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W. H. PROPER

AUTOMATIC CROSSING GATE FOR RAILROADS

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Inventor

William H. Proper

Attorney
This invention relates to automatic crossing gates, guards or barriers for railroad grade crossings, for preventing the passage of vehicles over the crossing when a train or car is approaching upon the railroad and during its transit.

The main object is to provide, in combination with a properly recessed and prepared crossing way of the kind referred to, gates, guards or barriers pivotally mounted at their inner sides or margins adjacent the railroad in such manner as to normally lie flush and flat with the intersecting surfaces of the crossing, but which under the action of an approaching train, will automatically raise or swing up, at their outer sides or margins, from the surface of the crossing and so as to present to an approaching vehicle a gate, guard or barrier angularly inclined from its outer margin downwardly towards its inner margin, the said guard or barrier being then in its operative position and so disposed that the front wheels of an approaching automobile or the like will strike upon or against the said elevated outer margin of the gate, guard or barrier and thereby be stopped and prevented from moving upon the railroad track proper.

Another object is to provide means for resiliently supporting the said gates, guards or barriers in their said raised or operative position, so that a vehicle entrapped between them might nevertheless drive upon and over either and escape, the same being depressed under the weight of the vehicle.

Another object is to provide slideable bearings for the said gates at their inner margins, together with means for resiliently supporting the gates in their outermost positions upon said bearings, to the end that when raised to their operative positions and when struck by a vehicle, they will yield sufficiently under the impact to prevent serious damage being done to the vehicle.

A further object is to provide a means for positively elevating the said gates and for limiting the height to which the gates or barriers may be raised, thus preventing the said barriers from being swung over toward the crossing should a vehicle strike them while traveling at a high rate of speed.

A further object is to provide means for controlling the said gate elevating means and whereby the latter will be actuated for raising or lowering the gates upon the approach or departure of a train.

Still a further object is to provide a simple and efficient form of unstable support for the gate or barriers when in the closed or stop operative position which will effectively prevent the barriers from freezing fast during cold weather and remaining closed while a train is approaching.

The foregoing and other objects, together with means whereby the same may be carried into effect, will best be understood from the following description of a preferred embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a plan view of a crossing over a railroad equipped with my invention;

Figure 2 is an enlarged section along the line 2—2 in Figure 1, showing the barrier in the raised position;

Figure 3 is a section along the plane indicated by the line 3—3 in Figure 2, this view being reduced in scale and showing the operating mechanism of both barriers;

Figure 4 is a side view of the motor and barrier raising cam and associated elements;

Figure 5 is an enlarged plan view of the motor switch and the operating solenoids therefor;

Figure 6 is an enlarged section along the line 6—6 in Figure 1;

Figure 7 is an enlarged sectional detail of the resilient hinge structure of the barriers;

Figure 8 is a view similar to Figure 7, showing the position of the barrier as depressed by the impact of a vehicle;

Figure 9 is an enlarged side view of the motor switch and solenoids;

Figure 10 is an enlarged section along the line 10—10 in Figure 2;

Figure 11 is a wiring diagram of the operating mechanism for the barriers.

Referring more particularly to the drawings, A represents a railway track and B the...
crossing thereover. In equipping a crossing with my improved form of gates or guards, a pit C is provided beneath the track and is extended laterally at each side of the track substantially under the crossing as shown. This pit is lined with suitable walls D and bottom E. The central portion of the pit C, beneath the track A and a little to each side thereof, is provided with a suitable covering 1, leaving gate openings 2 in the roadway of the crossing at either side of the cover 1. A smaller chamber 5 is extended off laterally from the main pit C adjacent one end thereof for the reception of the motor and other operating elements for the gates, as will be set forth hereinafter. The foregoing constructions will, of course, vary according to the characteristics of the crossing being equipped with the invention, and according to the best practice in such work. The rails A may be supported over the crossing by any suitable means, for instance, the hangers 6 mounted upon the supports 7.

