N. E. DELL.

AUTOMATIC GATE FOR RAILWAY CROSSINGS.

APPLICATION FILED OCT. 14, 1910.

1,043,907.

Patented Nov. 12, 1912.

5 SHEETS—SHEET 1.

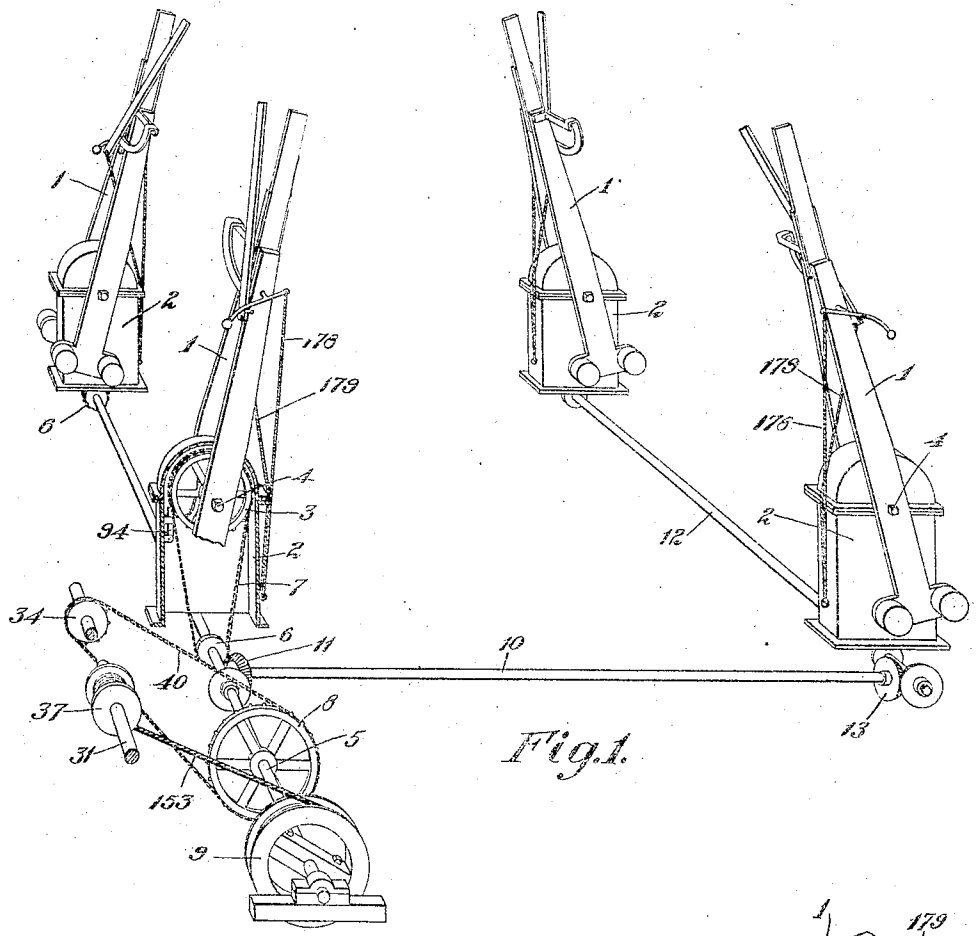

Fig. 1.

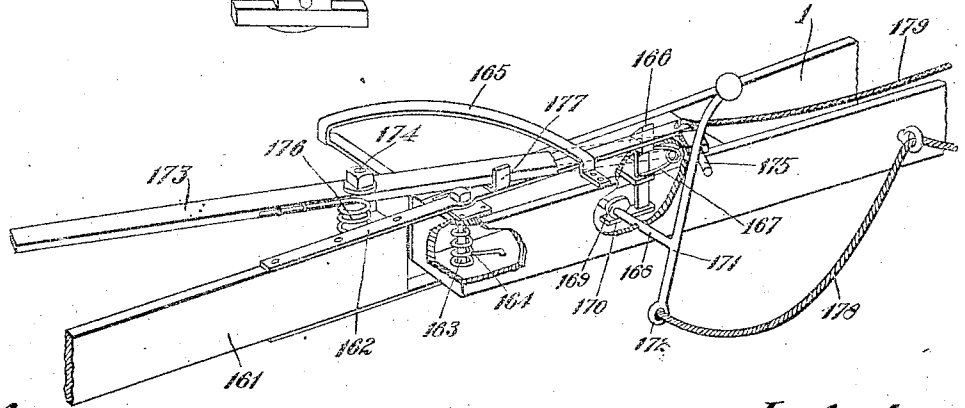

Fig. 8.

