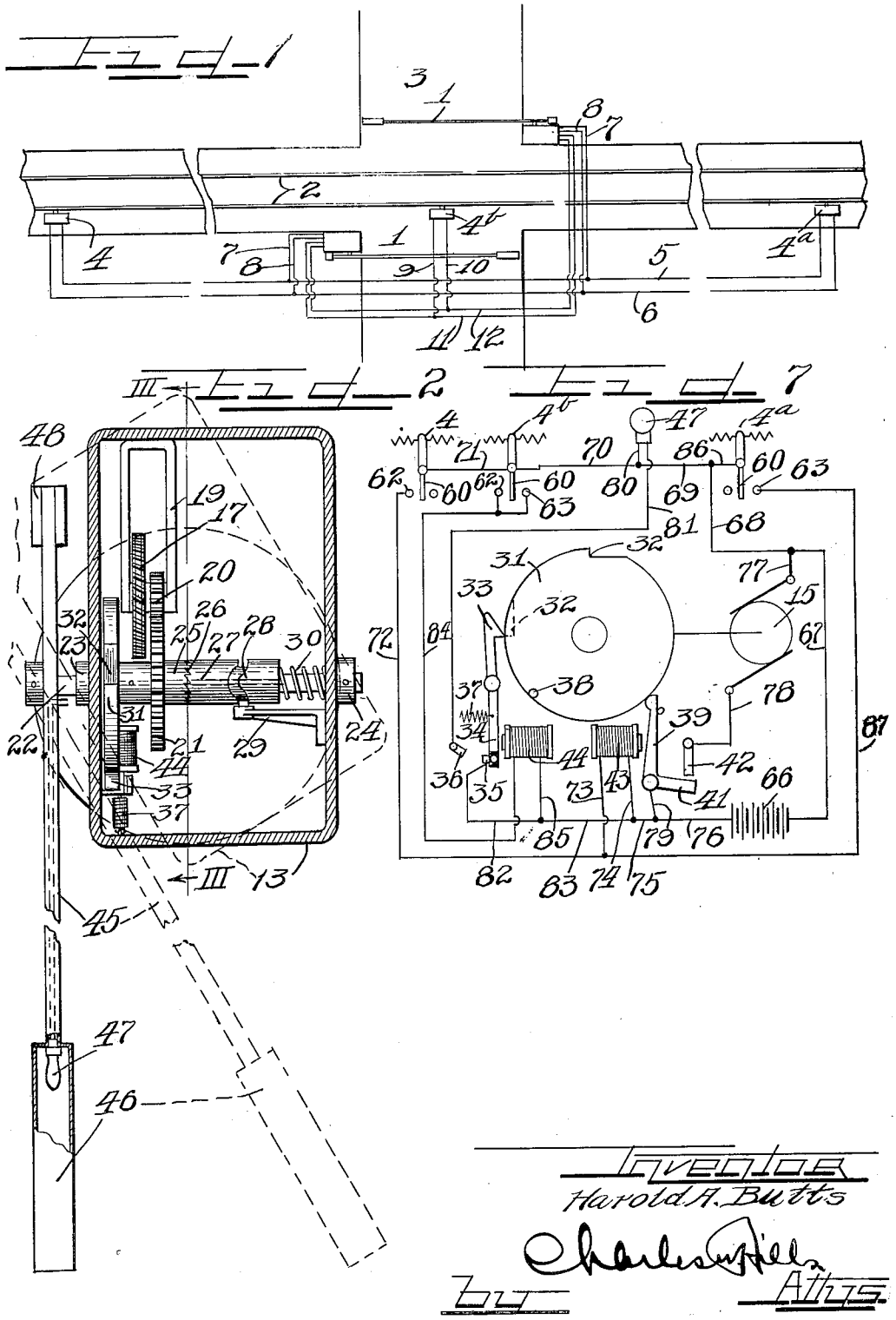
June 20, 1933. H. A. BUTTS 1,914,359

AUTOMATIC RAILROAD CROSSING GATE

Filed April 14, 1930 2 Sheets-Sheet 1



June 20, 1933. H. A. BUTTS 1,914,359

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Filed April 14, 1930 2 Sheets-Sheet 2

