June 24, 1930. H. S. CODER 1,765,906

GRADE CROSSING SAFETY EQUIPMENT

Filed Oct. 28, 1929 4 Sheets-Sheet 1

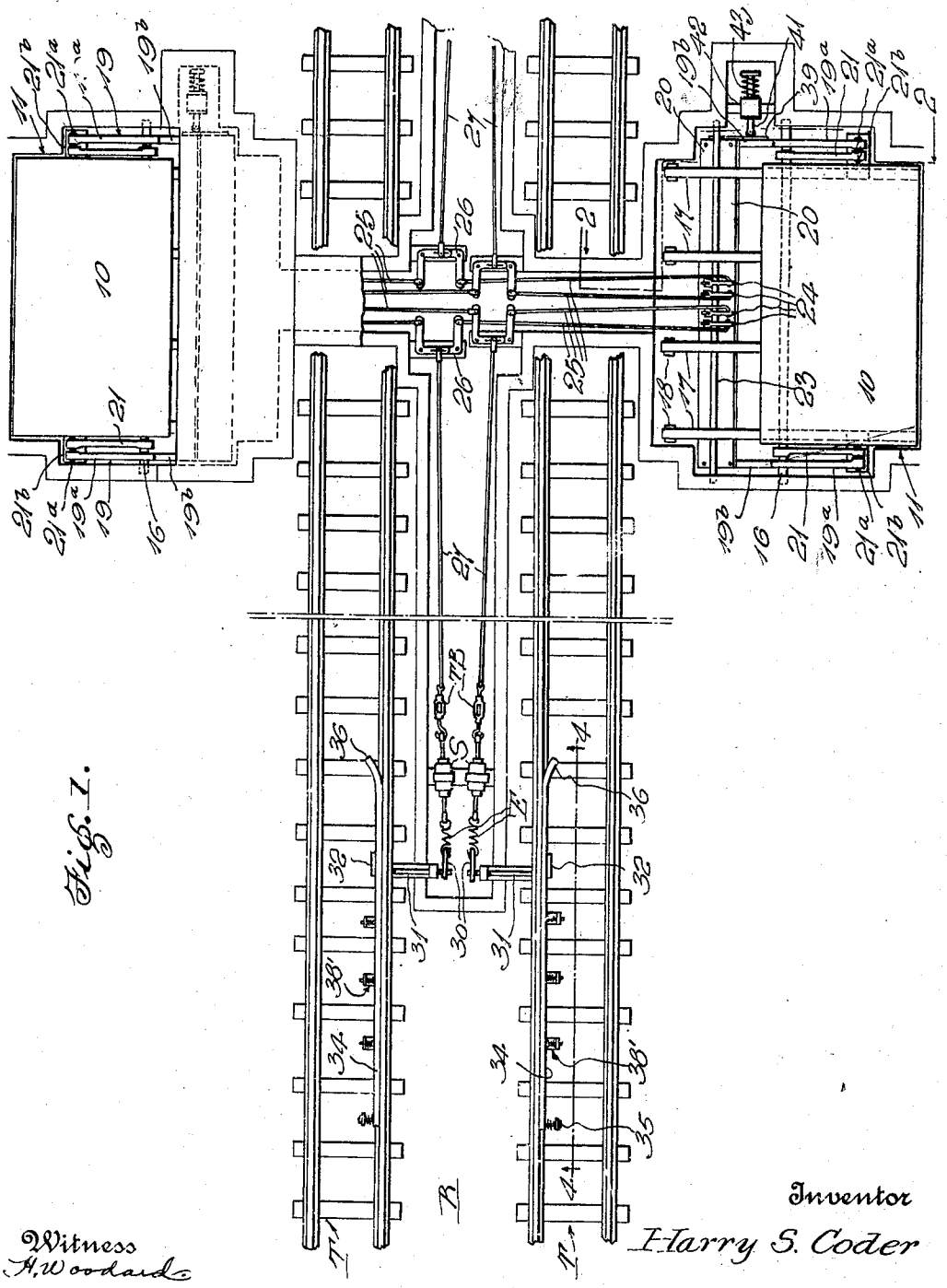


Fig. 1.

