May 6, 1924. 1,493,317

J. T. BERNARD

AUTOMATIC RAILROAD GATE

Filed Nov. 5, 1923 3 Sheets-Sheet 1

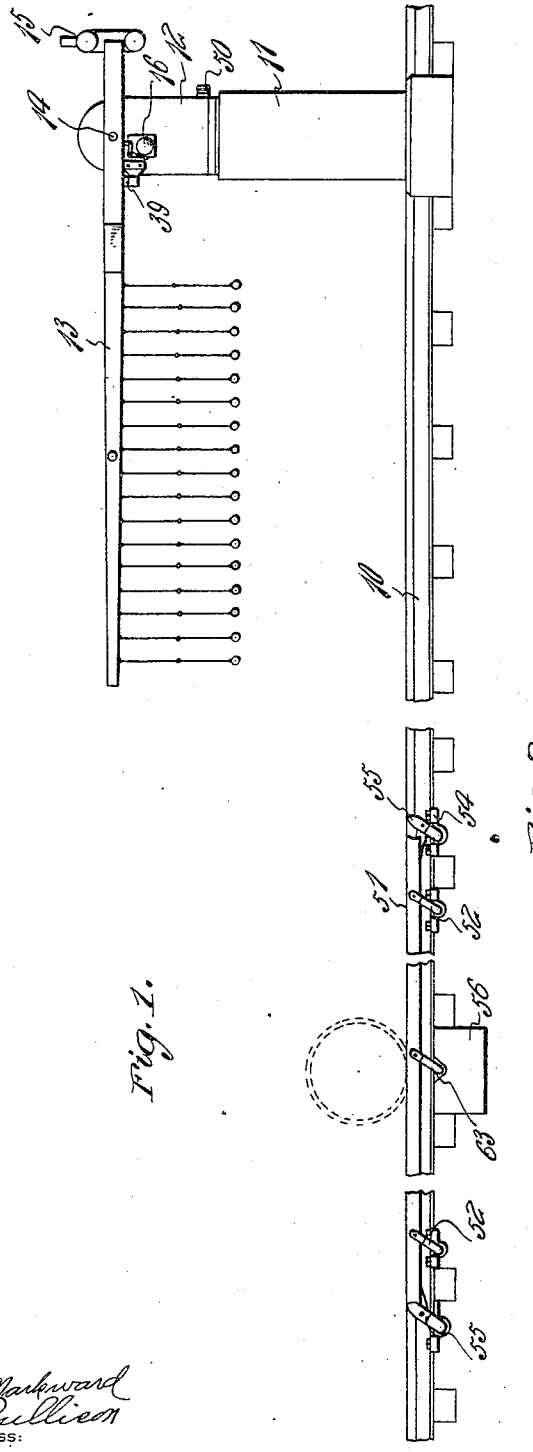


Fig. 1.

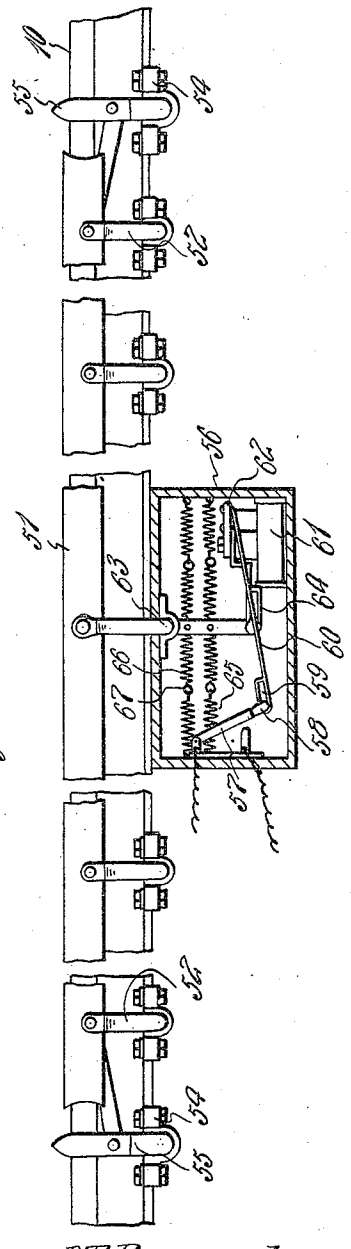


Fig. 2.