In carrying out the invention, two gates or barriers 8 are provided, the same being preferably rectangular in form and constructed of heavy sheet metal set in frames of angle iron or made in any preferred form of structure, the said gates being hinged in the openings or apertures 2 provided in the top 1 at each side of the track A and at some distance therefrom. The gates 8 are hinged in the apertures 2 upon their longer sides and near those margins of the apertures which are nearest the track A, these margins of the apertures 2 and the corresponding margins of the gates 8 being herein after referred to as their inner margins for convenience in description. Pivot or hinge shafts 10 are extended across the apertures 2 near their inner margins and are journaled in bearings 11 secured to the underside of the top or cover 1 near the ends thereof.

Brackets 12 and 13 (Figures 7 and 8) are secured to the undersides of the gates 8 in spaced and aligned pairs, the brackets 13 being secured to the gates at the inner margins thereof, and the complementary brackets 12 being spaced outwardly therefrom. The said brackets 12 and 13 are secured in place by the bolts or rivets 14 passed through their feet 15, and are braced by connecting and rigidly mounted tie rods 16. Slide rods 17 are arranged between the brackets 12 and 13, with their ends rigidly secured to the brackets 12 and 13 and passing slidably through apertures 18 provided di metrically through the pivot shafts 10. Expansion coil springs 19 are mounted upon the rods 17 and are braced between the brackets 12 at their outer ends and the pivot shafts 10 at their inner ends. The springs 19 serve to normally press the gates 8 outwardly within the slidable bearings afforded by the brackets 12 and 13, the tie rods 16 and the slide rods 17. Thus the gates 8, being mounted upon the shafts 10, have a hinged or pivotal connection at their inner margins with the inner margins of the openings 2 and through the action of the springs 19 are at the same time pressed or forced resiliently outward towards the outer margins of the said apertures 2, so that when opened or raised into operative position in a manner later to be described, they will upon the impact of a vehicle against their elevated outer edges, spring inwardly and angularly downwardly and thus safeguard the vehicle as far as possible against damage. Sleeves 20 may be mounted over the pivot shafts wherever the slide rods 17 are passed there through, the said sleeves having aligned apertures 21 to register with the apertures 18 through the said pivot shafts and having their peripheries flattened as at 22 to receive the end of the springs 19 and to bear against the brackets 13. The said pivot shafts 10 are supported intermediate their ends by standards 23 secured at 24 to the bottom E and having bearings 25 at their upper ends as shown.

Counterweight arms 26 are secured to the gates 8 adjacent the inner margins thereof by bolts or rivets 27 and extend inwardly into the pit C beneath the top 1, and weights 28 are secured to the inner free ends of the arms 26 at such distance from the pivot shaft 10 as to substantially counterbalance them without opening them, and thereby enabling them to close easily and without shock. The arms 26 are somewhat angularly disposed relative to the gates 8 to enable the latter to freely close without the weights 31 coming in contact with the top 1. Stops 28 in the form of elongated arms are secured angularly between the standards 23 and the bottom E of the pit in such position that the arms 26 will strike the same when the gates 8 reach the proper height, thus limiting the height to which the gates may rise. Sides 29 and end blocks 30 are provided upon the inner ends of the stop arms 28 to form sockets 32 into which the weights 31 may enter as the gates are raised, the end blocks 30 limiting the distance which the gates 8 may move or be pressed inwardly over the pivot shafts 10 as heretofore pointed out. The said weights are arranged to come into engagement with the end blocks 30 of the sockets before the springs 19 are fully compressed, thus eliminating all strain from the pivot shafts, as will be understood.

Supporting angles or brackets denoted generally at 33 are depended from the top 1 around the outer and lateral margins of the apertures 2, these angles being secured to the top 1 in any suitable manner by their vertically disposed legs 24 and having their horizontal base flanges 35 extended inwardly beneath the apertures 2 as shown. A plurality
of vertically mounted supporting studs 36 are secured in spaced relationship upon the base flanges 35 of the angles 33 by the nuts 37, the said studs extending upwardly substantially flush with the undersides of the gates 8, the center studs 38, however, upon both the outer and laterally disposed angles 33 being somewhat longer than the remainder of the studs for supporting the gates 8.