Fig. 3

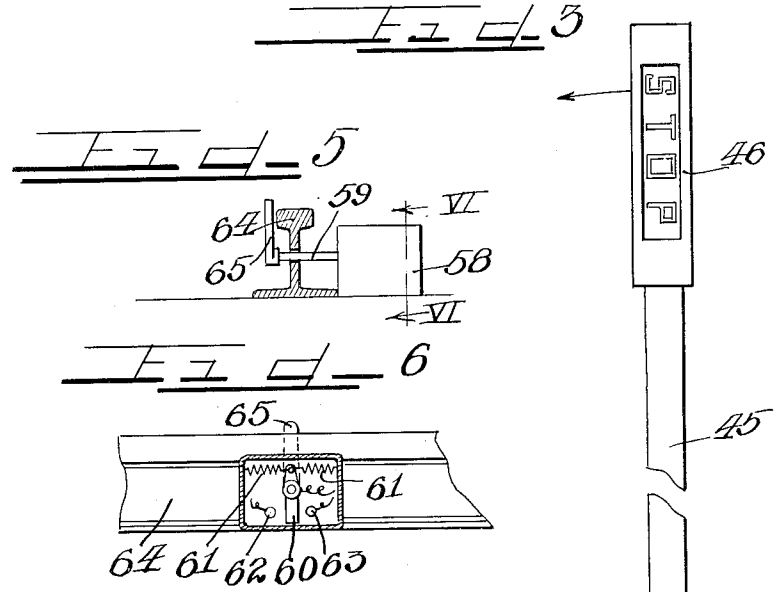
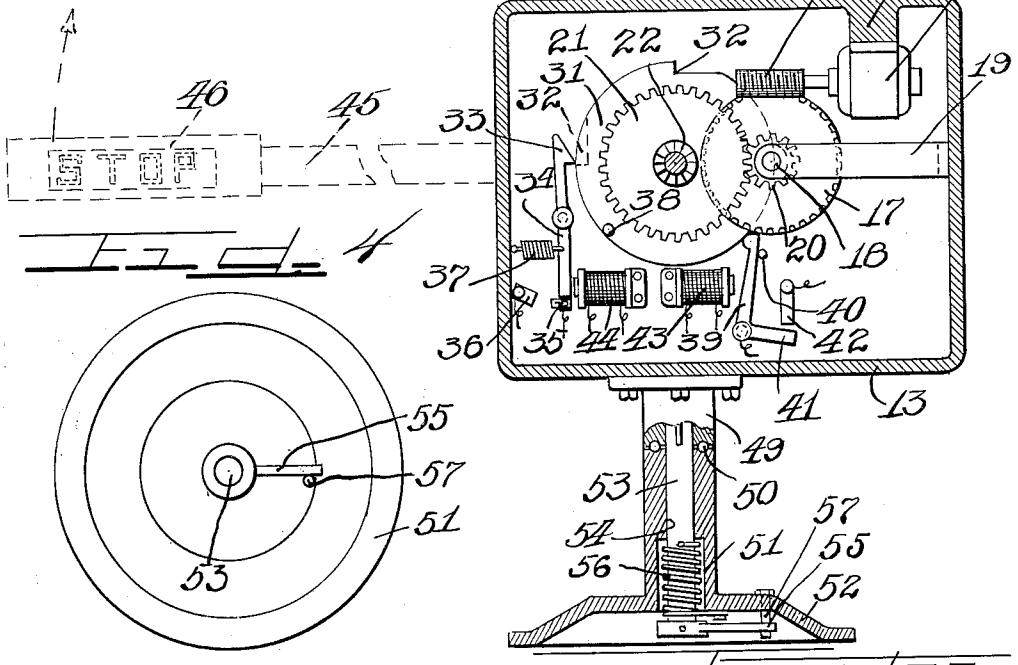


Fig. 5

Fig. 6

Fig. 4



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AUTOMATIC RAILROAD CROSSING GATE

Application filed April 14, 1930. Serial No. 444,204.

This invention relates in general to gates for railway crossings, and more particularly to improvements in electrically-operated gates of the type which are automatically lowered to guard the crossing when a train is approaching and raised after the train has passed the crossing.

An object of this invention is to provide apparatus in a railroad crossing gate adapted to minimize damage to the same in the event of a vehicle striking the gate when in a lowered position.

