

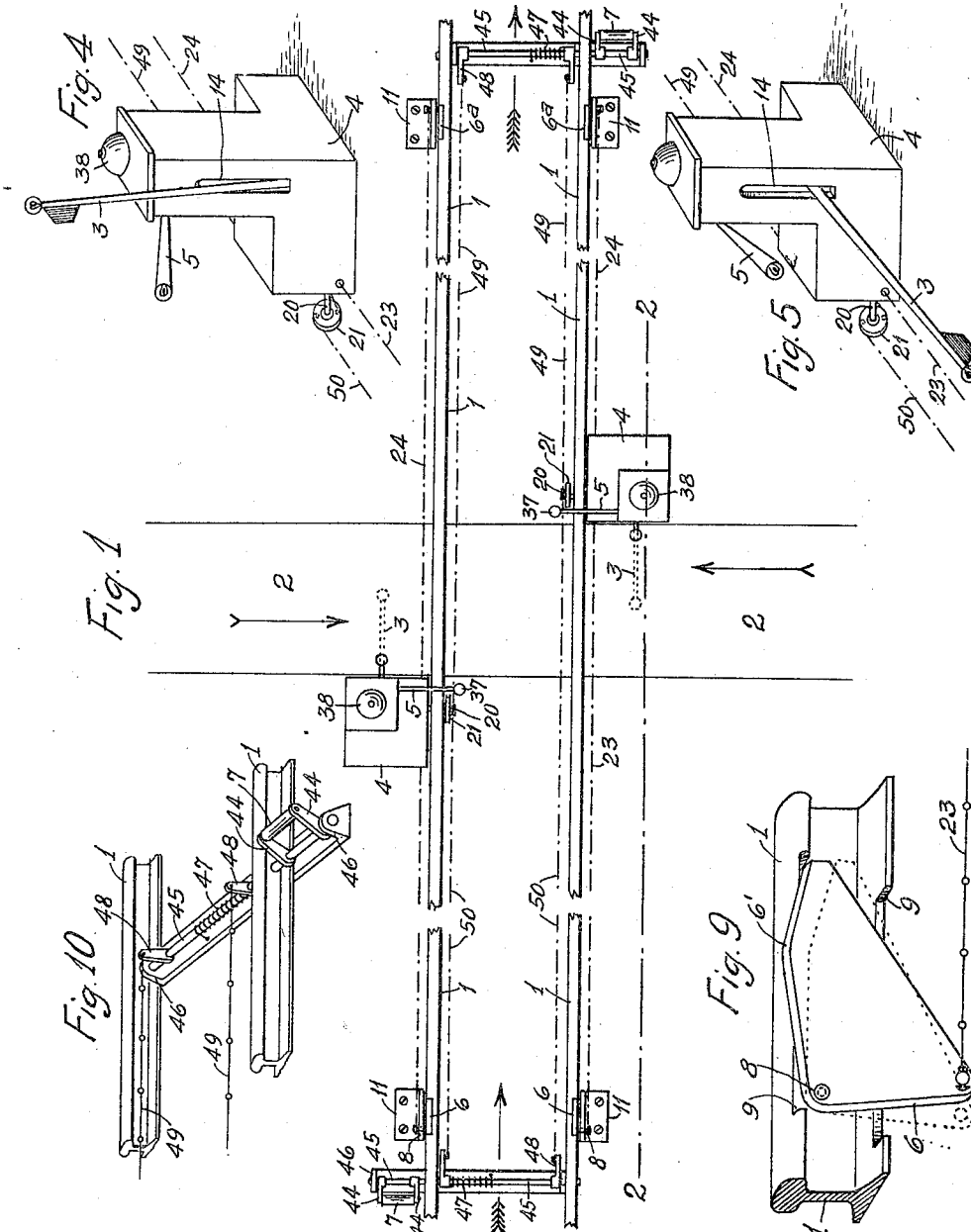
Jan. 6, 1931.