Witnesses

A. Simmison

W. C. Muir

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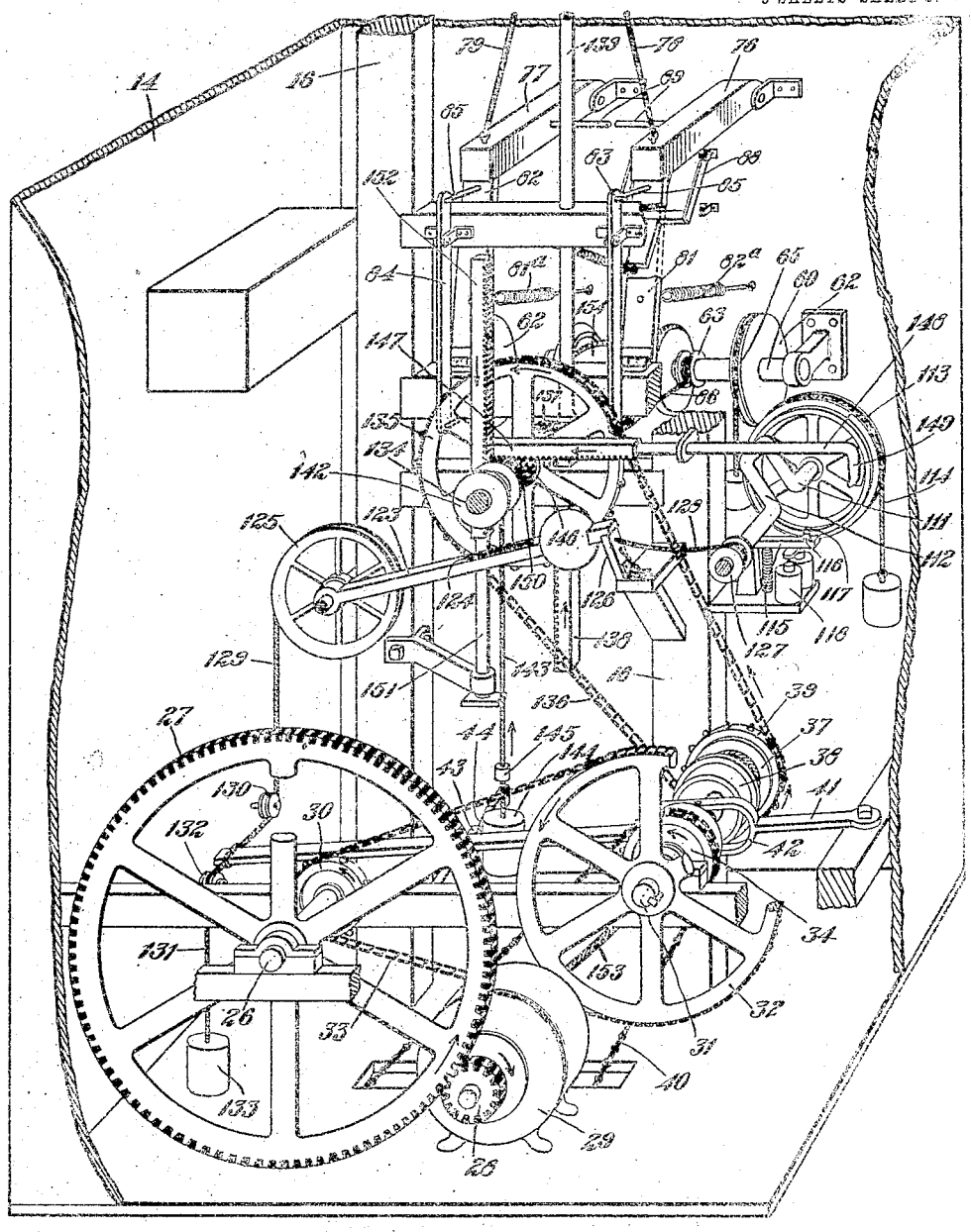

Fig. 2.

Witnesses

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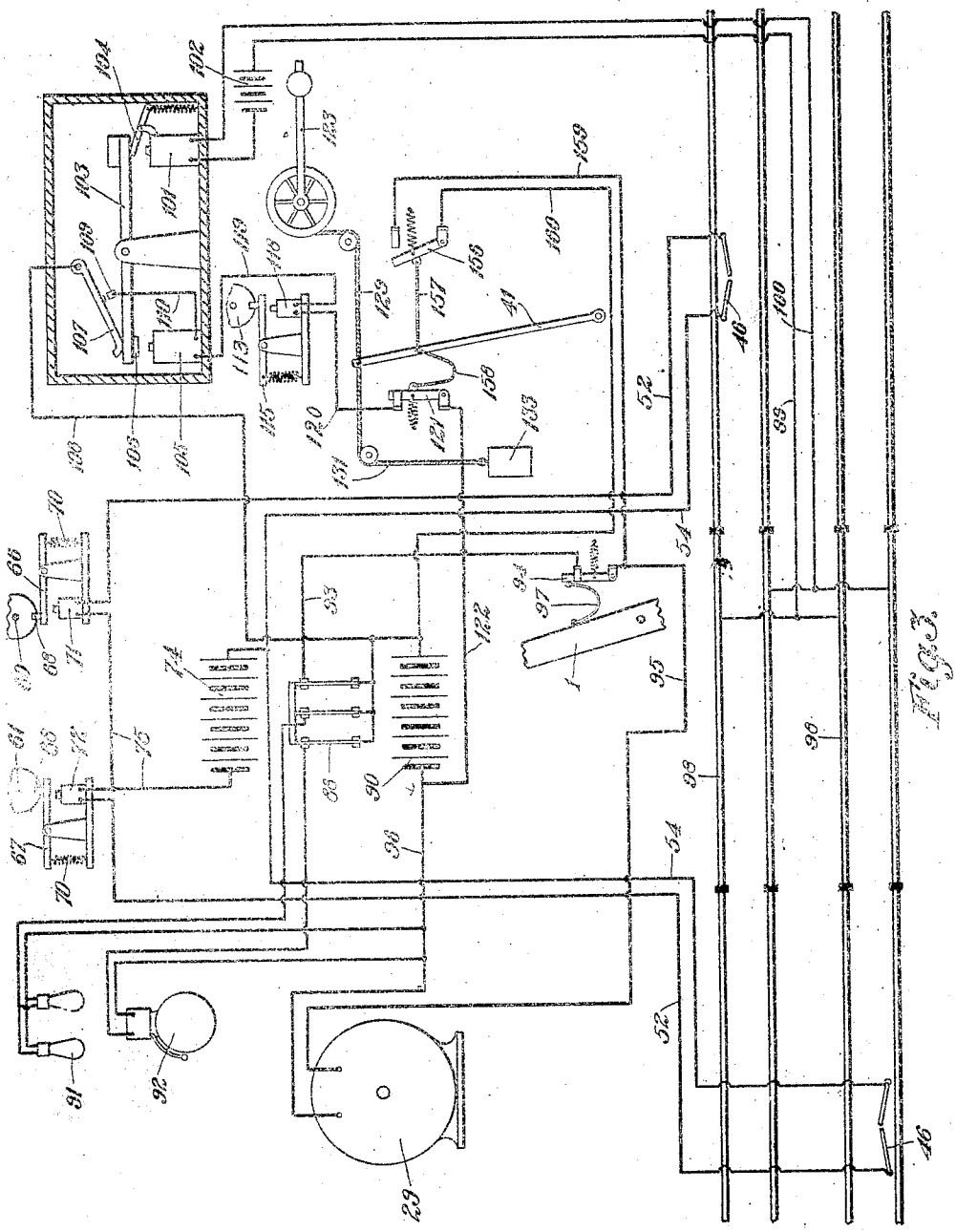