Thus the gates 8 normally rest in a horizontal position upon the center studs 38, but as each vehicle passes over the gates they will be rocked upon these studs 38 which action will serve to break the gates loose from the studs in case they should become frozen thereato. To further minimize the danger of the gates freezing shut, the upper ends of the studs 36 are rounded off as shown at 39, thus reducing the contacting surface between the elements.

Motor 40 is mounted upon a stand 41 secured to the bottom 42 of the smaller chamber 5 hereinbefore described, the drive shaft 43 of the motor being extended and having a worm 44 formed on or secured to its end. A housing 45 is mounted upon the bottom 42, the said housing in cross section being in the form of an inverted U and being set over the worm 44, and having foot flanges 46 by means of which it is mounted in place. A shaft 47 is journaled transversely through the housing 45 below the worm 44 and a worm gear 48 is fixed upon this shaft 47 within the housing and in mesh with the worm 44, and thus adapted to be driven thereby. A cam 50 is eccentrically mounted upon the shaft 47 and is adapted to operate the lever 51 fulcrumed at 52 to the housing 45, the said lever 51 carrying a roller 53 at its upper end in engagement with the periphery of the cam. A pulley 54 is journaled by the screw 55 upon the motor stand 41, and a cable 56 is secured at 57 to the lower end of the lever 51 and trained over this pulley 54 and then extended into the pit C and passed through the spring 59 and secured to the inner end 58 thereof.

A pulley 60 is journaled in a vertical bracket 61 secured to the base E beneath the stop 28, and another similar pulley 62 is journaled in a horizontally disposed bracket 68 secured to the wall D at that end of the pit C from which the chamber 5 extends. Similar pulleys are provided for the other gate or barrier 8 as indicated at 60A and 60B in Figure 3. A cable 64 is secured at 65 to the counterweight arm 26, and is then passed downwardly through a slot 66 in the stop 28 and then trained under and around the pulleys 60 and 62 as shown, a slot 72 being provided through the standard 23 at the center of the cable. A similar cable 67 is connected in the same manner to the other barrier or gate 8, and is then extended across the pit C and trained around a pulley 68 journaled in a horizontal bracket 69 secured to the wall D above the aforesaid pulley and brackets 62 and 68. The two cables 64 and 67 are joined together as shown at 70 and are then passed through the spring 59 and secured to its other end 71 thereof as shown. The foregoing arrangement is such that when the motor 40 runs, the cam 50 will swing the lever 51 to and fro, causing the barriers or gates 8 to open and close as will be understood, the lever 51 and cables causing the gates to raise when the cam rotates so that its lobe 50A pushes the upper end of the lever outward, and the weight of the gates causing them to close when the lever is allowed to swing back as the lobe 50A of the cam passes.

In order to regulate the motor so that it will stop when the gates have been raised until the train passes over the crossing and then again start and run until the gates are allowed to drop, I provide a switching system now to be described, and while I have indicated in the drawings that the source of electrical energy by means of which the switching system and the motor are operated is derived from the conventional line as represented in Figure 11, it is understood that any source of current may be used as found most practical in use.

A pair of axially aligned solenoids 73–74 is mounted upon brackets 75 secured to the bottom 42 of the small chamber 5 at the rear of the motor 40, and a core piece 76 is loosely passed within the two solenoids as shown, the solenoids being spaced apart somewhat. A pair of spaced switch blades 77 is fulcrumed at 78 to the bottom 42, these blades being insulated from each other and from the bottom 42. An arm 79 is rigidly secured to and extended from the juncture of the switch blades 77 and is pivoted at 80 to a medial point of the core piece 76 in such manner that the switch blades 77 will be swung to and fro as the core piece 76 is moved to and fro in the solenoids 73 and 74. Two pairs of spaced switch clips 81 and 82 are mounted on the insulating blocks 83 and held in place by screws 84, the clips being so disposed that the blades 77 may be swung therebetween to bridge the same or connect them together as will be understood from Figure 9.

