Oct. 2, 1928. 1,686,430

C. WRIGHT

SAFETY GATE

Filed May 27, 1927

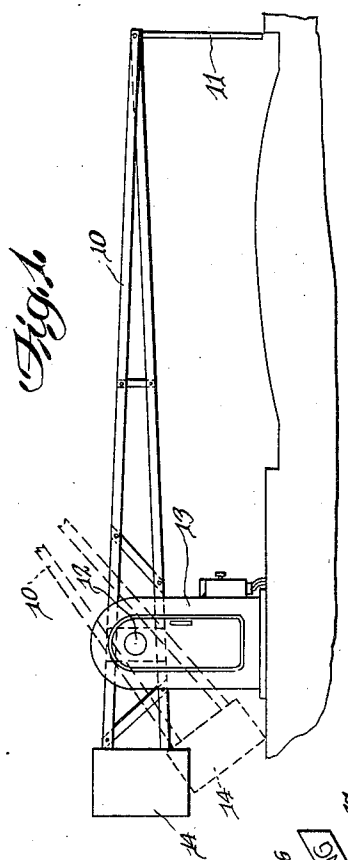


Fig. 1.

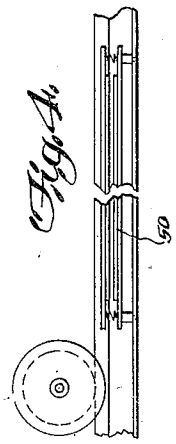


Fig. 4.

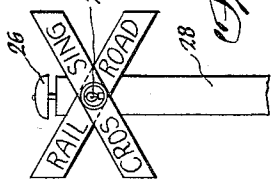


Fig. 5.

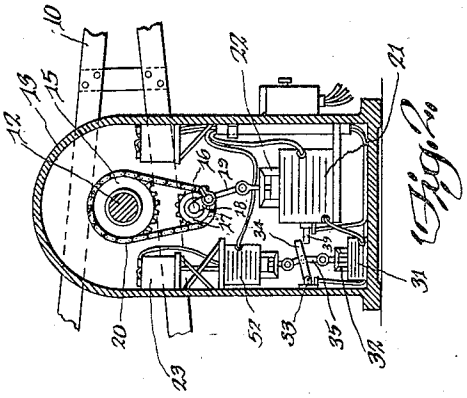


Fig. 2.

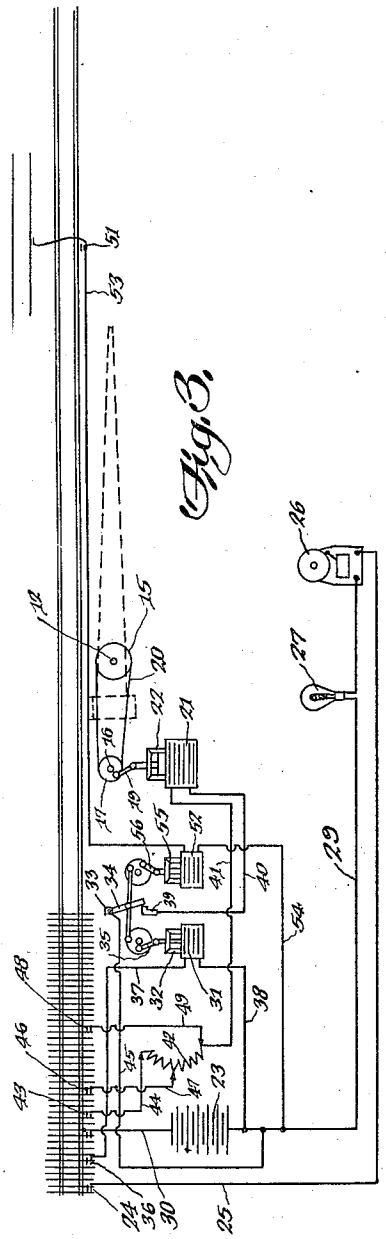


Fig. 3.