Fig. 3.

Witnesses

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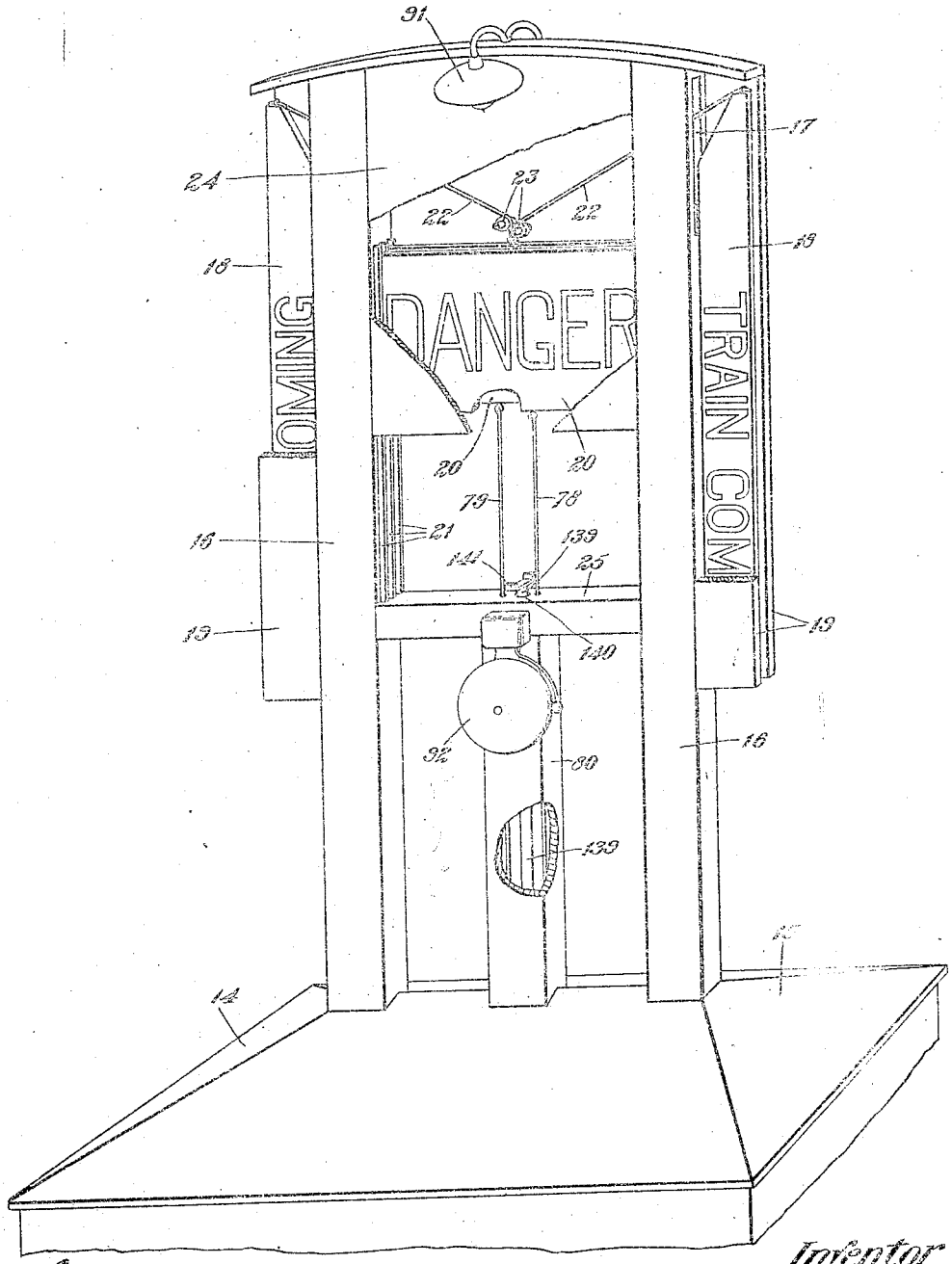

Witnesses

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Wm. McKeir

Fig. 4.

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Attys

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5 SHEETS—SHEET 5.