Witness
A. Woodard

Inventor
Harry S. Coder

By A. B. Williamson
Attorneys

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Filed Oct. 28, 1929 4 Sheets-Sheet 2

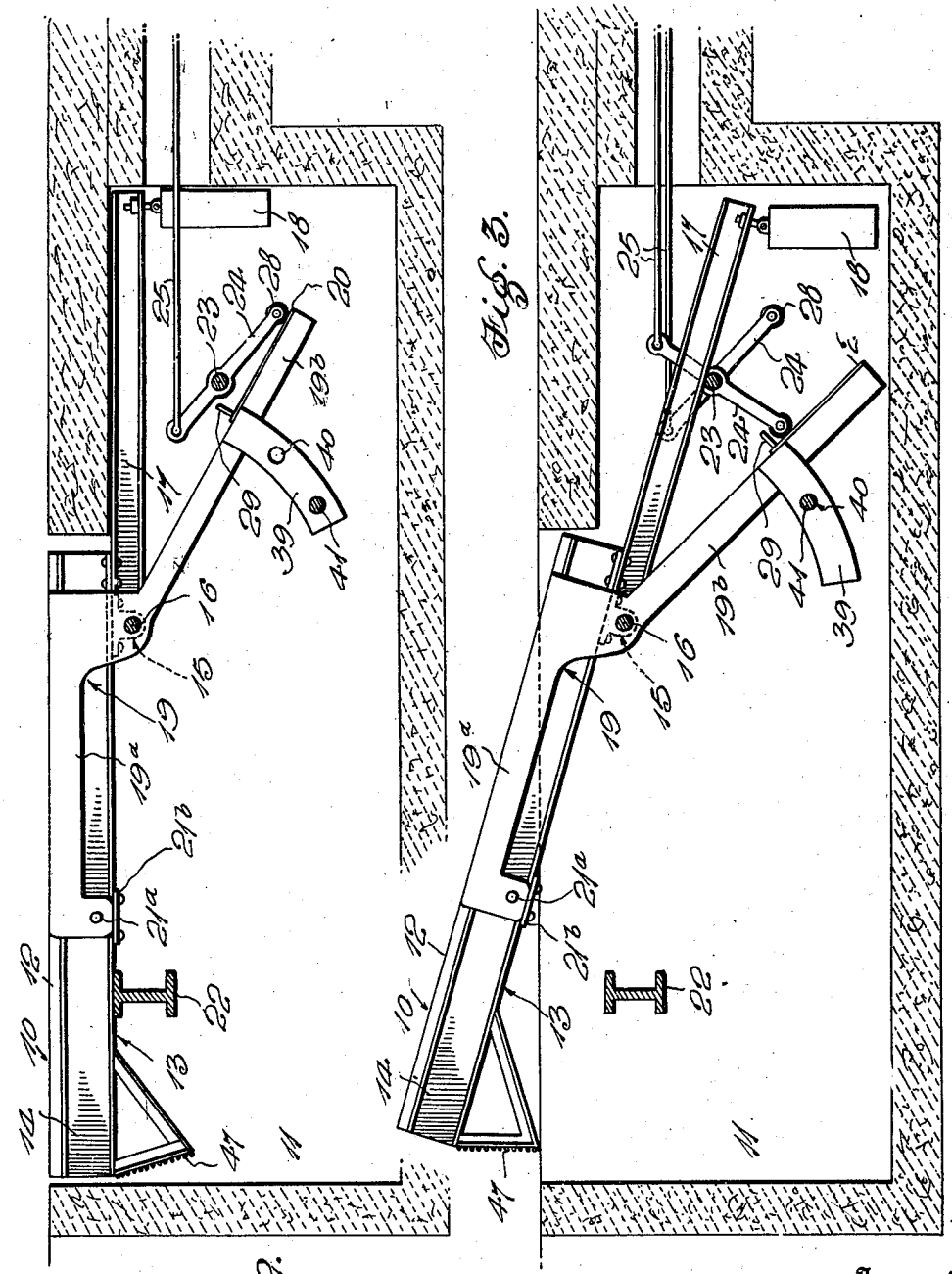


Fig. 3.

Fig. 2.