J. T. Bernard
INVENTOR

BY Victor J. Evans
ATTORNEY

E. W. Markward
H. Cullison
WITNESS:

May 6, 1924. 1,493,317

J. T. BERNARD

AUTOMATIC RAILROAD GATE

Filed Nov. 5, 1923 3 Sheets-Sheet 2

Fig. 9.

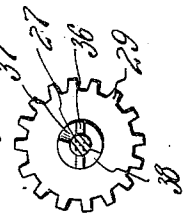


Fig. 8.

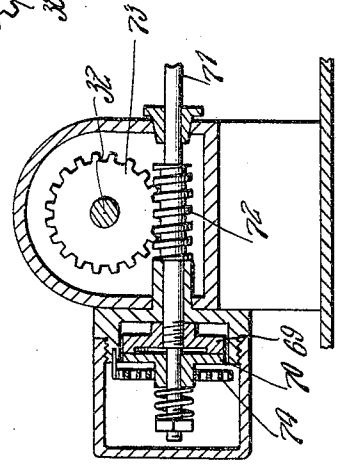


Fig. 10.

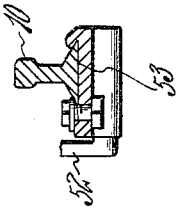


Fig. 7.

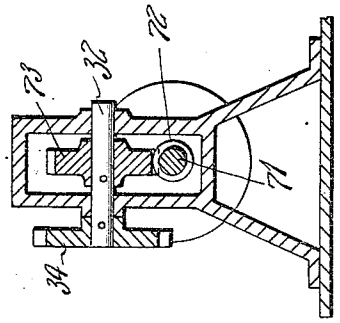


Fig. 4.

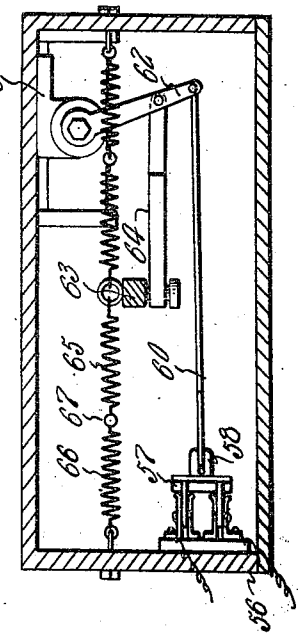
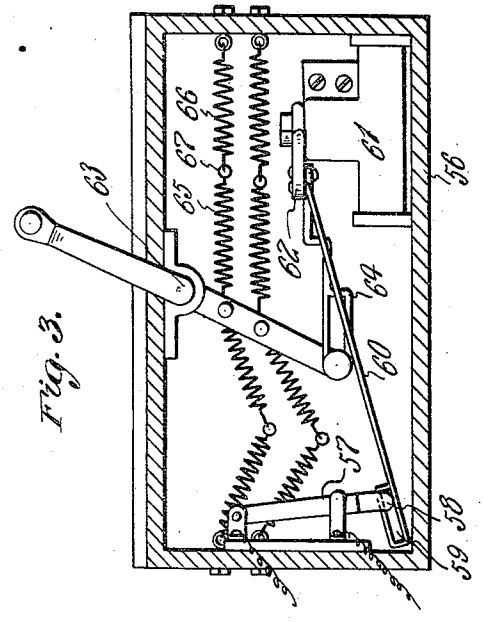


Fig. 3.



J. T. Bernard

INVENTOR

BY Victor J. Evans

ATTORNEY

W. Markward
H. Cullison
WITNESS:

May 6, 1924.

1,493,317

J. T. BERNARD

AUTOMATIC RAILROAD GATE

Filed Nov. 5, 1923

3 Sheets-Sheet 3

Fig. 6.

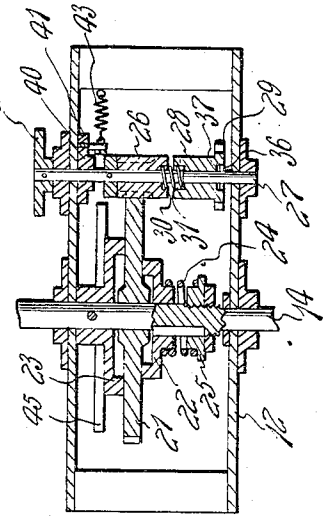


Fig. 11.

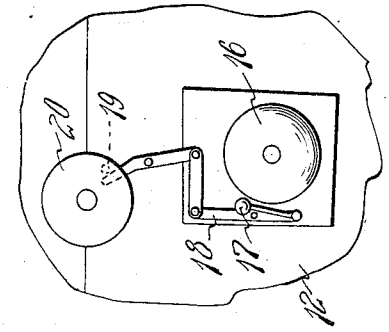


Fig. 12.