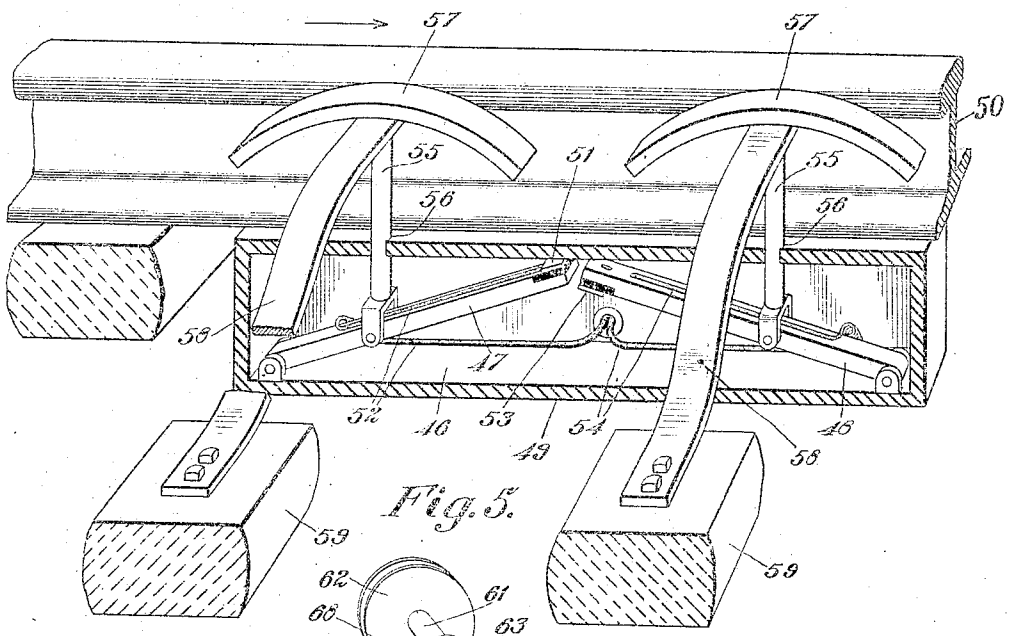

Fig. 5.

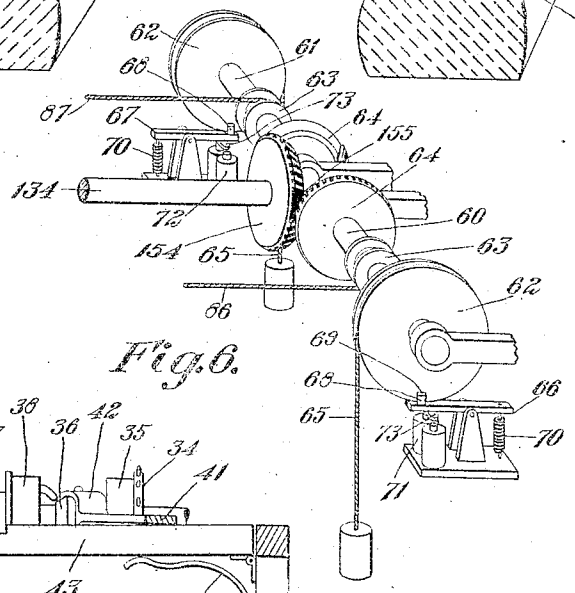

Fig. 6.

Fig. 7.

Witnesses

H. S. Emmison

W. C. McNair

Inventor

N. E. Dell

by E. J. Rutherford & Co.

Atty.

UNITED STATES PATENT OFFICE.

NORMAN E. DELL, OF COBOURG, ONTARIO, CANADA, ASSIGNOR OF ONE-THIRD TO MARTIN JEX & COMPANY, OF COBOURG, ONTARIO, CANADA.

AUTOMATIC GATE FOR RAILWAY-CROSSINGS.

1,043,907. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed October 14, 1910. Serial No. 587,095.

To all whom it may concern:

Be it known that I, NORMAN E. DELL, a subject of the King of Great Britain, and resident of the town of Cobourg, in the county of Northumberland, Province of Ontario, Canada, have invented certain new and useful Improvements in Automatic Gates for Railway-Crossings; and I do hereby declare that the following is a full, clear, and exact description of the same.

The invention relates to improvements in automatic gates for railway crossings, as described in the following specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially in the novel construction and arrangement of parts, whereby the gates are lowered and raised by a power driven mechanism controlled by electrically operated means, said electrically operated means being actuated by the movement of trains on the railway.

The objects of the invention are, to protect highways crossing railroads, to reduce the cost of maintenance for protection, and to devise a positive automatically operated device for lowering and raising the gates.

In the drawings, Figure 1 is a perspective view of a set of gates for a railway crossing showing the means for operatively connecting the several gate arms together, parts of the figure being broken away. Fig. 2 is a perspective view of the main operating mechanism, parts thereof being broken away. Fig. 3 is a diagrammatic view showing the wiring of the system. Fig. 4 is a perspective view, shown partly broken away, of the crossing signal. Fig. 5 is an enlarged perspective detail, shown partly broken away, of the rail switch mechanism. Fig. 6 is a perspective detail of a portion of the mechanism illustrated in Fig. 2. Fig. 7 is an elevational detail view of the clutch shifting mechanism for the main shaft of the gate lowering mechanism. Fig. 8 is an enlarged perspective detail of the outer end of one of the gate arms shown partly broken away.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 are the gate arms pivotally supported from the casings 2 and suitably counter-balanced, each of said arms having a sprocket wheel 3 secured to the shaft 4 within said casings.