Witness
H. Woodard

Inventor
Harry S. Coder

By H. B. Williamson & Co
Attorneys

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GRADE CROSSING SAFETY EQUIPMENT

Filed Oct. 28, 1929 4 Sheets-Sheet 3

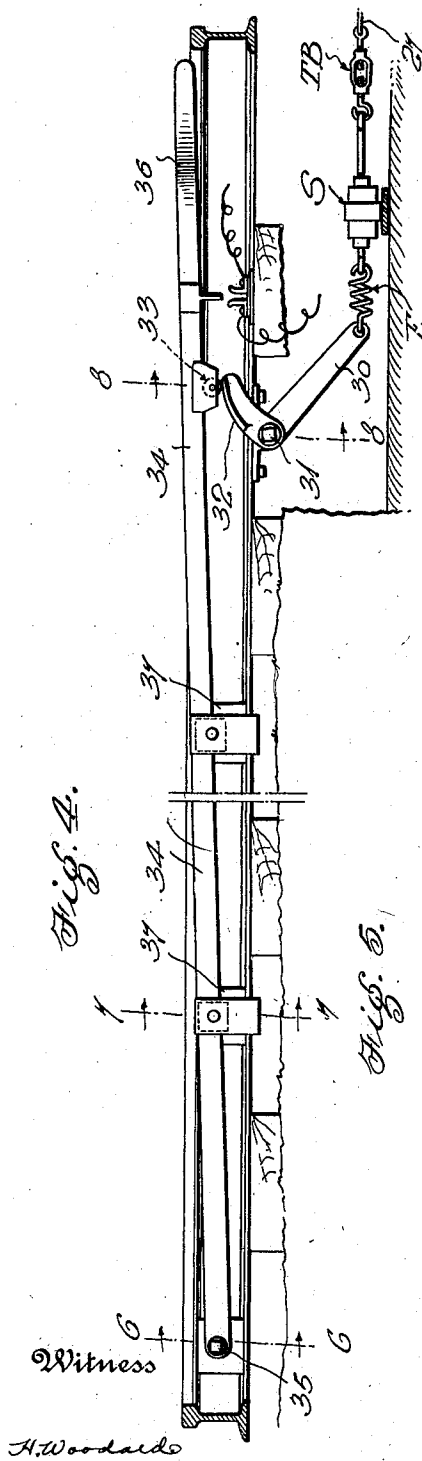


Fig. 4.

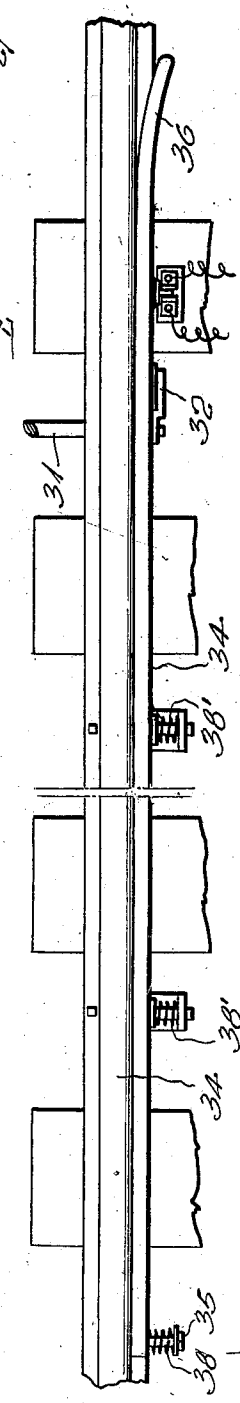


Fig. 5.

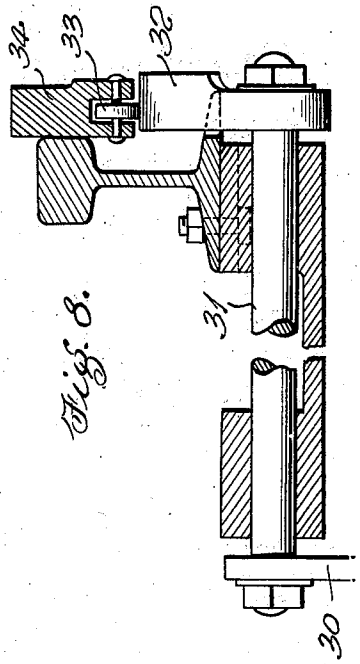


Fig. 8.

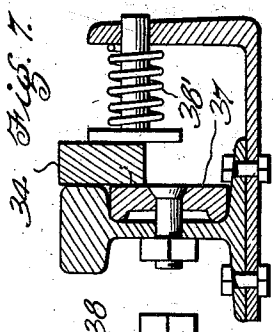


Fig. 7.