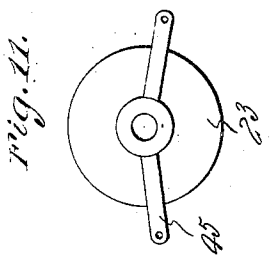


Fig. 5.

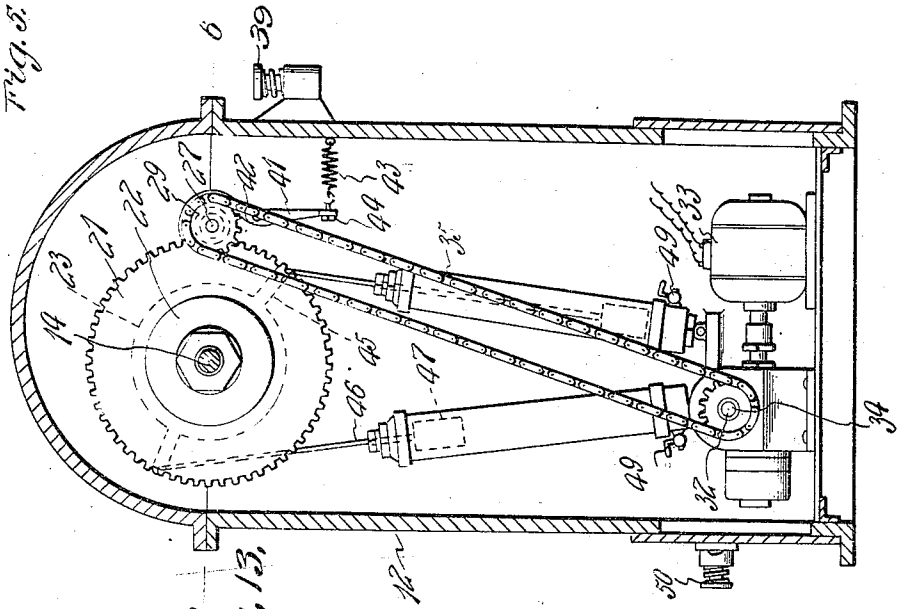
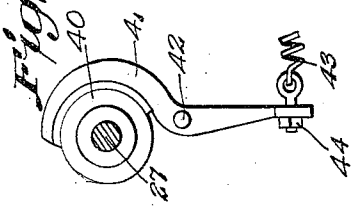


Fig. 13.



J. T. Bernard

INVENTOR

BY Vieu. J. Evans

ATTORNEY

WITNESS:

Patented May 6, 1924. 1,493,317

UNITED STATES PATENT OFFICE.

JAMES T. BERNARD, OF DANVILLE, VIRGINIA.

AUTOMATIC RAILROAD GATE.

Application filed November 5, 1923. Serial No. 672,996.

To all whom it may concern:

Be it known that I, JAMES T. BERNARD, a citizen of the United States, residing at Danville, in the county of Pittsylvania and State of Virginia, have invented new and useful Improvements in Automatic Railroad Gates, of which the following is a specification.

This invention relates to railroad gates and more particularly to means for automatically operating the same.

In carrying out the invention, I provide a gate operating mechanism controlled by an electric motor, the circuit for the latter being closed by train actuated means which holds the gate closed until the train passes the crossing, the gate subsequently returning to its normal position.

Another important object of the invention resides in providing a clutch in the gate operating mechanism, whereby said mechanism is rendered inoperative after the gate reaches its active position, and also while the circuit is still closed.

The nature and advantages of the invention will be better understood when the following detailed description is read in connection with the accompanying drawings, the invention residing in the construction, combination and arrangement of parts as claimed.

In the drawings forming part of this application. like numerals of reference indicate similar parts in the several views, and wherein:

Figure 1 is a view in elevation showing the gate lowered to its active position, and the position of the train actuated means while the train is passing over the crossing.

Figure 2 is an enlarged view partly in section showing the normal position of the train actuated means.

Figure 3 is an enlarged view of the switch included in the train actuated means, showing the active position of the movable switch element and its associated parts.

Figure 4 is a sectional view taken through Figure 3 and at a right angle thereto.

Figure 5 is a sectional view through the housing for the gate operating mechanism showing said mechanism in elevation.

Figure 6 is a sectional view taken on the line 6—6 of Figure 5.