5 is a shaft supported in suitable bearings below the level of the casings 2 having the sprocket pinions 6 secured thereto and connected by the sprocket chains 7 to two of the sprocket wheels 3.

8 is a sprocket wheel secured to the shaft 5 at one end thereof and 9 is a rope drum also secured to the shaft 5.

10 is a shaft operatively connected to the shaft 5 by the miter gears 11 at one end and to a shaft 12 operating the two opposite gates by the miter gears 13.

14 is a casing arranged adjacent to the gates having a top 15 thereto and a pair of upright posts 16 projecting through and extending above the top 15, said posts having the vertical slots 17 therein adjacent to the top.

18 are signal arms hinged adjacent to their upper ends and to the posts 16, the upper ends thereof being adapted to swing into the slots 17. The arms 18 are suitably inscribed with a warning to indicate when a train is coming and they are hidden from sight from the high-way between the casing sides 19 secured to the outer sides of said posts when in their vertical position.

20 are signal boards slidably arranged between the posts 16 and held in place by the guide strips 21.

22 are cords secured to the upper edges of the signal boards 20 and extending over the rollers 23 and connected to the upper ends of the signal arms 18.

The boards 20 are, when in their upper position, arranged out of sight between the side members 24 extending between the posts 16. The side members 24 terminate a considerable distance above the cross sill 25 extending between the posts so that the said signal boards will be visible when drawn

downwardly. On the downward movement of either the signal boards, the corresponding signal arm connected therewith is swung outwardly upon its hinge to indicate the direction from which the train is approaching.

26 is a shaft supported in suitable bearings within the casing 14.

27 is a spur gear wheel secured to the shaft 26 and meshing with the spur pinion 28 secured to the shaft of the electric motor 29.

30 is a sprocket pinion secured to the shaft 26.

31 is a shaft journaled in suitable bearings within the casing 14.

32 is a sprocket wheel rigidly secured to the shaft 31 and operatively connected with the sprocket pinion 30 by the chain 33.

34 is a sprocket pinion rotatably mounted on the shaft 31 and having a clutch member 35 formed on one end of the hub thereof.

36 is a longitudinally movable clutch member non-rotatively secured to the shaft 31 and adapted to engage the clutch portion of the pinion 34.

37 is a rope drum rotatably supported upon the shaft 31 and having a clutch member 38 formed on the end thereof adjacent to the movable clutch member 35 and adapted to be engaged thereby.

39 is a sprocket secured to the outer end of the drum 38.

40 is a sprocket chain connecting the pinion 34 with the sprocket wheel 8.

41 is a lever pivotally secured at one end within the casing 14 and having the divided portion 42 extending above and below the sliding clutch member 36 and pivotally secured thereto.

43 is a pivotal latch arm supported at one end from the casing 14 and having a notch 44 in the top face thereof adapted to receive the outer end of the lever to hold the clutch member 36 in engagement with the drum clutch 38. The latch arm 43 is spring held upwardly by the spring 45.

It will be seen from this construction that when the clutch member 36 is in engagement with the clutch 35 of the sprocket 34, the arms will be operated through the chain 40 to swing downwardly on the rotation of the motor in one direction.

46 are track switches located on the railway a considerable distance from the highway crossing. The switches 46 are formed of a pair of contact members 47 and 48 secured at their outer ends within a casing 49 arranged beneath the rail 50.

51 is a contact plate secured to the upper side of the pivotal member 47 at its outer end and having a wire 52 leading therefrom.

53 is a contact plate secured to the underside of the outer end of the pivotal member 48 and electrically connected with a wire 54. The wires 52 and 54 are carried to the casing 14. 55 are rods having fork shaped lower ends pivotally connected to the members 47 and 48 and extending upwardly through the orifices 56 in the top of said casing and having the rigid arc-shaped heads 57 arranged close to the side of the rail head.

58 are springs rigidly secured at their outer ends to the ties 59 supporting the casing 49 and arching upwardly to support the rods 55 and contact members 47 and 48 in their raised positions. The heads 57 of the rods 55 are thus spring held so that the flange of the wheels of a train approaching the crossing will engage the heads and swing the contact members 47 and 48 downwardly in succession so that the contact plate 53 of the member 48 will be brought down upon and engage the contact member 51 on the member 47.

The operation of the contact members 47 and 48 in the manner described establishes an electrical connection between the wires 52 and 54 when the train is traveling toward the crossing in the direction indicated by arrow in Fig. 5 but in the event of the train backing up the member 48 will be depressed first and the contacts 51 and 53 will not come into engagement the one with the other. The inner walls of the top and bottom portions of the casing may be suitably insulated to obviate the short circuiting of the current through the casing.

60 and 61 Fig. 6 are a pair of horizontally arranged shafts journaled in bearings supported from one of the sides of the casing 14, each of said shafts having a grooved pulley 62 and drum 63 and a beveled gear 64. The beveled gears 64 are preferably formed with the teeth extending only one-half the way therearound and are arranged facing each other at the inner ends of the said shafts.

65 are weighted cords secured to the grooved pulleys 62, the cord of one pulley being arranged depending from the opposite side to that of the other pulley.

66 and 67 are latches pivotally supported beneath the grooved pulleys 62 and having the tooth members 68 adapted to extend into notches 69 in each of the said grooved pulleys, said latches being spring held by the spiral springs 70 to hold the said teeth in the notches in said pulleys.