Charles Wright
INVENTOR

BY Victor J. Evans

ATTORNEY

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UNITED STATES PATENT OFFICE.

CHARLES WRIGHT, OF EVANSTON, ILLINOIS.

SAFETY GATE.

Application filed May 27, 1927. Serial No. 194,758.

This invention relates to certain novel improvements in safety gates adapted to be used at the intersection of a highway and a railroad and more particularly to such gates adapted for automatic operation.

As is well understood gates of the foregoing type must be positive in operation. It is therefore the salient object of my invention to provide a safety gate for railroad crossings which will embody an arrangement which will operate automatically in a positive manner and which will embody a minimum number of moving parts in order to insure said positive operation.

Another object of the invention is to provide a safety gate for railroad crossings which will embody an electromagnetic construction for the operation of said gates in one direction and which will include weight means for operating the gate in the other direction.

A further object of the invention is to provide an automatic safety gate for railroad crossings which will embody a structure that will produce a warning signal prior to the operation of said gates.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings, showing the preferred form of construction and in which:

Fig. 1 is a side elevational view of a preferred embodiment of my safety railroad crossing gate;

Fig. 2 is a longitudinal sectional view of the housing containing the operating mechanisms for the gate;

Fig. 3 is a schematic view of the electrical connections embodied in my invention;

Fig. 4 is a detail view of a contact structure employed in the invention; and

Fig. 5 is a detail view of a warning signal which operates prior to the safety gate.

In the preferred embodiment of my invention, illustrated in the accompanying drawings, a gate 10 is adapted to obstruct passage along a public highway over a railroad track. In the present instance I depict the gate 10 as being of a type adapted to extend entirely across the highway and a leg 11 is pivotally attached to the outer end of the gate 10 that is adapted to support the outer end of said gate when it is in lowered position. It is to be understood that if the highway is wide, two gates will be employed, one on each side that will be adapted to obstruct passage along one half of the highway.

In the present instance the gate 10 is mounted on the shaft 12 that is journaled in suitable bearings (not shown) that are provided in the housing 13. Preferably the shaft 12 and the housing 13 are located with respect to the gate 10 in such a way that the major portion of the gate extends across the highway and that the remaining portion of the gate will be arranged so that a counter balance 14 may be mounted, these two portions being adapted to pivot with the shaft 12. The counter balance 14 is of greater weight than the portion of the gate 10 on the opposite side of the shaft 12 in order that said counterweight will tend to hold the gate in raised position.

On the shaft 12 within the housing 13, a pinion 15 is mounted. Supported within the housing 13 is a shaft 16 to which a pinion 17 is keyed. The shaft 16 is rotatably journaled in the bearings (not shown) that are provided in the housing 13. An arm 18 is secured to the shaft 16 and a connecting rod 19 has pivotal connection with the outer end thereof. A chain belt 20 connects the pinions 15 and 17 but it is to be understood that any other analogous structure might be substituted.

Mounted within the housing 10 is a magnetic coil 21 which is adapted to be of the solenoid type and a movable core 22 is provided in this coil that is adapted to be attracted thereby. The connecting rod 19 is pivotally attached to the core 22 and movement of said core is translated through the connecting rod 19 through the arm 18 to the shaft 16. Mounted within the housing 13

is a source of electrical energy which in the present instance is composed of a battery bank 23.

Positioned along one rail of the railroad track are a series of switches that are adapted to be operated by the wheels of a passing train. These switches may be of any desired type and are arranged in a manner to be described. It is readily apparent that a warning device must be provided which will be operable before the gates are lowered in order that pedestrians and vehicles on the crossing may be appraised of the fact that the gates are to be lowered. Therefore a switch 24 is located along the rails at a point far in advance of the gate operating switches. A conductor 25 connects the switch 24 to the warning devices which in the present instance are comprised of a bell 26 and a lamp 27 that are mounted on a post 28 that is located at a readily visible point along the highway. A conductor 29 connects the warning devices 26 and 27 with a battery 23 and the switch 24 is connected with the battery through a conductor 30.