P. P. ESTEVEZ ET AL
SYSTEM OF RAILROAD AUTOMATIC GATES

1,787,674

Filed April 10, 1930

3 Sheets-Sheet 1



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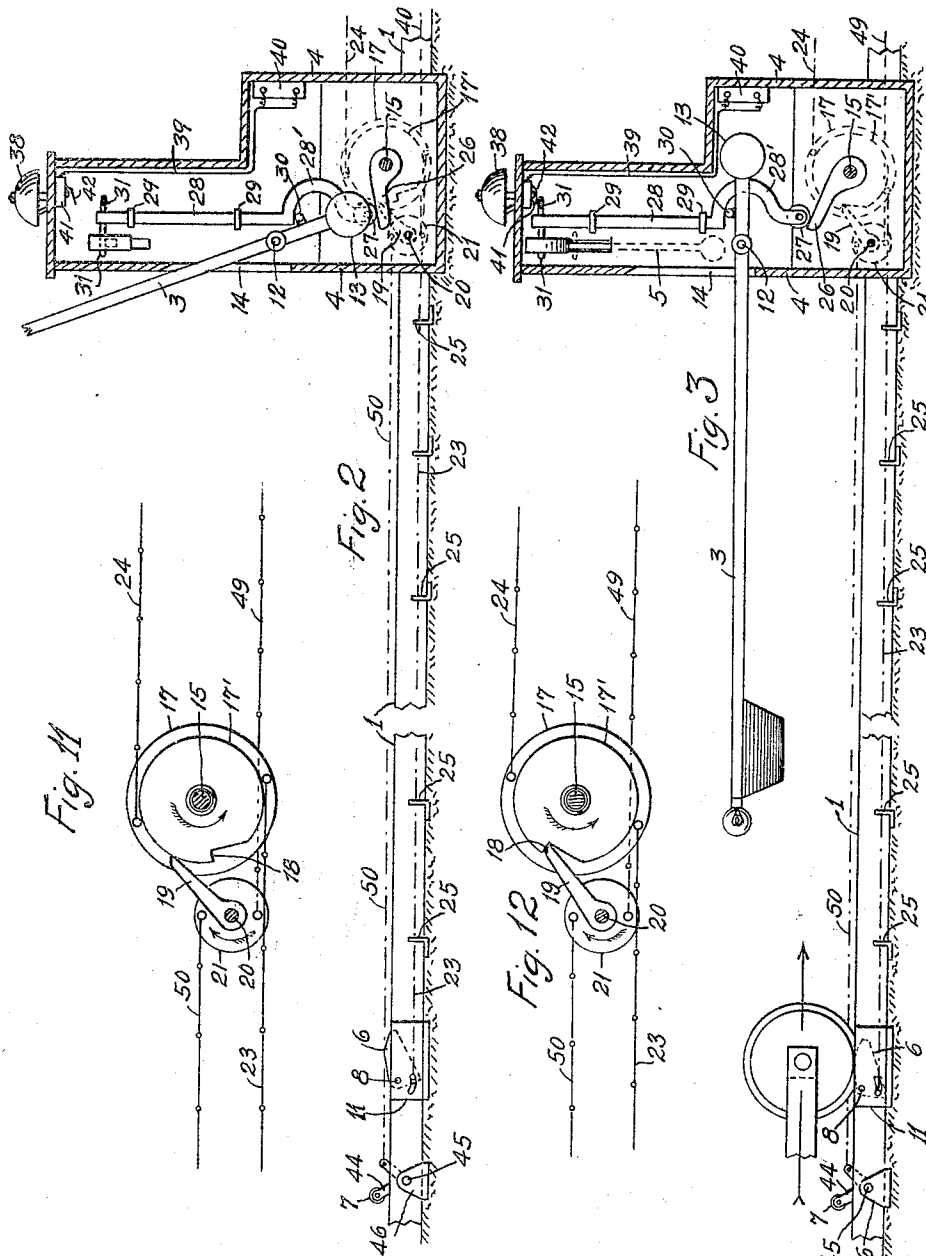
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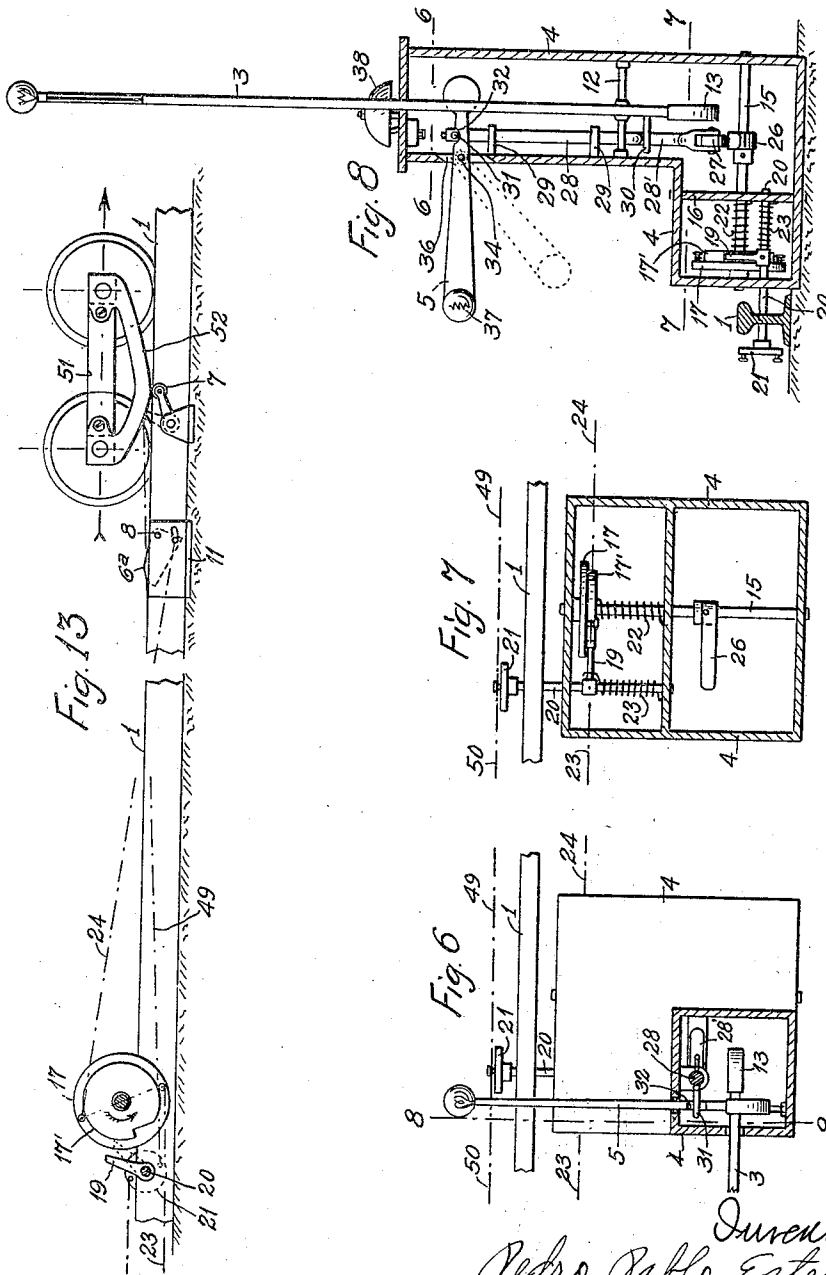
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UNITED STATES PATENT OFFICE