71 and 72 are electro-magnets supported immediately beneath the latches 66 and 67 respectively and adapted to operate the armatures 73 secured to the respective latches adjacent to the toothed end. The wire 52, leading from the track switch 46 arranged at one side of the crossing is electrically connected to the electro-magnet 71 Fig. 3 and the wire 52 from the track switch arranged at the other side of the crossing is electrically connected to the electro-magnet 72 and the wires 54 from each of said track switches

are electrically connected to an electric battery 74 inclosed within the casing 14. The electric circuit to the electro-magnets 71 and and 72 is completed by the wires 75.

76 and 77 Fig. 2 are a pair of weighted arms pivotally supported at one end within the casing 14.

78 and 79 are cords connected to the outer ends of the arms 76 and 77 respectively, said cords leading upwardly through the vertical casing 80 Fig. 4 to and through the cross sill 25 and each connected at the upper end to one of the danger signal boards 20. The arms 67 and 77 are sufficiently heavy to pull the signal board 20 downwardly and swing its corresponding arm 18 upwardly.

81 and 82 are pivotal latches supporting the outer ends of the weighted arms 76 and 77 respectively held by the springs 81^a and 82^a.

83 and 84 are levers pivotally supported adjacent to the latches 81 and 82 and connected thereto at the upper ends by the rods 85.

86 and 87 are cords connected to the lower ends of the levers 83 and 84 respectively and secured to the drums 63 secured to the shafts 60 and 61 respectively.

The closing of the electric circuit through either of the magnets 71 or 72 draws on the armature 73, consequently pulling downwardly upon the corresponding latch 66 or 67 to release the grooved pulley. The weighted cord secured to the said pulley rotates the shaft released, and turning, the drum 63 thereon pulls on the cord 86 or 87, as the case may be, thus swinging the corresponding lever 83 or 84 to draw the latch 81 or 82 free of the corresponding weighted arm. Immediately the latch is withdrawn from beneath the weighted arm 76 or 77 the said arm pulls downwardly upon the signal board to which it is attached, coincidently swinging the corresponding signal arm 18 outwardly to indicate to travelers on the high-way the direction from which a train is approaching and that it is close by.

88 is a three point electric switch pivotally secured to the inner side wall of the casing 14 beneath the weighted arm 76 and spring held out of contact with its terminals and adapted to be swung into contact with its terminals on the downward movement of either of the weighted arms 76 or 77, said weighted arms having the pins 89 projecting therefrom adapted to engage said switch to throw it into its closed position.

90 Fig. 3 is an electric battery or other source of electric supply, electrically connected to three of the terminals of the switch 88. The three contact posts of the switch 88 are electrically connected as follows:—one to an electric light or lights 91 arranged above the casing inclosing the signal boards 20. Another of said terminal posts is electrically connected to an electric bell 92 suitably arranged and supported from the casing 14, the return wires leading to the battery 90 so that the lights will be lighted and the bell sounded on the closing of the said switch. The third terminal post of the switch 88 is electrically connected through the wire 93, the electric switch 94 arranged in one of the casings 2 and operatively connected with one of the gate arms, and the wire 95 to the motor 29.

96 is the return wire leading from the motor to the battery 90. The electric switch 94 is spring held to close the circuit to the motor 29 while the arms are in the raised position and remain closed until the arms reach their lowermost position when the said switch is thrown open by means of a flexible connection 97 secured to one of said arms and to said switch.

From the foregoing description it will be readily apparent that on a train approaching a crossing and engaging the track switch 46 the switch 88 will be closed and the several signals operated as described and the arms will at the same time be lowered to protect the high-way. The arms remain in their closed position during the time the train is passing the crossing and are not released until the last car has moved clear of the crossing. The railway rails at the crossing are insulated from the main line of rails to form the sections 98 and to these sections are connected the wires 99 and 100 leading to an electro-magnet 101 arranged within the casing 14, the circuit to said magnet including the electric battery 102 and the circuit is closed by the wheels of the cars traveling over the rails.

103 is a member pivotally supported midway of its length and weighted at the end extending over the electro-magnet 101.

104 is a short pivotal lever supported from the side of the magnet 101 and forming an armature thereto, the outer end of said lever armature being spring held to hold the inner end in contact with the weighted end of the member 103—clear of the said magnet.

105 is an electro-magnet supported adjacent to the opposite end of the pivotal member 103 to which is secured an armature 106.

107 is an arm pivotally supported above the member 103 and having a curved lower end resting on the top of said member at its outer end. The arm 107 is electrically connected through the wire 108 to the battery 90.

109 is an electric contact arranged adjacent to the underside of the arm 107 though it is normally out of contact with said arm, the spring of the pivotal armature 104 being adjusted to support the weighted end of the member 103 so that the arm 107 will be just out of contact with the electrical con-

tact 109. The contact 109 is electrically connected to one of the terminals of the electro-magnet 105 by a wire 110.

111 Fig. 2 is a shaft supported in suitable journals within the casing 14 having a crank 112 formed intermediate of its length.

113 is a grooved pulley fixedly secured to the shaft 111 and having the weighted cord 114 attached thereto.

115 is a pivotal lever having a tooth 116 extending into a notch 117 in the rim of the pulley 113 and holding said pulley and shaft 111 from rotation.

118 is an electro-magnet supported beneath the toothed end of the lever 115 and adapted on being energized to draw the said lever downwardly to release the pulley 113 and shaft 111. The wire 119 Fig. 3 leading from the magnet 105 is electrically connected to the magnet 118 and 120 is a wire leading from said magnet 118 to an electric switch 121 spring held in a closed position, the opposite terminal of the switch being connected to the battery 90 through the wire 122.