Beside each of the two rails A and at some distance to each side of the crossing B, a pair of spaced insulated switch contacts 85 are provided, the contacts upon each side of the crossing being wired in parallel as shown by the wires 86 in Figure 1. These contacts 85 may be bridged by any suitable contact brush (not shown) carried by the train or car upon the track A, the arrangement being such that the contacts upon one side of the track will be bridged as the car approaches the crossing, and those upon the other side will be bridged as the train leaves the crossing, the first mentioned contacts 120
being designated at 85a and the latter at 85b in the schematic diagram in Figure 11. Obviously, any other type of train operated switches may be used in lieu of the structure here recited and illustrated. The source of current for the switching mechanism preferably, though not necessarily, is drawn from a transformer 87, one side of the output circuit from this transformer being wired directly to both of the solenoids 73 and 74 by the wires 88, and the other side of the circuit being connected by wires 89 to the contacts 86 and thence by wires 90 to the solenoid 73 as shown.

As a train or car approaches the crossing, the brush which it carries (not shown) will bridge the approach contacts 85a closing the circuit to the solenoid 73 which, becoming energized, will draw the core pieces 76 inward into its center, which action will swing the switch blades 77 upon their fulcrum point 78 and cause them to enter the clips 81 and 82. These clips 81 and 82 are each wired in series with one side of the input wires 91 carrying the current to the motor 42 and it will be understood that as the blades 77 are swung inward between the clips, the circuit will be closed through the motor, and the motor will thus be started, rotating the cam 30 and raising the barriers or gates 8 as hereinafter set forth. In order to disconnect the motor when the barriers 8 are thus raised, I provide a switch cam 92 of insulating material secured upon the shaft 47 outside of the housing 48 and upon the opposite end from the cam 50. A pair of switch blades 93 and 94 of spring material are connected to an insulating block 95 secured to the bottom 42 of the pit C, the said blades being extended upward to one side of and in alignment with the cam 92. The blade 94 next to this cam is provided with an angularly formed offset 96 extending into proximity to the periphery of the switch cam.

The switch cam 92 carries shoulders or lugs 97 and 98 at diametrically opposite points which are adapted to strike the offset portion 96 of the switch blade 94, forcing this blade into contact with the blade 93. The switch cam 92 is so arranged on the shaft 47 relative to the cam 50 that when the lever 51 has been swung outward to its full extent to raise the gates or barriers 8, one of the shoulders, as 97, will cause the switch blades 93 and 94 to come into contact. These switch blades are connected in series with the wire 99 carrying the other side of the transformer output to the solenoid 74. It will now be understood that as these blades 93 and 94 are brought into contact, the solenoid 74 will be energized, drawing the core piece 76 inward into this solenoid 74, causing the blades 77 to swing outward from the clips 81 and 82, disconnecting the motor and causing it to stop, thereby leaving the barriers or gates in their raised position. The interval between the closing of the switch blades 93 and 94 and the actual stopping of the motor is sufficient to allow the shoulder 97 to move past the offset portion 96 of the blade 94, as shown in Figure 6, thus allowing the current to the solenoid 74 to be cut off before the motor and its associated elements cease their movement. This time interval is due to the swinging of the blades 77 out of the clips 81 and 82 as set forth, as well as the normal momentum of the motor and cams. A friction screw 100 is threaded through a stud 101 mounted through the top of the housing 45 and has a brake shoe 102 bearing on the motor shaft 43 to allow the momentum of the motor to be controlled so that the said motor will stop immediately after the switch blades 83 and 94 have been opened as set forth. As the train or car leaves the crossing and engages the contacts 85b, the operation just described is simply repeated, the other shoulder 98 upon the switch cam 92 closing the circuit to the solenoid 74 and disconnecting the motor after it has rotated the cam 50 until the barriers 8 are allowed to drop. When the train approaches the crossing from the other direction, the operation is the same, and the contacts 85 may also be applied to any number of tracks over which a thoroughfare crosses, as will be understood.

It is thought that the operation of the invention will be apparent from the foregoing, it being evident that when the barriers 8 are raised, vehicles cannot pass over the track. In case a vehicle should be caught between the barriers 8 when they are raised, it may nevertheless move over them and off the crossing, the weight of the vehicle depressing the barriers for this purpose through the resiliency of the spring 59. When the barriers or gates are in the raised position, red reflectors 103 which are mounted at the undersides of the gates, are brought into view, these reflectors catching and reflecting the rays of the headlights of the oncoming vehicle, to serve as a warning that the crossing is obstructed.