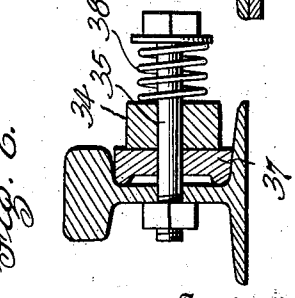


Fig. 6.

Witness

H. Woodside

Inventor

Harry S. Coder

By H. B. Williamson & Co

Attorneys

June 24, 1930. H. S. CODER 1,765,906

- GRADE CROSSING SAFETY EQUIPMENT

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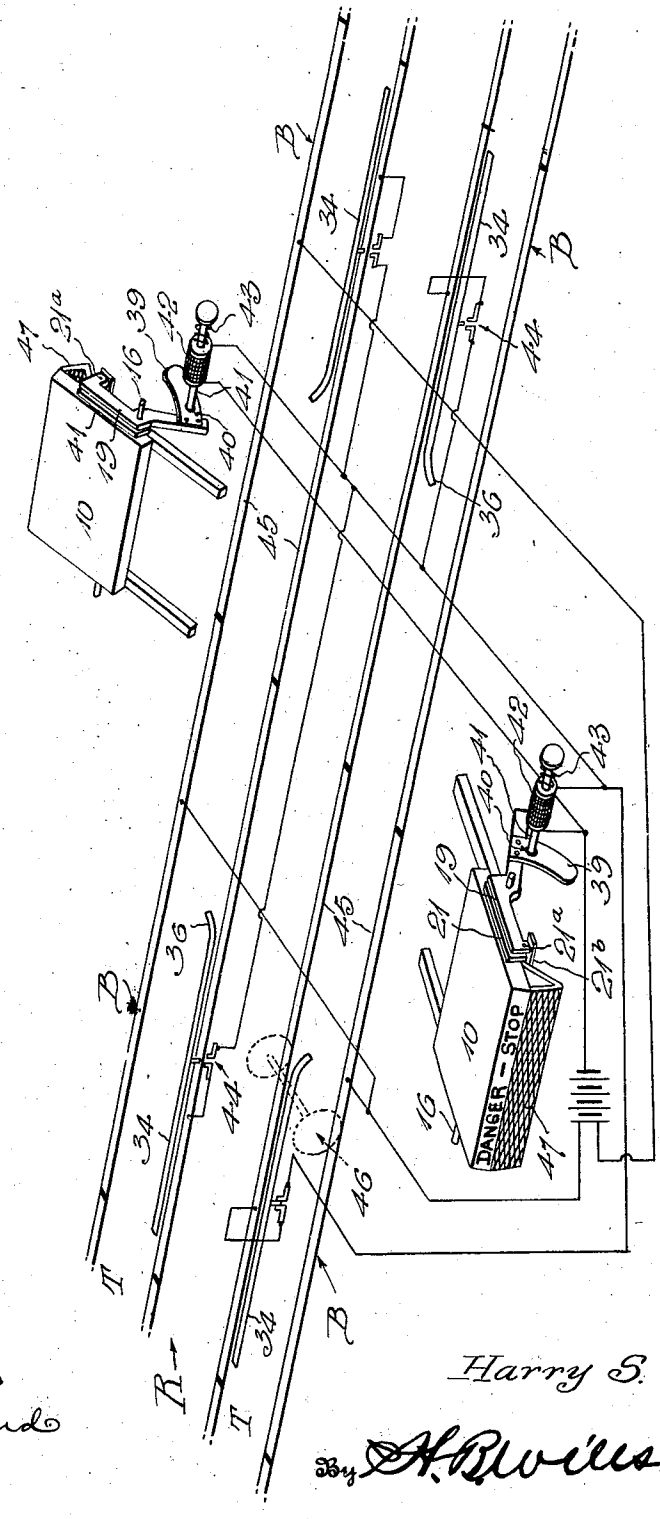


Fig. 9.

Witness
H. Woodard

Inventor
Harry S. Coder
By H. B. Williamson & Co
Attorneys

Patented June 24, 1930 1,765,906

UNITED STATES PATENT OFFICE

HARRY S. CODER, OF BRIDGETON, NEW JERSEY

GRADE-CROSSING SAFETY EQUIPMENT

Application filed October 28, 1929. Serial No. 402,969.