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SYSTEM OF RAILROAD AUTOMATIC GATES

Application filed April 10, 1930. Serial No. 443,143.

This invention relates to gates at railroad crossings, and has for its object to provide an improved system of such gates, the operating mechanism of which is arranged in such a manner that the operation of the gates is made completely automatic from the passage of a train at a predetermined and relatively considerable distance from the railroad crossing where such gates are situated, it being unnecessary to provide the mediation of an operator to operate such gates, which provides great advantages for the traffic regulation at the railroad crossings, the vehicles and persons passing by the highways being thereby prevented against the dangers to which they are actually exposed at the railroad crossings by indolence of the gate-keepers.

Another object is to provide such a system of automatic gates, with a bumper placed on the railway and connected to the mechanism activating the gates, so that upon the passage of the last wagon of the train, the gates may be restored to their normal position.

Another object is to provide a semaphore associated with the gates, which is adapted to take two positions, one to advise the engineer of the train approaching the crossing that the way is free, and another position to advise him that the way is occupied.

And, another object is to provide the same system with an alarm-bell in the cabins where the gates are mounted, so that when the train passes at a predetermined distance from said cabins, it may advise the persons going to cross the railway the proximity of the train, at the very moment the gates are to drop.

The invention is described with reference to the figures in the accompanying drawings, of which:

Fig. 1 is a diagrammatical plan view of a system of gates and its operating mechanism on both sides of a railroad crossing.