Another object of this invention is to provide a railway crossing gate that is substantially unbreakable and is so constructed that, if a motorist should accidentally drive into the gate, when it is in a lowered position, it will be swung out of the way and automatically return to its normal position across the highway as soon as he has passed, thereby preventing damage to the gate.

It is a further object of this invention to provide a railway crossing gate which is so constructed that it will be impossible to entrap a motorist on the crossing by lowering the gates.

Another object of my invention is to provide a railway crossing gate and signal which is automatically lowered through the action of an electric motor and raised by gravity, thereby permitting the gate to be raised and thus not hold up traffic, without having to depend on the use of other power.

Still another object of my invention is to provide means for accomplishing the above which is simple in design, which has a minimum number of moving parts, and which is dependable in operation.

Other and further important objects of this invention will be apparent from the disclosures in the accompanying drawings and the following specification.

The invention (in a preferred form) is illustrated on the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a diagrammatic view showing the application of my invention to a single track railroad system at a crossing, and also the electrical connections between the various components thereof.

Figure 2 is a horizontal section through the housing of my device showing the operative relationship of the instrumentalities employed for raising and lowering the gate.

Figure 3 is a vertical section through the housing of my device showing the operative relationship of the instrumentalities employed for raising and lowering the gate, also the details of the swivel mounting for the gate, taken substantially on line III—III of Figure 2.

Figure 4 is a plan view of the supporting pedestal for the gate as viewed from below, which shows the mechanism for returning the gate to normal position across the highway after it has been swung around.

Figure 5 is an elevation of the rail switch for controlling my device which shows the manner in which it is mounted on the rail.

Figure 6 is a vertical section taken through the housing of the rail switch to show the operative relationship of the instrumentalities therein for closing an electrical circuit, taken substantially on line VI—VI of Figure 5.

Figure 7 is a schematic wiring diagram showing the electrical connections between the various components of my device and the control means therefor.

As shown on the drawings:

In order that my invention may be more clearly understood, I have chosen to illustrate in Figure 1 an application of my device, wherein it is used to protect a highway where it crosses the railway right of way. Although I have shown my device as being applied to a single track railway system, it will be obvious to one skilled in the art that it may be applied with equal facility to the protection of a crossing having a plurality of tracks. As shown, a gate 1 embodying the features of my invention is disposed on each side of the track 2, so that, when the gate is lowered, it will extend across the highway or street 3 to prevent traffic thereon from approaching too near the track. Rail switches 4, 4*a* and 4*b*, which are designed to be actuated by the wheels of the train passing there-

over, are spaced along the track for controlling the operation of the gate. These switches are of similar construction and may be electrically connected to close an electrical circuit either when a train passes in one direction only or when it passes in both directions. The switch 4 is placed a considerable distance to one side of the highway to close the control circuit of the mechanism for lowering the gates when a train passes thereover in approaching the highway. The switch 4*a* is arranged in a similar manner a considerable distance to the other side of the highway, and is connected so as to close the control circuit of the gates when a train passes thereover going in the opposite direction. The switch 4*b* is connected in the control circuit for raising the gates when a train passes thereover in either direction. This latter switch is preferably placed at the center of the highway, as it will not be necessary to keep the gates in the lowered position after the engine of the train has crossed the highway. The switches 4 and 4*a* are connected in multiple by conductors 5 and 6 which are respectively connected to the conductors 7 and 8 which go to the respective control mechanisms for lowering the gates. The switch 4*b* is connected through conductors 9 and 10 which are respectively connected to conductors 11 and 12 which go to the respective control mechanisms for raising the gates. The electrical connections for the gate operating mechanism will be hereinafter more fully described.

The gate operating mechanism is contained within a housing 13 and is provided with a projecting portion 14 which forms a pad to which an electric driving motor 15 is secured. The shaft of this motor carries a worm 16 which drives a worm-wheel 17 which is secured to a shaft 18 that is rotatably supported on the spaced arms of a bracket 19 secured to the housing. A pinion 20 is secured to the shaft 18 for rotation with the gear 17. This pinion meshes with a gear 21 that is freely rotatable on a shaft 22.

The shaft 22 is rotatably supported in bearings 23 and 24 which are secured to the side walls of the housing. The gear 21 is provided with a hub 25 having clutch teeth 26 arranged to mesh with similar teeth on a sleeve 27 which is splined on the shaft 22 for longitudinal movement.