The invention aims to provide new and improved safety equipment for grade crossings, which will project barriers across the highway when a train is approaching from either direction, will allow either of the barriers to be temporarily moved to inoperative position by a vehicle, should this be necessary by "trapping" of such vehicle upon the tracks, and will cause return of the barriers to inoperative position, after the train has passed.

In carrying out the above end, further objects are to provide unique electrically-controlled means for holding the barriers against self-return to inoperative position, and for preventing alternate projection and retraction of said barriers while the train is passing, and to provide novel and advantageous operating means for the barriers, permitting temporary movement of them to inoperative position by means of the vehicle, although one of the operating connections of each barrier is at that time positively locked by train-controlled locking means.

A still further object is to provide a construction which will operate advantageously in connection with either one barrier or a plurality of such barriers, or with only a single track or a plurality of tracks.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a top plan view with portions of the track rails broken away and with the covers of the various passages and one of the barrier pits removed.

Fig. 2 is an enlarged vertical sectional view through one of the barriers and a portion of its operating means, as indicated by line 2—2 of Fig. 1, the barrier being in its normal lowered position.

Fig. 3 is a duplicate of Fig. 2 with the exception that it illustrates the barrier in raised position.

Fig. 4 is a sectional view on line 4—4 of Fig. 1 illustrating one of the depressible rails employed to project the barriers.

Fig. 5 is a top plan view of the parts shown in Fig. 4.

Figs. 6, 7 and 8 are vertical sectional views on the correspondingly numbered lines of Fig. 4.

Fig. 9 is a diagram illustrating one wiring system which may be employed for the electrically-controlled devices which hold the barriers against self-return to normal position while a train is approaching and passing.

The preferred construction has been illustrated and will be specifically described, with the understanding, however, that within the scope of the invention as claimed, various modifications may be made.

Two barriers 10 are shown mounted at the tops of pits 11 and normally forming portions of a highway at its intersection with a railway R, said barriers being disposed at opposite sides of said railway. The constructions associated with the barriers 10 are all identical and hence a description of one association of these parts will suffice.

The barrier 10 is preferably composed of a heavy metal plate 12 or a plurality of planks or plates secured upon a bed-frame 13 which may well be composed of longitudinal beams 14 and transverse beams suitably secured together. Secured to the lower sides of the beams 14, are bearings 15 which are rockably supported by a horizontal shaft 16 extending across the portion of the pit 11 toward the railway R. Rigidly secured to these beams 14 and projecting toward the railway therefrom, are horizontal arms 17 preferably formed of channel iron or I-beams, the inner ends of these arms being provided with weights 18 which are sufficiently heavy to descend and cause raising of the barrier 10 as seen in Fig. 3, when permitted to do so. Fulcrumed between their ends upon shaft 16 are two levers 19 whose outer ends or arms 19^a are much heavier than their inner ends or arms 19^b. These arms 19^b decline from the shaft 16 toward the railway and are rigidly connected at their lower end portions by a plate 20 which is secured upon the upper sides of said arms 19^b. The lever arms 19^a are at opposite

edges of the barrier 10 and between said lever arms and edges, are two heavy arms 21 pivoted upon shaft 16 and connected at 21[a] with said lever arms 19[a]. These arms 21 and lever arms 19[a] normally rest upon ledges 21[b] carried by barrier 10 and hold the latter depressed as in Fig. 2. When the levers 19 and arms 21 are swung to the position of Fig. 3, the weights 18 function to raise the barrier 10, and even though said levers 19 be then locked by means hereinafter described, if it should be necessary for a vehicle to temporarily depress the barrier 10 in order to run off of the railway crossing, such temporary depression is allowed by the weights 18 but they will then immediately act to restore the barrier to its raised position. Depression of the barrier beyond the proper extent may be prevented by any desired means such as one or more heavy beams 22 extending across the pit 11.