123 Fig. 2 is a lever pivotally supported at one end and weighted at its outer end and having the slot 124 therethrough intermediate of its length.

125 is a grooved pulley fixedly secured to the pivotal end of the lever 123.

126 is a pivotal latch member suitably supported from the frame of the device within the casing 14 and spring held in engagement with the weighted end of the lever 123 and holding it in its raised position.

127 is a drum fixedly mounted on the shaft 111.

128 is a cord secured to the drum 127 and at its other end to the latch member 126, said cord being wound upon the drum 127 upon the release of the pulley 113 withdrawing the latch 126 and releasing the lever 123.

129 is a cord attached to the pulley 125 and extending downwardly around an idler grooved roller 130 and attached to the outer end of the lever 41.

131 is a cord attaching to the outer end of the lever 41 and extending over a grooved roller 132 supported from the side of the casing 14, said cord having a weight 133 attached to its lower end and holding the lever 41 normally so that the clutch member 33 is held in operating engagement with the clutch portion of the sprocket 34. On the withdrawal of the latch member 126 from engagement with the lever 123 the said lever swings downwardly drawing on the cord 129 and swinging the lever 41 on its pivot to release the sprocket 34 and to operatively connect the drum 37 with the shaft 31.

134 is a shaft supported in suitable bearings between the uprights 16 and having a sprocket wheel 135 secured thereto.

136 is a sprocket chain connecting the sprocket wheel 135 with the sprocket pinion 39 on the shaft 31, thus operatively connecting the shaft 134 to be rotated in the direction indicated by arrow following the release of the lever 123.

137 is a spur pinion secured to the shaft 134.

138 is a rack formed at the lower end of a vertically arranged rod 139 and meshing with the spur pinion 137. The rod 139 is slidably held in suitable guides in the frame of the casing 14 and extends upwardly through the casing 80, the upper end thereof projecting through an orifice 140 in the sill 25.

141 is a cross bar secured to the upper end of the rod 139 and adapted to receive the lower edges of the danger signals 20 when said signals are drawn downwardly through the operation of the gears 78 and 79. On the rotation of the shaft 134 the rack 138 and rod 139 are moved upwardly pushing the danger signals 20 up within the casing 24 and allowing the arms 18 to swing back to their normal hidden position.

142 is a drum secured to the shaft 134 immediately above the lever 123.

143 is a cord attached to the drum 142 and extending downwardly through the slot 124 in the lever 123.

144 is a weight secured to the lower end of the cord 123.

145 is a stop secured to the cord 123 a short distance above the weight 144 and adapted to engage the underside of the lever 123 to swing said lever upwardly as the shaft 134 is rotated.

146 is a spur pinion secured to the shaft 134 and meshing with a rack 147 horizontally supported in suitable guides.

148 is a rod secured to one end of the rack 147 and having a downwardly turned hooked outer end 149 adapted to engage the crank 112 of the shaft 111, to return the grooved pulley 113 and its weighted cord to the normal position, coincidently releasing the latch 126 so that when the lever 123 is raised to its uppermost position the spring latch will engage the outer end thereof and hold it securely.

150 is a spur pinion secured to the shaft 134.

151 is a rod vertically supported in suitable guides and having a rack 152 formed on its upper end adapted to mesh with the spur pinion 150. The rod 151 is supported vertically above the outer end of the pivotal latch lever 43 and said rod being moved downwardly on the rotation of the shaft 134 engages the outer end of said latch lever pushing it downwardly to release the lever 41 at the proper period.

153 is a cable wound upon the drum 37 and operatively connected with the drum 9 on the gate shaft 5. The drum 37 is rotated coincidently with the sprocket 39 and

through the cable 153 swings the gates upwardly.

154 is a beveled gear secured to the shaft 134 and meshing with the gears 64 on the shafts 60 and 61, said gear having the gaps 155 in the toothed face thereof. The teeth of the gears 64 extend only half way around and the gaps in the gear 154 are arranged so that when the shaft 134 is at rest the gears 64 will be free to rotate independently of the gear 154, thus allowing the shafts 60 and 61 to rotate freely on the release of the latch members 66 and 67. On the rotation of the shaft 134 in the manner described the gear 154 will mesh with the teeth of the gears 64 and rotate the shafts 60 and 61 to return them to their normal position, that is, with the teeth of the latches 66 and 67 engaging the notches in the grooved pulleys 62.

156 is an electric switch arranged within the casing 14 directly opposite the switch 121 (shown only in Fig. 3) and spring held to its closed position.

157 is a flexible cord connected to the switch 156 and to the clutch lever 41, said cord being arranged to held the switch 156 open when the clutch lever is in its normal position and the gates being lowered.

158 is a cord connected to the clutch lever 41 and to the switch 121 and adapted to open the switch 121 on the swinging of the lever to the reverse position. The cord 157 is loosened by the movement of the clutch lever coincidently with the tightening of the cord 158 so that as the switch 156 is closed the switch 121 is opened.

159 is a wire leading from one terminal of the switch 156 to the motor 29.

160 is a wire leading from the other terminal of the switch 156 to the battery 90.

161 (Fig. 8) are supplemental arms projecting outwardly from the ends of the main portion of each of the gate arms 1, each of said supplemental arms having the strap portions 162 secured to the upper and lower edges and rigidly connected to the bolt 163 pivoted in the outer end of the arm 1.