Fig. 2 is a longitudinal vertical section on the line 2—2 of Fig. 1, including the mechanism operating a gate on only one side of the railroad crossing, in the lifted position of the gate.

Fig. 3 is a section similar to Fig. 2, showing the mechanisms in the downfallen position of the gate.

Fig. 4 is a perspective view of one of the cabins in which one of the gates is mounted, showing the gate in its lifted position, and the semaphore in its position of "danger".

Fig. 5 is a view similar to Fig. 4, showing the gate in its downfallen position, and the semaphore in its position of "free way".

Fig. 6 is a horizontal section of the cabin on the line 6—6 of Fig. 8, seen at a 90° angle with respect to this latter figure.

Fig. 7 is a horizontal section of the cabin on the line 7—7 of Fig. 8, seen at a 90° angle with respect to this latter figure.

Fig. 8 is a vertical section of the cabin on the line 8—8 of Fig. 6, seen at a 90° angle with respect to this latter figure.

Fig. 9 is a detail in perspective view, showing the treadle mounted on each rail for actuating at a predetermined distance the mechanism for operating the gate and the semaphore.

Fig. 10 is a detail in perspective view, showing the mechanism mounted across the railway for restoring, at a predetermined distance, the gate and the semaphore to their normal position.

Fig. 11 is a detail in elevational view, showing the dog mechanism associated with the gate inside the cabin, in the normal unengaged position.

Fig. 12 is a detail similar to that of Fig. 11, showing the dog mechanism in its engaged position.

Fig. 13 is a longitudinal elevation of the railway diagrammatically showing the connection between the dog mechanism associated with the gate and the bumper device placed transversely to the railway for restoring the gate and the semaphore to their normal position, upon the passage of the last wagon of the train.

In the drawings, 1 indicates the rails of a railway, and 2 indicates a highway crossing the railway, across which highway it is customary to place gates 3 which act by falling down until set across the highway 2 outside the railway for preventing persons and vehicles from crossing the railway at the time a train is next to run in one direction or the other. These gates usually have an operating

mechanism which is operated by the hand of a gate-keeper stationed in a cabin at the same place where the railroad crossing is.

The system constituting the object of this invention consists in a pair of gates 3, which will preferably have a length substantially equal to a half the width of the highway 2 with the purpose that, if at the moment of the gates 3 falling down upon the running of a train by the level crossing, a vehicle might be let stand in the middle of the railway, the same vehicle may pass to the other side of the railway 1 by the space of the highway 2 not closed by the gates 3. At each of the outside angles formed by the railway 1 with the highway 2 is situated a cabin 4 which may be constructed with some suitable material as wood or metal, and inside each of said cabins is installed the operating mechanism for a gate 3 and for an associated semaphore 5, which mechanism serves to indicate to the engineer of the approaching train that the way is free, or else is obstructed by some other train in the proximity of the highway 2.

Each gate 3 has its operating mechanism connected with a treadle 6 mounted on the rail of the same side of the railway 1, and designed to be actuated by the weight of the train when passing at a distance from the cabin 4 which may be of a sixth of a mile, of a third of a mile, or of a half-mile, as it may be suitable, which will depend on the maximum speed of the train when passing by the crossing with the highway 2, and a treadle 6 should exist on each rail and at both sides of the highway 2, for the trains crossing in both directions by the railway 1, as shown in Fig. 1. Moreover, on each side of the highway 2 there will be, across the railway 1, a bumper 7 also connected to the operating mechanism for each gate 3, in order to restore this mechanism to its normal position, and for lifting up each gate and also for restoring each semaphore 5 to its normal position. As the construction and mounting of each treadle 6, and of each bumper 7 is the same at both sides of the highway 2, and for each gate 3, the mechanisms inside the cabins 4 being also similar, it will be sufficient to describe the mechanism at a single cabin 4 and one of the treadles and bumpers connected to same, in order to explain the whole construction of the system. Each treadle 6 (Fig. 9) consists of a vertical plate of a shape like an elongated triangle pivotally mounted at the upper portion of its side, on a pivot-bolt fixed across the web of the rail 1, so that it may be arranged outside the rail and lodged in cuts 9 formed in the upper and lower wings of the rail, and said plate has its upper edge level at its ends with the upper surface of the rail, but in the shape of an angular ridge 6' the vertex of which normally projects very slightly from the upper surface of the rail, with the peculiarity that the side of said angle 6' beginning at the pivot point

is much longer than the other side of the same angle, with the object in view that the impact of the train against the treadle may be not extremely violent, but that it be effected gradually. Said plate 6 will exteriorly be protected by a cover formed by an angle supporting plate 11, which is at its base fixed by means of screws to a cross-tie of the railway 1, and through the vertical portion of which is also mounted the pivot-bolt 8.