Extending across the pit 11, over the plate 20, is a suitably supported shaft 23 upon which four levers 24 are mounted for independent movement. Extending from these levers are pull rods 25 connected by bell cranks 26 with additional pull rods 27 extending longitudinally of the railway, two of said rods 27 extending in one direction from the crossing and the other two in the other direction. If the invention be installed on a single track railway instead of a double track as shown, only two of the rods 27 will be necessary, two sets of bell cranks 26 will suffice, two pull rods 25 are all that are required, and only two levers 24 are needed. Actuation of any pull rod 27 actuates the bell cranks 26 connected therewith and pulls upon the rods 25 connected with these bell cranks, with the result that the levers 24 to which said rods 25 are connected, are swung, causing their lower ends to engage the plates 20 of the two barriers, said levers being preferably provided with rollers 28 for contact with said plates. Movement of the levers 24 in this manner depresses the lever arms 19[b] of the levers 19, swings the lever arms 19[a] and the arms 21 upwardly, and hence allows upward swinging of both barriers 10 under the influence of the weights 18. To limit the movement of the levers 24, the plate 20 may be provided with an upstanding stop flange 29 as shown in Figs. 2 and 3.

The outer ends of the pull rods 27 are connected with crank arms 30 on transverse rock shafts 31, there being one rock shaft for each track T at each side of the crossing, that is, four rock shafts in all for a double track railway. The rock shafts 31 are provided with cams 32 upon which rest rollers 33 of pivotally mounted depressible rails 34. These rails are rather remote from opposite sides of the crossing and their pivots 35 are at the ends thereof more remote from said crossing, the other ends of said rails being obliquely turned as at 36 for a purpose to be described. The depressible rails 34 are disposed at the inner sides of the track rails and the latter are preferably provided with appropriate fillers 37 against which the rails 34 are normally held by appropriate spring means 38—38′, the spring means 38 being associated with the pivots 35 while the means 38′ are spaced apart at suitable intervals along the rails 34. The depressible rails normally incline toward the crossing as seen in Fig. 4 and consequently the wheels of any car or train traveling toward said crossing, will depress one of these rails by contact of the wheel flanges therewith. Rail depression in this manner, causes rollers 33 and cam 32 to turn the rock shaft 31, thereby moving the crank arm 30 to operate the pull rod 27, causing upward swinging of both barriers 10. The ends 36 and the spring mountings for the depressible rails 34 are employed in order that none of these rails will be depressed by wheels of a train traveling away from the crossing. Then, the flanges of the wheels, will simply force the rails 34 outwardly against the action of the springs 38 and 38′.

Unique, train-controlled means are provided for holding the barrier-actuating levers 19 in barrier-projected position. One of the lever arms 19[b] of each barrier is provided with a downwardly projecting arcuate plate 39 provided with an opening 40. Below this opening, is a locking pin 41 here shown as formed by a portion of the core of a solenoid 42. This locking pin is normally held in retracted position by a coiled spring or the like 43, but provision is made for energizing the two solenoids 42 (one for each barrier 10) when any of the depressible rails 34 is depressed. Consequently, when the barriers 10 raise and the openings 40 arrive in alinement with the locking pins 41, the solenoids 42 project said locking pins through said openings 40, thereby locking the levers 19 in barrier-projected position as long as the solenoids are energized. Provision is made whereby these solenoids are de-energized only by passage of the train from the crossing. When this occurs, the springs 43 retract the locking pins 41 from the openings 40 and the weight of the lever arms 19[a] and arms 21 causes the barriers to lower to normal position. As the levers 19 return to normal, the plate 20 restores the previously operated lever 24 to its original position, and this lever operates the numerous connections between itself and the depressed rail 34 to restore the latter to normal position.

There are four circuits shown for the solenoids 42 and closing of any of these circuits will energize both of said solenoids. Each circuit is provided with two breaks. One of these breaks is constituted by a

switch 44 associated with the depressible rail 34 to be closed by depression thereof. The other break of each circuit is constituted by a gap between two opposed track rails 45, which gap is adapted to be bridged by train trucks as indicated by dotted lines 46 in Fig. 9. Each track T is divided into blocks B at opposite sides of the crossing and insulated from each other. Associated with each of these blocks B, is one of the depressible rails 34 and one of the switches 44. When a train enters a block, its trucks 46 bridge the gap between the opposed rails 45 and when these trucks depress the rail 34, the latter closes the switch 44. Hence, both breaks in one of the solenoid circuits are closed. It follows that upon raising of the barriers 10, effected by depression of the rail 34, the solenoids 42 project the locking pins 41 into the openings 40 as above described. When the train wheels leave the depressible rail 34, the latter remains lowered and consequently switch 44 remains closed. Consequently, the circuit of the solenoids is maintained until the last wheels of the train have passed from the block B, that is when the train has left the crossing. Then, movement of the last wheels of the train from the rails 45, effects breaking of the solenoid circuit with the result that the springs 43 retract the locking pins 41, to their normal positions, causing the various operating connections to restore the previously depressed rail 34 to its raised position, again opening the switch 44.