In order to close the circuit to the gate operating mechanism 21 an auxiliary switch structure is provided which in the present instance comprises a solenoid coil 31 that is adapted to attract a movable core 32. Secured to a wall of the housing 13 is a pivotal mounting 33 on which the switch blade 34 is pivotally mounted. Pivotally attached to the switch blade 34 and the movable core 32 is a connecting arm 35 that is adapted to transmit movement of said core 32 to said blade 34. Located along the rails at a point behind the switch 24 is a switch 36 that is connected to the core 31 by a conductor 37. A conductor 38 connects the winding of the core 31 to one terminal of the battery 23 and the conductor 30 connects the other terminal of the battery to the switch 36. When the switch 36 is closed current will flow from the battery 23 through conductor 30, switch 36, conductor 37, through the windings of the solenoid coil 31, and conductor 38, back to the battery 23, thus providing a closed circuit which will create a magnetic flux in coil 31 which will attract the core 32 that will move downwardly and cause the switch blade 34 to engage the contact 39.

A conductor 40 connects the contact 39 with the winding of the solenoid coil 31. The conductor 41 connects the other terminal of the coil 21 to one terminal of a resistance 42. The resistance 42 is adapted to control the current input to the coil 21. This is accomplished by connecting a plurality of switches located along the rail to said resistance at points arranged to gradually reduce the effective resistance of said coil. The first switch to be engaged by an on-coming train is the switch 43 which is connected to the resistance 42 through a conductor 44 that is connected to the resistance 42 in such a way as to include the entire resistance in the circuit. When the switch 43 is closed current will flow from the battery 23 through conductor 30, switch 43, conductor 44, resistance 42, conductor 41, coil 21, conductor 40, contact 39, blade 34 and conductor 45 to the other terminal of the battery 23. This will close the circuit to the coil 21 and will cause said coil to create a magnetic flux which will attract the movable armature 22. The magnitude of the attraction however will be comparatively small due to the fact that the resistance 42 is in the circuit. It will be sufficient however to begin movement of the gate 10 which will be caused by the downward movement of the armature 22 that will be translated to the connecting rod 19, arm 18, pinion 17, shaft 16, chain belt 20, pinion 15, to shaft 12 on which the gate 10 is mounted. A short time after the circuit is closed by the switch 43 the switch 46 will be engaged. The switch 46 is attached to the resistance coil 42 by a conductor 47 which engages the resistance in such a way that part of the effectiveness thereof is reduced. The circuit to the coil 21 may be the same as that described except that the current will now flow through the conductor 47, instead of the conductor 44 and therefore a greater flux will be built up in the coil 21 which will accelerate the movement of the armature 22. The switch 48 is next engaged which is connected through a conductor 49 to the resistance 42 at the same point the conductor 41 is attached to said resistance and therefore said resistance is entirely cut out of the circuit which will permit the coil 21 to exert its maximum magnetic force. This will cause further acceleration of the core 22 and will completely lower the gate 10.

A contact strip 50 is positioned along the rail at a point behind the switch 48 and is arranged so that it will be held in engaging position as long as a train is passing over the crossing. As soon as the last car of the train disengages the contact strip 50 the circuit will be opened and the counter balance 14 will cause the gate to raise which will cause the armature 22 to assume its inoperative position.

In order to re-position the armature 32 a switch 51 is provided at a point beyond the end of the contact strip 50. The contact strip 50 is connected to a solenoid coil 52 by a conductor 53 and the other terminal of the coil 52 is connected to the battery 23 by a conductor 54. The switch 51 is attached to the other terminal of the battery 23 by an extension of the conductor 30. When the circuit is closed by the switch 51 the coil 52 is energized by current which will flow through the conductor 30, switch 51, conductor 53, coil 52, and conductor 54. This will cause a magnetic flux to be exerted by the coil 52 which will act on the movable armature 55, the movement of which will be translated through a connecting rod 56 that is pivotally

attached thereto and which is also pivotally attached to the contact blade 34 which will cause the blade 34 to disengage the contact 39.