Inside the cabin 4 placed at the same side of the railway 1 with respect to the treadle 6 is loosely mounted the gate 3 on a horizontal spindle 12 supported on two opposed walls of the tower formed by said cabin 4, said gate substantially being a lever of unequal arms, the longer of which arms forms the proper gate and the shorter arm of which carries at its end a counter-weight 13 which serves to lessen its movement, and said gate 3 projects outside the cabin across a slot 14 formed in the wall of the tower of the cabin 4 which is in front of the highway 2. Beneath the spindle 12 and on the enlarged lower part of the cabin 4 at such a height that it may not hinder the course of the counter-weight 13 is placed a shaft 15 arranged parallel to the spindle 12 and rotatively mounted in the wall next in front of the rail 1, in the opposite wall, and in a vertical partition-wall 16 which divides the lower portion of the cabin in two parts. On said shaft 15 and near the wall next to the rail 1 is fixed a disk 17 which shows a circular offset portion of smaller diameter 17' which shows at its periphery an angular notch 18 one of whose sides has a nearly radial direction. Said disk 17 and the offset portion 17' form a ratchet wheel with which cooperates a dog or pawl 19 fixed on another shaft 20 parallel to the shaft 15 and mounted in the wall that is in front of the rail 1 and in the vertical partition-wall 16, said shaft 20 projecting outwardly from the cabin 4 and passing through an opening in the web of the rail 1 to carry a disk 21 at its end.

The shafts 15 and 20 always tend to rotate in opposed directions by means of a coil spring 22 rolled on the shaft 15 and another coil spring 23 rolled in opposite direction on the shaft 20, so that if the wheel 17, 17' and the pawl 19 are in the position in which the pawl 19 engages the notch 18, as shown in Fig. 12, upon making the disk 21 to rotate in order that the pawl 19 may disengage the notch 18, the wheel 17, 17' may rotate downwards by the action of the spring 22, until it reaches the position shown in Fig. 11, which is the normal position, that is, when the gate 3 is in its lifted position (Fig. 4).

At two points diametrically opposed, and near the periphery of the disk 17 there are tied the ends of two wires 23 and 24 formed by pivotally connected sections, one of which wires extends along the outside of the rail 1

until attached to the lower portion of the treadle 6 mounted at one side of the highway 2, and the other wire 24 is extended in opposed direction by the outside of the same rail 1 until attached to the lower portion of the other treadle 6a mounted at the other side of the highway 2 and in inverted position to the treadle 6 so that the same disk 17 may be operated by trains crossing the railroad crossings 2 in opposed directions (Fig. 1) to the ones operating the treadles 6. Said wires 23 and 24 are mounted across openings in spaced angular shaped brackets 25 which are fixed by screws to the cross-ties of the railway. Said wires will preferably be covered by metallic tubes of such a diameter as to render it impossible for any imprudent person to operate them by hand from the outside.

On the shaft 15 is secured, under the tower formed by the cabin 4, an arm 26 upon which rests by gravity a roller 27 rotatively carried at the lower end of a vertical bar 28 slidably mounted in guide-clasps 29 secured to the wall of the tower which is in front of the railway, and the power portion of the bar 28 has a substantially semicircular curved shape 28' which properly forms a cam surface which cooperates with a horizontal pin 30 integral with the shorter arm of the gate 3, between the counterweight 13 and the pivot pin 12. Said bar 28 shows at its upper end a horizontal pin 31 which freely engages a cut 32 formed at the upper edge of a lever 5 pivotally mounted on a pivot pin 34 fixed across a slot 36 formed in the wall looking toward the rail 1, so that the lever 5 stands divided in two unequal arms, the longer of which wholly projects outward and is widened toward its end in order to hold a suitable sign to constitute a semaphore for the train engineers, at which end it may also hold an electric light 37 to serve as a night sign. On the top of the tower is arranged an alarm-bell 38 connected by wires 39 with an electric battery 40 mounted on the walls of the cabin 4, said bell 38 having a stationary contact 41 and a movable contact 42 which is placed in the vertical course of the free end of the pin 31, so that when the bar 28 ascends, the free end of the pin 31 may press the movable contact 42 on the stationary contact 41 and close the circuit of the battery 40 thus causing the bell 38 to sound.