The arrangement shown and described will operate whether a train or car approaches from either direction upon either track and in attaining the desired ends, any appropriate circuit wiring may be employed. That diagrammatically shown in Fig. 9, which is readily readable without description, may be followed if desired. A battery or other source may feed the circuits.

It will be seen from the foregoing that effective provision has been made for raising both barriers 10 whenever a train is approaching in either direction upon either track, that the invention will permit any vehicle which may have been "caught" upon the track to leave the same, due to the fact that either barrier 10 may be depressed against the action of the weights 18, even though the levers 19 be then locked by the pins 41. As soon as the vehicle thus leaving the tracks has cleared the barrier, the weights 18 again restore the latter to raised position. Preferably, when the barriers are so raised, they display danger and stop signs, and the space between the barriers and the pits may then be closed by suitable guards 47. The barriers will remain raised until the train has cleared the crossing, whereupon the solenoid circuit is broken and all parts return to normal position, unless another train be at that time totally or partially upon one of the blocks B. If the barriers be maintained in raised position by a train on one block and another train enters a block such as B, on the same or another track, the barriers are prevented from lowering to normal position until the additional train (or any number of them) has cleared the crossing. Assuming that a train on one track clears the crossing and another has entered the block B on the same track, it will be clear that the second train will maintain the solenoil circuit which would ordinarily be broken by the first train leaving the block, so that the levers 24, etc. will remain in the position shown in Fig. 3. If, at the time a train on one track clears the crossing and a train on another track is in the block B, the levers 24 related with this last-named track will be applied to prevent return of the barriers 10, when the solenoid circuit of the first track is broken and the levers 24 associated with this track are then free to return to normal. It is thus insured that at any time there is a train or car in any of the blocks B, regardless of the number of tracks at the crossing, the barriers will be held in raised position.

At some suitable location, each rod 27 is preferably provided with a hydraulic or other shock absorber S, with a turnbuckle TB and with a coiled spring or other elastic connection E. This elastic connection and the shock absorber S, effectively absorb the shock when the arm 30 is actuated by the depressible rail 34 to pull upon the rod 27. The elastic connection E also compensates for expansion and contraction, and any stretch or lost-motion may be taken up by the turn-buckle TB.

The parts denoted at 25 and 27 have been described as rods but it will be understood that other equivalent means could be substituted if desired, for instance, chains or cables.

I claim:—

1. In grade crossing safety equipment, a self-projecting traffic stopping barrier, means normally holding said traffic stopping barrier against projection, a train-actuated member, and operating connections between said train-actuated member and said holding means for releasing the latter, allowing said barrier to move to projected position, said barrier when projected being free to move under the influence of a vehicle, whereby the latter may temporarily restore said barrier to inoperative position if necessary.

2. In grade crossing safety equipment, a normally retracted self-projecting traffic stopping barrier, a weight movable with respect to said barrier for normally holding the latter against projection, means for moving said weight to barrier-releasing position, and means for holding said weight in said

barrier-releasing position, leaving the barrier free for retraction under the influence of a vehicle if necessary.

3. In grade crossing safety equipment, a normally lowered self-raising traffic stopping barrier normally forming a portion of a highway, means pivotally mounting said barrier at the top of a pit, a weighted lever fulcrumed in said pit and adapted for vertical swinging, a one-way connection between said lever and barrier whereby the former normally holds the latter lowered, means for swinging said lever to a barrier-releasing position, and means for holding said lever in said barrier-releasing position, leaving the barrier free to be depressed under the influence of a vehicle if necessary.

4. In grade crossing safety equipment, a normally lowered self-raising traffic stopping barrier normally forming a portion of a highway, means pivotally mounting said barrier at the top of a pit, a pair of weighted levers fulcrumed for vertical swinging at two opposite edges of said barrier, one-way connections between said levers and the barrier, whereby the former normally hold the latter lowered, a plate extending between and secured to said levers, an operating lever in said pit and having an end contacting with the upper side of said plate, and means for swinging said operating lever to cause said end thereof to depress said plate and swing said weighted levers to barrier-releasing position.