It is apparent that a gate will be required on each side of the railroad crossing. The other gate will be operated in the same manner as that described for the gate 10. In the event a double track system is provided duplicate sets of switches will be located on the respective sides of the highway depending on the direction of operation over the tracks.

It is apparent from the foregoing description that I have provided a gate operating mechanism which embodies a minimum number of operating parts and in view of the fact that an electromagnet is used to operate the gates, the apparatus will function in a positive manner.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification, without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention what I claim as new and desire to protect by Letters Patent is:

1. A device of the class described including a crossing gate mounted on a rockable shaft, means tending to hold said gate in raised position, a housing in which said shaft is mounted, another shaft mounted in said housing, and means connecting said shafts, an electro-magnet having a movable core, means connecting said core and said second mentioned shaft, a circuit for said electromagnet including, a source of energy, a resistance, and a plurality of switches operated by an approaching train, said switches being arranged to gradually cut out said resistance from the circuit.

2. In combination, a housing, a shaft rockably journaled in said housing, a crossing gate mounted on said shaft embodying a counter-balance tending to hold said gate in raised position, another shaft in said housing operatively connected to said first mentioned shaft, means for moving said shafts to lower said gate including an electromagnet having a movable core operatively connected to said second mentioned shaft, a circuit for said electro-magnet including an energizing source, a resistance, and an electro-magnetic switch means controlling said circuit, a switch means operated by an approaching train for actuating said electromagnetic switch means for closing said circuit, and a plurality of switch means successively operated by said approaching train adapted to cut out said resistance in a step by step manner to gradually accelerate said electro-magnet.

3. In combination, a housing, a shaft rockably journaled in said housing, a crossing gate mounted on said shaft embodying a counter-balance tending to hold said gate in raised position, another shaft in said housing operatively connected to said first mentioned shaft, means for moving said shafts to lower said gate including an electro-magnet having a movable core operatively connected to said second mentioned shaft, a circuit for said electro-magnet including an energizing source, a resistance, and an electro-magnetic switch means controlling said circuit, a switch means operated by an approaching train for actuating said electro-magnetic switch means for closing said circuit, and a plurality of switch means successively operated by said approaching train adapted to cut out said resistance in a step by step manner to gradually accelerate said electro-magnet, said operating mechanisms being returned to inoperative position after the passing of said train by said counter balance.

4. In combination, a housing, a shaft rockably journaled in said housing, a crossing gate mounted on said shaft embodying a counter-balance tending to hold said gate in raised position, another shaft in said housing operatively connected to said first mentioned shaft, means for moving said shafts to lower said gate including an electro-magnet having a movable core operatively connected to said second mentioned shaft, a circuit for said electro-magnet including an energizing source, a resistance, and an electro-magnetic switch means controlling said circuit, a switch means operated by an approaching train for actuating said electro-magnetic switch means for closing said circuit, and a plurality of switch means successively operated by said approaching train adapted to cut out said resistance in a step by step manner to gradually accelerate said electro-magnet, said operating mechanisms being returned to inoperative position after the passing of said train by said counter balance, and electro-magnetic means operated by said train after passing for breaking said circuit and repositioning said electro-magnetic switch.

5. In combination, a crossing gate, means for lowering said gate including an electromagnet having a movable core, the circuit of said electromagnet including an energizing source, a resistance, electro-magnetic means controlling said circuit, and a plurality of switches mounted along the rails of a railroad right of way, one of said switches serving to operate said electro-magnetic switch to close the circuit to said electromagnetic operating means, another of said switches operable after said first mentioned switch to close the circuit to said electromagnetic means through said resistance, and other of

said switch means operable in a step by step manner after said last mentioned switch means to gradually cut out said resistance from the circuit, and means operable by a train on said rails for maintaining said circuit closed while said train is passing, and weight means on said gate for positioning said operating means is inoperative position after the passage of said train, and a switch means operating electro-magnetic means after said train has passed said contact strip to open said circuit and reposition said electromagnetic switch members.

In testimony whereof I affix my signature.

CHARLES WRIGHT.