On the railway 1 and at the opposite side of the highway 2 with respect to each treadle 6 and 6a, and in a place which may be close to the treadle of the same side of the highway 2, and, therefore, far from, or immediate to the highway 2, is arranged a bumper which serves to restore the operating mechanism for each gate 2 and for each semaphore 5 to its normal position. Said bumper consists in a roller 7 the spindle of which is rotatively mounted in openings formed at the ends on two arms 40 fixed outside the rail-

way 1 on the right hand of the approaching train, on a horizontal spindle 45 which passes through openings formed in the web of the rails 1 and which is supported in mountings 46 integral with a supporting base secured on a cross-tie under the rails 1, being rolled on said spindle 45, between the two rails, a coil spring 47 which will tend to cause the spindle 45 to rotate in a counter-clock movement, so that in its normal position said roller 7 may be compelled to stay in a position slightly higher than the upper surface of the rails 1 (Fig. 10). On the portion of said spindle 45 comprised between the two rails 1, two arms 48 are fixed close to said rails 1, in an angular position with respect to the arms 44 and at whose ends are tied two wires 49 and 50 formed by pivotally connected sections similar to those of the wires 24 and 23, and which are placed, like those, on brackets similar to the aforesaid brackets 25, but which extend along the inside of the rails 1. A wire 49 extended at a side of the highway 2 and a wire 50 extended at the other side of the highway 2 are tied by their opposite ends to diametrically opposed points of each disk 21 mounted inside the railway 1.

For operating the roller 7, the frame 51 of one of the rolling trucks of the last wagon of each train is provided with an abutment 52 detachably secured by means of screws, and having an angular shape projecting downward with its longer side looking toward the advancing front of the train, and at such a level, that said abutment 52 may engage the roller 7 and cause this to descend by rotating on the spindle 45 against the tension of the spring 47.

The operation of the system is as follows: upon a train passing by the railway 1 in the direction indicated by the arrow on Fig. 1, and the treadles 6 at the outside of both rails being operated, the fore wheels of the locomotive will downwardly press the ridge 6' of each treadle, causing the treadles 6' to oscillate on their horizontal pivots 8 into the position indicated in dotted lines in Fig. 9, whereby the lower ends of the treadles will draw the wires 23 tied to the disks 17 arranged inside the cabins 4 which disks 17 will previously be in the position shown in Fig. 11 with the respective pawls 19 engaging the periphery of offset portions 17' of the disks 17 beyond the notches 18, and the pull on the wires 23 will rotate the offset portions 17' and the disks 17 in a direction contrary to the tension exercised by the coil spring 22 in the direction indicated by the arrow in Figs. 11 and 12, until, upon the notches 18 passing the points of the pawls 19, those will engage said notches 18, the disks 17 becoming thus locked by said pawls 19.

During this angular motion of the shafts 15, the arms 25 will shift upward the same

angular distance (Figs. 4 and 5), whereby the vertical bars 28 will be lifted, and the cam curved surfaces 28' thereof upon going upward will permit the lifting of the horizontal pins 30 annexed to the gates 31 which, in virtue of their greater heaviness at their outward projecting arms, will fall by shifting on their horizontal pivots 12 until adopting the substantially horizontal position shown in Fig. 5, and at the same time, upon the bars 28 being lifted up, the horizontal pins 31 carried on their upper end will allow the downward shifting of the levers 33 which form the semaphores, into the position shown in dotted lines in Fig. 8, which will indicate to the train engineer, at a great distance, that the gates act well, whilst, upon the ends of the pins 31 engaging the movable contacts 42 of the alarm-bells and pressing them against the stationary contacts 41, the alarm-bells 38 will sound, advising the passers by the highway 2 of the proximity of a train and the falling of the gates 3 to close the passage across the railway.