5. In grade crossing safety equipment, a self-raising traffic stopping barrier, a weight which normally holds said barrier depressed and acts also to again lower said barrier after raising thereof, means for raising said weight allowing the barrier to raise, and means establishing a one-way connection between said weight and barrier allowing depression of the barrier if necessary while the weight is held raised.

6. In grade crossing safety equipment, a normally retracted self-projecting traffic-stopping barrier, means normally holding said barrier in retracted position and adapted also to again retract said barrier after projection thereof, train-actuated means for moving said barrier-holding and retracting means to released position allowing said barrier to move to projected position, and train-applied means for holding said barrier-holding and retracting means in released position until the train clears the crossing, said barrier when projected being free for retraction under the influence of a vehicle if necessary.

7. In grade crossing safety equipment, a normally retracted self-projecting traffic-stopping barrier, means normally holding said barrier in retracted position and adapted to also again retract said barrier after projection thereof, train-actuated means for moving said barrier-holding and retracting means to released position allowing said barrier to move to projected position, latch means for holding said barrier-holding means in released position, electrical means for applying said latch means, and a normally open circuit for said latch-applying means, said circuit embodying a gap between two opposed track rails adapted to be bridged by a train truck to apply said latch means and hold it applied until the train leaves said opposed rails, said barrier when projected being free for retraction under the influence of a vehicle if necessary.

8. In grade crossing safety equipment, a normally retracted self-projecting traffic-stopping barrier, means normally holding said barrier in retracted position and adapted also to again retract said barrier after projection thereof, a track-carried train-moved member and means for transmitting motion from said train-moved member to said barrier-holding and retracting means to move the latter to barrier-releasing position allowing projection of the barrier, latch means for holding said barrier-holding and retracting means in barrier-projected position, electrical means for applying said latch means, and a normally open circuit for said electrical means, said circuit embodying two breaks, one of said breaks being constituted by a switch under the influence of said train-moved member and closed by the latter concurrently with movement of said barrier-holding and retracting means to barrier-projected position, the other of said breaks being a gap between opposed track rails adapted to be bridged by a train truck, whereby said circuit will be closed until the train leaves said rails, said barrier when projected being free for retraction under the influence of a vehicle if necessary.

9. In grade crossing safety equipment, a normally retracted self-projecting traffic-stopping barrier, a weight movable with respect to said barrier for normally holding the latter against projection and for again retracting said barrier after projection thereof, train-actuated means for moving said weight to barrier-releasing position allowing the barrier to project, latch means for holding said weight in barrier-projected position, and train-actuated means for applying said holding means concurrently with movement of said weight to said barrier-projected position and for holding said holding means applied until the train clears the crossing, said barrier when projected being free for retraction under the influence of a vehicle if necessary.

10. In grade crossing safety equipment, a normally retracted self-projecting traffic-stopping barrier, a weight movable with respect to said barrier for normally holding the latter against projection and for again

retracting said barrier after projection thereof, train-actuated means for moving said weight to barrier-releasing position allowing the barrier to project, latch means for holding said weight in barrier-projected position, electrical means for applying said latch means, and a normally open circuit for said electrical means, said circuit embodying a gap between two opposed track rails adapted to be bridged by a train truck to apply said latch means and hold it applied until the train leaves said rails, said barrier when projected being free for retraction under the influence of a vehicle if necessary.

11. In grade crossing safety equipment, a normally retracted self-projecting traffic stopping barrier, a weight movable with respect to said barrier for normally holding the barrier against projection and for again retracting said barrier after projection thereof, a track-carried train moved member and means for transmitting motion from said member to said weight to move the latter to barrier releasing position, latch means for holding said weight in barrier-projected position, electrical means for applying said latch means, and a normally open circuit for said electrical means, said circuit having two breaks, one of said breaks being formed by a switch under the influence of said train-moved member and closed thereby concurrently with movement of said weight to barrier-projected position, the other of said breaks being a gap between two opposed track rails adapted to be bridged by train trucks, thereby holding said circuit closed until the train leaves said rails, said barrier when projected being free for retraction under the influence of a vehicle if necessary.

In testimony whereof I have hereunto affixed my signature.

HARRY S. CODER.