Figure 7 is a sectional view taken through Figure 8 at a right angle thereto.

Figure 8 is a view taken at a right angle to Figure 7 and partly in section.

Figure 9 is a detail view of one of the collar pinions used in the gate operating mechanism.

Figure 10 is a sectional view showing the manner of attaching the train actuated means to the rail of the trackway.

Figure 11 is a detail view of one of the clutch members.

Figure 12 is a fragmentary view of the signal.

Figure 13 is an enlarged view of the braking element showing it in active position.

Referring to the drawings in detail, 10 indicates one rail of a trackway, with which the train actuated mechanism above referred to is associated. Arranged adjacent the trackway is an upright 11 which supports the housing 12, the latter containing the gate operating mechanism, the gate being indicated at 13 and pivoted on said housing as at 14. The free end of the gate supports a weight 15 which automatically returns the gate to its normally vertical position after the train passes the crossing; it being of course understood that the mechanism is operated by the train to lower and hold the gate in the position shown in Figure 1, while the train is passing the crossing. Supported by the housing 12 is a signal in the nature of a bell indicated at 16, this signal is sounded while the gate is being lowered to its active position, and continues to ring as long as the gate remains lowered. The hammer for the bell is indicated at 17 and is carried by one of a plurality of pivotally connected levers 18, one of these levers being disposed in the path of a movable pin 19 carried by a disk 20 and rotated incident to the operation of the gate mechanism, the pin 19 tripping the lever arranged to actuate the hammer and thus sound the bell.

The gate is pivoted, or in other words mounted upon the shaft 14 forming part of the gate operating mechanism, this mechanism including a gear 21 which is loosely mounted on said shaft being arranged between cooperating clutch elements 22 and 23 respectively. The former of these elements is spring pressed against one side of the gear 21, the spring for this purpose being indicated at 24, and the tension of the spring can

be conveniently regulated through the instrumentality of an adjusting nut 25. The other clutch member 23 is keyed or otherwise suitably secured to the shaft 14 to rotate therewith. The gear 21 meshes with a smaller gear 26 loosely mounted upon the shaft which carries the disk 20 above referred to. This small gear 26 is arranged in end to end relation with a collar 28, one end of which supports a pinion 29. This collar 28 is keyed to the shaft 27 for rotation therewith, and the manner in which this collar is associated with said shaft permits the collar a sliding longitudinal movement of the shaft for a purpose to be presently described. The adjacent ends of the small gear 26 and the collar 28 are provided with ratchet teeth 30 which are normally spaced apart through the instrumentality of a small spring 31. The collar 28 is rotated from a motor driven shaft 32, the motor being indicated generally at 33. The shaft 32 supports a pinion 34 over which and a pinion 29 forming part of the collar 28, is trained an endless chain 35. The pin 36 which associated the collar 28 with the shaft 27 passes through an opening 37 provided in the collar, this opening having an outline to provide an inclined wall 38 which moves along the pin 36 in a manner to allow the collar 28 to move into interlocking association with the small gear 26 when movement is initially imparted to the collar 28 from the motor, consequently the small gear 26 is locked with the collar 28 to rotate in unison therewith and with the shaft 27, and the gear 26 then serves to rotate the large gear 21 of the mechanism. This large gear 21 is held between the cooperating clutch members 22 and 23 in fixed relation to the shaft 14 as long as the mechanism is in operation to lower the gate 13, but just as soon as the gate assumes the position shown in Figure 1, being limited in its downward movement by means of a resilient stop 39, the large wheel 21 is allowed to idle between the clutch members 22 and 23, and continues to so idle as long as the circuit for the motor is closed. Carried by the shaft 27 is a brake drum 40 which is engaged by a braking element 41 pivoted as at 42, and having one end connected with a spring 43 whereby the braking element is held in effective contact with the brake drum. The spring 43 is adjustably connected with one end of the braking element as at 44, so that the tension of the spring can be regulated with a view to having the shaft 27 rotate with a more or less uniform speed. Again, I also provide means for regulating the speed of rotation of the shaft 14, so that the gate proper will not be too abruptly raised or lowered, this means consisting of a pair of oppositely disposed arms 45 carried by the clutch member 23 and terminally connected with the piston rods 46 of a pair of pneumatic door checking devices. These rods are associated with the pistons 47 which operate in cylinders 48, the latter being provided with bleed valves 49 adjacent the lower ends thereof. The housing for the gate operating mechanism also supports a resilient stop 50 which is engaged by the gate when the latter is returned to its normally vertical position.