While I have herein set forth a certain preferred embodiment of my invention, it is understood that I may vary from the same in minor structural details, so as best to construct a practical device for the purposes intended, not departing from the spirit of the invention and within the scope of the appended claims.

I claim:

1. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor, gates horizontally disposed at the crossing at each side of the railroad and adapted to normally lie flat with the intersecting surfaces of the crossing, and slideable bearings for the said gates at their inner mar...
gins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly in a direction coincident with its own extended plane.

2. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor, gates horizontally disposed at the crossing at each side of the railroad and adapted to normally lie flat with the intersecting surfaces of the crossing, sliding bearings for the said gates at their inner margins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly in a direction coincident with its own extended plane, and means for yieldingly supporting the gates against said inward movement.

3. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor, gates horizontally disposed at the crossing at each side of the railroad and adapted to normally lie flat with the intersecting surfaces of the crossing, sliding bearings for the said gates at their inner margins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly in a direction coincident with its own extended plane, means for yieldingly supporting the gates against said inward movement, and means for positively elevating and lowering the said gates.

4. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor, gates horizontally disposed at the crossing at each side of the railroad and adapted to normally lie flat with the intersecting surfaces of the crossing, sliding bearings for the said gates at their inner margins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly in a direction coincident with its own extended plane, means for yieldingly supporting the gates against said inward movement, means for positively elevating and lowering the said gates, and means for limiting the height to which the said gates may be raised at their outer margins.

5. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor including a pit, gates horizontally disposed at the crossing at each side of the railroad over the pit, and adapted to normally lie flat with the intersecting surfaces of the crossing, sliding bearings for the said gates at their inner margins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly, arms secured to the gates at their inner margins and extended inwardly, and stops arranged to coact with the inner ends of the said arms to limit the upward movement of the outer margins of the gates.

6. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor including a pit, gates horizontally disposed at the crossing at each side of the railroad over the pit, and adapted to normally lie flat with the intersecting surfaces of the crossing, sliding bearings for the said gates at their inner margins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly, arms secured to the gates at their inner margins and extended inwardly, stops arranged to coact with the inner ends of the said arms to limit the upward movement of the outer margins of the gates.

7. In a device of the kind described, a gate, a pivot shaft for the gate, the said shaft being pierced adjacent its ends with diametrically extended apertures, aligned pairs of spaced brackets upon the gate adapted to embrace the said pivot shaft at the apertured ends thereof, slide rods extended between the said brackets and slidably passed through the said apertures of the pivot shaft, and expansion coil springs mounted over the said slide rods and braced between the brackets at one end and the said pivot shaft at the other end.

8. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor, including a pit arranged under the crossing, a cover for the pit, the same having a gate opening therein, supporting brackets depending around the margins of the gate opening of the pit cover, a plurality of vertically mounted supporting studs arranged in spaced relation upon the said brackets, a portion of the said studs extending upwardly substantially flush with the under side of the said pit cover, and another portion of the said studs extending upwardly beyond the upper limit of the other portion of studs to provide unstable bearings for the gate, and a gate disposed upon the said unstable bearings.

9. In a guard for a railroad crossing, the latter being properly recessed and prepared therefor including a pit, gates horizontally disposed at the crossing at each side of the railroad over the pit, and adapted to normally lie flat with the intersecting surfaces of the crossing, sliding bearings for the said gates at their inner margins upon which the gates may turn angularly upward at their outer margins above the surface of the crossing and may be slidably pressed inwardly, arms secured to the gates at their inner margins and extended inwardly, and stops arranged to coact with the inner ends of the said arms.
to limit the upward movement of the outer margins of the gates, means for yieldingly supporting the gates in their outermost positions upon their said slidable bearings, counterweights for the inner ends of the said arms, and means aside from the said pivot shaft for limiting the inward travel of the said arms and counterweights.

In testimony whereof I affix my signature.

WILLIAM H. PROPER.