Once the last wagon of the train, provided with the abutment 52, has reached the other side of the highway 2 and engaged the roller 7 arranged at the right side of the railway (Fig. 13) in the advancing direction of the train, the roller 7 will be pushed downwardly, making it to shift around its horizontal spindle 45 against the tension of the coil spring 47, and the arms 48 will draw the wires 49 tied to the disks 21, and these will rotate an angular distance against the tension of the springs 23 rolled on the shafts 20, causing the pawls 19 to separate from the notches 18, whereby the disks 17 and the offset portions 17', under the tension of the springs 22 rolled on the shafts 15 will rotate an angular distance. This angular distance is the one required by the arms 26 to rotate downward to the position shown in Fig. 4, whereupon the vertical bars 28 will by their proper weight slide downward, and the cam curved surfaces 28' will make to move downward the pins 30 annexed to the gates 3, and these will descend by their shorter arms, and will ascend by their longer arms to free the level crossing at the railway, while the horizontal pins 31 will press downward the cam cuts 32 and will make to shift the levers 33 forming the semaphores, into the horizontal position indicated by entire lines in Fig. 4.

The same thing, but with the treadles 6 and the movable bumpers 7 arranged in an inverted position, will happen upon a train passing by the railway in a direction opposite to the one indicated by the arrow in Fig. 1.

It is obvious that changes can be made in the form and arrangement of the parts, without their being considered as altering the essential character of the invention whose spirit or scope is defined in the appended claims.

What we claim is:

1. In a system of automatic gates for railroads, the combination of gates oscillatorily mounted outside the railway, slidable cam means engaging the gates, rotatory ratchet means engaging by gravity said slidable cam means, drawing means extended longitudinally to the railway and connected at an end with the rotatory ratchet means, and oscillatory treadles mounted adjacent to the rails of the railway and connected at the other end with the drawing means, so that upon the pass of a train the treadles may be pressed downwardly by the weight of the train, the oscillatory treadles and the drawing ratchet means may cause the rotatory means to rotate a predetermined angular distance, and the rotatory ratchet means may cause the slidable cam means to rise and thereby the gates to fall down.
2. In a system of automatic gates for railroads, the combination of gates oscillatorily mounted at a vertical plane substantially parallel to the railway, semaphores oscillatorily mounted at a vertical plane substantially perpendicular to the railway, slidable cam means engaging the gates, rotatory ratchet means engaging by gravity said slidable cam means, drawing means extended longitudinally to the railway and connected at an end with the rotatory ratchet means, and oscillating treadles mounted adjacent to the rails of the railway and connected with the other end of the drawing means, so that upon the pass of a train the oscillating treadles may be pressed downwardly by its weight, and the drawing means may rotate the rotary ratchet means a predetermined angular distance, and the rotatory ratchet means may cause the rising of the slidable cam means and thereby the falling of the gates and the change of position of the semaphores.
3. In a system of automatic gates for railroads, the combination of gates oscillatorily mounted outside the railway, vertically sliding cam means engaging the gates, rotatory ratchet means engaging by gravity said vertically sliding cam means, rotatory dog means adapted to hold the rotatory ratchet means in a predetermined position, drawing means extended longitudinally to the railway and connected at an end to the rotatory ratchet means, oscillating treadles mounted adjacent to the rails of the railway and connected to the other end of the drawing means, oscillating bumpers mounted transversely to the railway, and drawing means extended longitudinally to the railway and connected at an end to said dog means and at their other end to the oscillating bumpers, so that upon the pass of a train this may press downwardly the treadles, and the drawing means connected to same may rotate the rotatory ratchet means until locked by the dog means, the gates thereby falling down, and that upon

the last wagon of the train passing beyond the gates, one of the oscillating bumpers may be engaged by the train, thus causing the release of the rotatory ratchet means and the lifting up of the gates to their normal position.

4. In a system of automatic gates for railroads, the combination of gates oscillatorily mounted outside the railway and parallel to same, a vertically sliding cam member engaging each gate, a horizontal shaft adapted to rotate against the tension of a spring below the lower end of each cam member, an arm fixed to said horizontal shaft and upon which rests the cam member, a ratchet wheel, a ratchet wheel on said shaft, drawing means longitudinally extended to the railway and connected at an end to the ratchet wheel, and treadles oscillatorily mounted next to the rails of the railway and provided with a ridge which normally projects a little over the upper surface of the rail, so that upon a train passing, the treadles may shift downwardly by the train weight, and the drawing means may rotate the ratchet wheels a predetermined angular distance, and the cam member may thereby rise and cause the gates to fall down.