The sleeve 27 has a tortuous groove extending around the circumference thereof which defines a cam 28 that is so arranged that it will engage a stationary bracket 29 on the housing, when the shaft 22 is rotated. This action will cause the sleeve to move against the pressure of a compression spring 30 which extends between the end of the sleeve and the housing 13 and encircles the shaft, and disengages the clutch teeth 26.

A disc 31 on the opposite side of the gear 21 from the sleeve 27 is keyed or otherwise secured to the shaft 22 for rotation therewith. This disc is provided with a notch 32 in its periphery for receiving a latching pawl 33 therein when said notch assumes a position as shown in dotted lines in Figure 3. The pawl 33 is formed on one end of a lever arm 34 which is pivotally mounted intermediate its ends. The other end of the lever arm 34 carries an electrical contact 35 which will be moved into engagement with a stationary contact member 36 upon the movement of the pawl 33 into the notch 32 under the influence of a spring 37 which is connected to said lever arm. At the same time that the notch 32 is moved to the position as shown in dotted lines in Figure 3, a pin 38 on the disc 31 will engage a pivotally mounted arm 39 and move it against a stop pin 40. The arm 39 carries a projecting portion 41 which is connected to one side of an electrical circuit and forms a movable contact for cooperating with a stationary contact 42 to open and close the electrical circuit. A solenoid 43 is operatively associated with the arm 39 and will upon being energized move the portion 41 into engagement with contact 42 to close the electrical circuit. Similarly, as solenoid 44 is operatively associated with the arm 34 and will upon being energized move the contact 35 out of engagement with contact 36 and simultaneously diengage the latch pawl 33 from the notch 32.

The outer end of the shaft 22 has secured thereto an arm 45 which forms the gate. The outer end of this arm is provided with a box 46 having sides of glass or other material bearing the legend "Stop" which is illuminated by a lamp 47 within the box. The opposite end of the arm 45 extends outwardly beyond the shaft 22 and carries a counterweight 48 which is sufficiently heavy to cause the gate to move to raised position under the influence of gravity, when the latch pawl 33 is disengaged from the notch 32.

The housing 13 is secured to a swivelled head 49 which is mounted upon ball bearings 50 at the top of a pedestal support 51 having a hollow base 52. This head is keyed to a shaft 53 which extends through and is rotatable in a central bore 54 of the pedestal support. The lower end of this shaft extends into the hollow portion of the base 52 and has mounted thereon an arm 55. A torsion spring 56 surrounds the shaft 53 and is connected at one end to said shaft and at the other end to said pedestal, so that the shaft and housing will always assume a normal position as determined by a stop pin 57 which is secured to the pedestal and is disposed so as to limit the movement of the arm 55. This arrangement permits the gate arm 45 and housing 13 to be swung

away from normal position as shown in dotted lines in Figure 2, without causing damage thereto as might otherwise result by a motorist accidentally running into the gate.

The rail switch 4 for closing the electrical control circuit of the gate operating mechanism comprises a housing 58 for enclosing the switch mechanism. A shaft 59 is rotatably supported in this housing and has secured thereto a contact member 60 to which an electrical circuit is connected. Oppositely extending tension springs 61 are connected to the contact member 60 to maintain it in a normal vertical position spaced between a pair of stationary contact members 62 and 63. An end of the shaft 59 extends through an aperture in the web of a rail 64 and has secured thereto a crank arm 65 which projects above the top surface of the rail for engagement by the wheels of a train. Displacement of the arm 65 in either direction from its normal position will cause the contact member 60 to engage either the stationary contact 62 or 63, depending upon which way the arm 65 is rotated.