The motor 33 is of the electrical type, and included in circuit with a switch forming part of a train actuated mechanism so that the motor is automatically put into operation by the train as it approaches and continues over the crossing. This train actuating mechanism consists of a tread bar 51 which is arranged parallel with the rail 10 of the trackway, normally projecting a slight distance above the head of the rail as clearly illustrated in Figure 2. The bar 51 is supported by a plurality of pivoted links 52, each of these links being pivotally associated with a clamp 53 designed to embrace the base of the rail as clearly shown in Figure 10. Similarly associated with clamps 54 at either end of the tread bar 51 are trip elements 55 connected with the bar to impart longitudinal movement thereto with respect to the rail 10, when these trip elements are engaged by the wheels of the train. When the trip elements are actuated in the manner just described, the bar 51 is not only moved longitudinally of the rail 10 but is simultaneously lowered to lie flush with the head of this rail, in a position where it will be engaged by the wheels of the train as long as the latter continues to pass by the crossing. Arranged beneath the base of the rail is a switch casing 56 which contains the switch above referred to, this switch being similar to the well known knife switch and indicated at 57. The movable element of this switch is formed with an eye 58 which receives the looped extremities 59 of a rod 60, the latter being connected with a pneumatic checking device 61 of a construction similar to the well known door check which operates to retard the return movement of the train actuated mechanism to normal position after the train has passed the crossing. The rod 60 is of course connected with the valve operating element 62 of this pneumatic device, so that when the switch is closed, the valve of the pneumatic device is opened to allow air to enter said device, and when the switch is being gradually opened, the valve is gradually closed to retard the return movements of the mechanism to normal position. Of course, the valve is not directly actuated by the rod 60, this rod primarily controlling the movements of the switch element 57. Arranged to operate within the switch casing, however, is a crank shaft 63, one end of which

is connected to an arm 64 associated with the valve of the pneumatic device, while the other end of said shaft projects through a slot in said casing and is connected with the tread bar 51. Manifestly, as the tread bar 51 is moved longitudinally of the rail 10 and simultaneously lowered the shaft 63 is rocked, moving the lower end of this shaft to the position clearly shown in Figure 3, in which position, a pull having been exerted upon the arm 64 opens the valve as clearly shown. As the valve is being opened by the arm 64, the rod 60 is shifted to the position shown in Figure 3. The slotted connection between the switch element 47 and the looped extremity 59 of this rod allowing for the necessary lost motion in the initial operation of the mechanism, the rod however being operable to close the switch and thus energize the circuit in which the motor 33 is included. When the motor 33 is put into operation, the gate operating mechanism is called into use, and the gate lowered to its active position as shown in Figure 1. Arranged within the casing 56 are springs terminally connected to the opposed ends of the casing and to the opposite sides of the crank shaft 63, these springs normally holding the shafts in the position shown in Figure 2. and also operating to automatically return the shaft and the thread bar 51 to their normal positions after being actuated by the train. It will be noted that each spring just referred to is made up of two sections indicated at 65 and 66 respectively, the adjacent ends of these sections being pivotally connected together by eyes 67 formed by the final convolutions of each spring, so that the springs can flex in the manner shown in Figure 3 when the crank shaft 63 is actuated to prevent buckling, breaking or bending of the springs in a manner which would impair their usefulness.

In Figure 8, I have shown a friction clutch, the respective members of which are indicated at 69 and 70. The member 69 is secured to the worm shaft 71, which worm 72 of said shaft meshes with the gear 73 carried by the motor driven shaft 32. Associated with the other clutch member 70 is a clock spring 74 which is wound and consequently tensioned while the gate is being lowered. After the switch has been opened, the clutch mechanism shown in Figure 8 reverses the motor in order to release the clutch mechanism shown in Figure 6 and thereby allow the gate to rise to its normal position.