5. In a system of automatic gates for railroads, the combination of gates oscillatorily mounted outside the railway and parallel to same, the shorter arm of each gate having a horizontal projection, a cam member vertically slidable adjacent the shorter arm of each gate and provided with a cam curved surface adapted to engage the horizontal projection of the shorter arm of each gate, a horizontal shaft adapted to rotate against the tension of a spring below the lower end of each cam member, an arm on said shaft and upon which the lower end of the slidable cam member may rest by gravity, a ratchet wheel on said horizontal shaft, drawing means extended longitudinally to the railway and connected at an end to the ratchet wheel, treadles oscillatorily mounted next to the rails of the railway and provided with a ridge which normally projects a little over the upper surface of the rail, so that upon the pass of a train the treadles may shift downwardly by the train weight, and the drawing means rotate the ratchet wheels a predetermined angular distance, the cam member causing the falling down of the longer arm of the gate by the rising action of the supporting arm secured to said shaft.

6. In a system of automatic gates for railroads, the combination of gates of unequal arms oscillatorily mounted outside the railway and parallel to same, semaphores in the shape of levers of unequal arms pivotally mounted above the gates at a plane substantially perpendicular to the railway, each gate having a pin projecting from the shorter arm thereof, a cam bar vertically slidable adjacent

the smaller arm of each gate and the semaphore lever and provided with a cam curved surface adapted to engage the horizontal pin projecting from the shorter arm of the gate, a projection at the top of the slidable bar which freely engages a cam cut on the upper edge of the shorter arm of each semaphore lever, an arm fixed to said shaft and upon which rests by gravity a roller carried at the lower end of the slidable bar, a horizontal shaft, adapted to rotate against the tension of a spring below the lower end of each cam bar, a ratchet wheel secured to the same horizontal shaft, drawing means extended longitudinally to the railway and connected at an end to the ratchet wheel, and treadles oscillatorily mounted adjacent the rails and provided with a ridge forming an obtuse angle and which normally projects a little over the top of the rail, said treadles being connected to the other end of the drawing means, so that upon the pass of a train the treadles may rotate downwardly by the train weight, and the drawing means may rotate the ratchet wheels a predetermined angular distance, the arm fixed to the shaft of the ratchet wheel causing the rising of the vertical cam bar and the vertical cam bar causing the falling down of the longer arm of the gate and the lowering of the longer arm of the associated semaphore lever.

7. In a system of automatic gates for railroads, the combination of gates of unequal arms oscillatorily mounted outside the railway and parallel to same, semaphores in the form of levers of unequal arms pivotally mounted at a plane substantially perpendicular to the railway above the gates, a horizontal shaft rotating against the tension of a coil spring below the pivot point of each gate, a cam bar vertically slidable adjacent to the shorter arm of each gate and to each semaphore lever, and provided with a cam curved surface which engages a horizontal projection of the shorter arm of each gate, a projecting pin at the top of the slidable bar and which pin freely engages a cam cut at the upper edge of the shorter arm of each semaphore lever, an arm fixed to said shaft and upon which rests by gravity a roller rotatorily carried at the lower end of the slidable bar, a disk provided with a notch for a pawl secured to said horizontal shaft, a second horizontal shaft rotating against the tension of a coil spring in a direction contrary to the rotating direction of the first shaft, a pawl fixed to the second shaft and adapted to engage the notch of the disk on the first shaft, a second disk fixed to the second horizontal shaft, treadles oscillatorily mounted close to the rails at one side and at a distance from the gates, and each one provided with a ridge forming an obtuse angle which normally projects a little over the top of the rail, drawing means connecting the treadles to the notch

disks, a spindle arranged transversely to the
railway and below the upper surface of the
rails at the opposed side with respect to the
treadles, a bumper supported on said spindle
outside the rails and adapted to receive the
impact of an abutment projecting from the
last wagon of a train, and drawing means connect-
ing arms fixed on the spindle transversely
to the railway to the second disk, so that upon
the pass of a train over the treadles, these
may rotate downwardly causing the lowering
of the gates and the semaphores, and upon
the pass of the same train over a bumper ar-
ranged beyond the gates, the gates and the
semaphores may be caused to lift up.

In witness whereof we affix our signatures.

PEDRO PABLO ESTEVEZ.
LUIS ENRIQUE ESTEVEZ.