The operation of my device will now be described by referring to the simplified wiring diagram in Figure 7. When a train approaches the crossing from the side where the switch 4 is located, the wheels of the train will cause the contact member 60 of said switch to engage the contact member 62, thereby energizing the solenoid 43 from a battery 66 through the following circuit: From one terminal of the battery through conductor 67, conductor 68, conductor 69, conductor 70, conductor 71, through contact member 60 of the switch 4 to contact member 62, through conductor 72, conductor 73 to one terminal of the solenoid 43, from the other terminal of the solenoid through conductor 74, conductor 75, and thence through conductor 76 to the other terminal of the battery. Upon energization of the solenoid 43, it will attract the arm 39 and move the contact 41 into engagement with the stationary contact 42 to connect the motor 15 to the battery 66 through the following circuit: From one terminal of the battery through conductor 67, conductor 77 to one terminal of the motor, from the other terminal of the motor through conductor 78 to the stationary contact 42, contact 41, conductor 79, and thence through conductor 76 to the other terminal of the battery. The motor then begins to operate and will rotate the disc 31 in an anti-counterclockwise direction to move the gate from a vertical position to a horizontal position as shown in dotted lines in Figure 3. As soon as the gate reaches the horizontal or lowered position, the notch 32 will have moved to the position shown in dotted lines and the latch pawl 33 will move thereinto under the action of spring 37. At this instant, the pin 38 will have displaced the arm 39 to break the motor circuit, whereupon the motor will stop. Also, as soon as the gate reaches the lowered position, the cam 28, shown in Figure 2, will have disengaged the clutch teeth 26 to permit the shaft 22 to be operated in the opposite direction. The shaft, however, cannot be rotated in the opposite direction so long as the latch pawl 33 is in the notch 32. Upon the movement of the pawl into the notch 32, the contacts 35 and 36 will be moved into engagement and the lamp 47 will be lighted through the following circuit: From one terminal of the battery 66 through conductor 67, conductor 68, conductor 69, conductor 80 to one terminal of the lamp, from the other terminal of the lamp to conductor 81, contacts 36 and 35, conductor 82, conductor 83, conductor 75, and thence through conductor 76 to the other terminal of the battery.

As soon as the train reaches the switch 4*b*, the contact 60 thereof will be moved into engagement with contact 62, thereby energizing the solenoid 44 through the following circuit: From one terminal of the battery 66 through conductor 67, conductor 68, conductor 69, conductor 70, contacts 60 and 62, conductor 84, to one terminal of the solenoid, from the other terminal of the solenoid through conductor 85, conductor 83, conductor 75, and thence through conductor 76 to the other terminal of the battery. The energizing of the solenoid 44 will attract the arm 34 and disengage contacts 35 and 36 and at the same time withdraw the latch pawl 33 from the notch 32. This action will release the gate and permit it to be automatically moved to a vertical position by the action of gravity upon the counterweight 48.

If it is now assumed that a train should approach switch 4*a* in coming to the crossing, the contact 60 thereof will be moved into engagement with contact 63 and again energize the coil 43 through the following circuit: From one terminal of the battery 66 through conductor 67, conductor 68, conductor 86, contact members 60 and 63, conductor 87, conductor 73 to one terminal of the solenoid, from the other terminal of the solenoid through conductor 74, conductor 75, and thence through conductor 76 to the other terminal of the battery. The energization of the coil 43 will start the motor as before and lower the gate, the action being the same as previously described in connection with the operation of switch 4.

When the train reaches the switch 4*b*, the contact member 60 will be moved into engagement with contact 63, and, since the contacts 62 and 63 are connected to the same circuit, the action will be the same as pre-

viously described, and the gate will thereupon be raised as before.

My invention, therefore, provides an improved railway crossing gate and signal which may be accidentally run into by a motorist approaching the crossing and it will swing out of the way and not be damaged and will automatically return to normal position across the highway; which is automatically returned to vertical position by gravity and will not hold up traffic even though the motor has ceased to function; which is simple in design, has a minimum number of moving parts to wear out, and is dependable in operation.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the spirit of this invention, and I therefore do not purpose limiting the patent granted hereon otherwise than is necessitated by the state of the prior art.

What I claim and wish to secure by Letters Patent is—

A railway crossing gate comprising a housing, a rotatable shaft trunnioned on said housing, a gate arm carried by said shaft, an electric motor connected to said shaft through a clutch for rotating said shaft to lower the gate arm, a disc member secured to and rotatable with said shaft, said disc having a notch in its periphery, a pawl arranged to enter said notch and latch the gate arm in a lowered position, means for actuating said clutch to disconnect said motor from said shaft and break the motor supply circuit, an electrical means operable to release said latch whereby said gate arm is raised by gravity.

In testimony whereof I affix my signature.

HAROLD A. BUTTS.