In practice, when the train approaches the crossing and contacts the bar 51, the latter is depressed and moved longitudinally of the rail in a manner above described, and for the purpose of closing the circuit to the electric motor through the switch arranged in the casing 56. It is during the operation of the motor that the gate is swung from a vertical to a horizontal active position, a motor driven shaft 32 being connected by means of an endless chain with the shaft 27, whereby the latter is rotated from the driven shaft 32. Upon the initial rotation of this shaft 27, the collar 28 is shifted longitudinally of the shaft into interlocking association with the gear 26, thereby causing the gear to rotate with the collar in unison. A smaller gear 26 meshes with the large gear 21 arranged upon the shaft 14, thereby rotating the last mentioned shaft in a direction to lower the gate. It is of course to be understood that the large gear 21 is arranged between cooperating clutch members on said shaft 14, which hold the gear 21 fixed relative to the shaft 14 as long as the mechanism is in operation to lower the gate, but just as soon as the gate assumes its lowered position, the circuit is automatically opened, during which time the large gear is permitted to idle on the shaft 14. While the gate is being lowered the clock spring 14 associated with one of the clutch members of the structure shown in Figure 8 is wound and tensioned, so that after the circuit has been broken this clutch mechanism in Figure 8 operates to reverse the motor in order to release the clutch shown in Figure 6 and thus allow the gate to return to its normal position, as above described. The various pneumatic checking devices control the speed with which the gate is allowed to be lowered or elevated.

While it is believed that from the foregoing description, the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described, and that such changes may be resorted to when desired as fall within the scope of what is claimed.

Having thus described the invention, I claim:

1. The combination with a railroad crossing gate, of mechanism for automatically lowering said gate, and including a motor driven shaft, a gate supporting shaft geared to said driven shaft, an adjustable brake for said driven shaft whereby the speed of rotation of the latter can be regulated, a switch for said motor, and train actuated means for closing said switch.

2. The combination with a railroad crossing gate, of mechanism for automatically lowering said gate and including a motor driven shaft, a gate supporting shaft arranged parallel with said driven shaft, a gear loosely mounted on the gate supporting shaft and geared to the driven shaft for rotation therefrom, cooperating frictional clutch members arranged on the gate shaft at opposite sides of said gear and adapted to hold the latter fixed with relation to said

shaft while the gate is being lowered and subsequently allowing said gear to idle on said shaft, a switch for said motor, and train actuated for closing said switch.

3. In combination with a railroad crossing gate, of mechanism for automatically lowering said gate and including a motor driven shaft, a gate supporting shaft arranged parallel with the first mentioned shaft, a gear loosely mounted on the driven shaft, a larger gear loosely mounted on the gate shaft, a sliding clutch member designed to cooperate with the first mentioned gear to hold the latter fixed relatively to the driven shaft for rotation therewith, cooperating frictional clutch members supported by the gate shafts at opposite sides of the larger gear thereon for holding said gear fixed with relation to the gate shaft for rotation therewith while said gate is being lowered, one of said cooperating clutch members being yieldably mounted to allow said large gear to idle on said shaft after the gate has been lowered, a switch for said motor, and train actuated means for closing said switch.

4. The combination with a railroad crossing gate, of mechanism for automatically lowering said gate and including an electrically operated motor, a switch for said motor, and train actuated mechanism for closing said switch, said mechanism including a tread bar arranged parallel with one rail of the trackway and normally projecting above said rail, means for movably supporting said bar whereby the latter is moved longitudinally of said rail to lie flush with the head thereof, a switch operating element carried by said bar, and a tripping element connected with said bar and adapted to be actuated by the wheels of the train.

5. The combination with a railroad crossing gate, of mechanism for automatically lowering the gate and including an electrically operated motor, a switch for said motor arranged adjacent the trackway, a tread bar arranged adjacent one rail of the track longitudinally thereof and normally projecting above the head of the rail, means for movably supporting said bar whereby the latter can be shifted to a position to lie flush with the head of the rail, a trip element connected with said bar and adapted to be actuated by the wheels of the train, a crank shaft terminally connected with said bar and adapted to be rocked simultaneously with movement of said bar, and a connection between the crank shaft and said switch, whereby the latter is closed when the bar assumes its shifted position.

6. The combination with a railroad crossing gate, of means for automatically lowering said gate and including an electrically operated motor, a switch for said motor, a casing enclosing said switch and arranged beneath the trackway, a tread bar arranged adjacent one rail of the track and normally projecting a slight distance above the head of said rail, means movably supporting said bar whereby the latter can be shifted to a position to lie flush with the head of the rail to be engaged by the wheels of the train, a trip element for shifting said bar and adapted to be actuated by said train, a crank shaft terminally connected with said bar and having its other terminal arranged within said casing, a pneumatic check device including a valve connected with said crank shaft to retard the movements of said train actuated mechanism, a connection between said valve and switch element whereby the latter is closed when the valve is moved in one direction, and said bar assumes its shifted position, and resilient means for normally holding said shaft in its normal position, and returning said train actuated mechanism to normal position after each operation.

In testimony whereof I affix my signature.

JAMES T. BERNARD.