164 is a spiral spring encircling the bolt 163 and having one end thereof secured to said bolt and the other end to the arm 1 and exerting a spring pressure on said bolt and said supplemental arm. The upper strap 162 extends beyond the bolt 163 beneath the arc-shaped guard 165 rigidly secured to the outer end of the arm 1 and is held against the tension of the spring 164 by a vertically arranged latch 166, the latch 166 engaging the edge of said strap and being held upwardly by the spring 167.

168 is a rod extending horizontally across the arm 1 adjacent to the latch 166 and having a cam 169 secured thereto adapted to engage the projecting portion 170 of said latch.

171 is an arm secured to or forming part with the rod 168 and arranged at right angles thereto and having an eye 172 formed on its short downwardly extending end and the upper long end suitably weighted.

173 is a thin flat bar pivotally supported on the bolt 174 and having one end extending beneath the guard 165 and engaging the upper portion of the arm 171.

175 is a pin extending laterally from the end of the bar 173 and engaging the arm 171 to retain the weighted end in the raised position. The opposite end of the bar 173 extends outwardly at an angle from the supplemental arm 161 and is held by the spring 176 with the short end engaging the lug 177 secured to and projecting upwardly from the upper strap 162. Each of the several arms are constructed in a similar manner with the bars 173 projecting inwardly toward the railway.

178 are cords secured to the eye 172 on the ends of the arms 171 and hanging loosely in suitable supports along the arms 1 and are secured at the opposite ends to the casings 2.

179 are cords secured to the inner ends of the upper strap members 162 and secured at their other ends to the casings 2. The arrangement of supplemental arms on the inner ends of the arms 1 is devised to obviate the accidental trapping of a horse and vehicle or person upon the tracks when a train is approaching, that is to say, in the event of a train approaching and the arms are automatically lowered while the person is driving over the crossing, a means of egress is provided.

In the operation of this portion of the device the horse or person presses against the bars 173. These bars are very light and swing quite freely upon their pivots offering very little resistance. The swinging of either of the bars 173 withdraws the pins 175 from engagement with the weighted arm 171 and said arm turns the rod 168 and through the cam 169 withdraws the latch 166, thereby loosening the supplemental arm and said supplemental arm immediately swings upon its pivot being actuated by the spring 164, thereby making an opening for the person or vehicle to pass through the gates, the bar 173 in each case being carried around with the supplemental arm by the lug 179 engaging the inner end of said bar and swinging it on its pivot. In the operation of the gates, a train approaching the crossing operates the track switch at one side of the crossing in the manner described, thus closing an electric circuit to the magnets 71 or 72 according to the direction from which the train is approaching. On the energization of either of the said magnets the corresponding latch is withdrawn from the weighted pulley and the weight being released rotates the shaft

on which the pulley is mounted and winds up the cords 86 or 87 as the case may be, thereby pulling on the respective lever 83 or 84 to release the corresponding latch holding up the pivotal weighted member 76 or 77. On the release of either of the weighted members 76 or 77 the said member swings downwardly on its pivot drawing downwardly on the cord attached thereto and operating the signal in the manner described. The cord on being pulled downwardly draws down the danger signal and throws out the corresponding signal arm, thereby indicating the direction from which the train is approaching. Simultaneously with the movement of the signals, the switch 88 is thrown downwardly by the pin 89 on either of the pivotal weighted members engaging the same and said switch closes an electric circuit to the lamps 91 and bell 92 and also closes the circuit to the motor 29 within the casing 14. The clutch lever 41 is normally held by the weight 133 so as to operate the sprocket chain 20 and shaft 5 to swing the arms 1 downwardly, thereby preventing the crossing of the tracks in advance of the approaching train. When the first pair of wheels of the train enters the block 98 an electric circuit is closed through the wires 99 and 100 through the magnet 101. The magnet 101 being energized draws the lever armature 104 downwardly allowing the weighted end of the pivotal member 103 to swing downwardly. This movement swings the pivotal arm 107 upwardly. The weighted member remains in this position until the last pair of wheels of the train leave the block 98. The electric circuit through the electro-magnet 101 is then broken and the armature 104 being released is thrown upwardly by its operating spring and throws the weighted end of the member 103 upwardly, allowing the pivotal arm 107 to swing downwardly into electrical contact with the contact 109. An electric circuit is thus closed through the electro-magnet 105 and the armature 106 is attracted thereby, thus holding the said pivotal member 193 with its armature end downward. Coincidently with the operation of the member 103 the current flows through the electro-magnet 118 throwing the latch 115 clear of the grooved pulley 113. The weight suspended from the pulley 113 rotates the shaft 111. The rotation of the shaft 111 winds the cord 128 upon the drum 127, thereby pulling the latch 126 to release the lever 123. The weighted lever 123 then swings downwardly rotating the pulley 125 and pulling upon the cord 129 swings the clutch lever 41 upon its pivot, releasing the driving connection between the shaft 31 and the sprocket 34. The arresting of the arms 1 on reaching their downward position is not dependent on the operation of the lever 41 but the said arms swinging downwardly draw upon the cord 97 (Fig. 3) so as to open the switch 94 at the limit of their downward movement, thus breaking the electric circuit to the motor 29 and arresting its movement. As the lever 41 is swung upon its pivot, the clutch member 36 is moved into engagement with the clutch 38 and coincidently the switch 121 is opened and the switch 156 allowed to close in the manner hereinbefore described.

The opening of the switch 121 breaks the electric circuit to the magnet 110 and as the armature 106 is thus released, the lever 193 is turned on its pivot but the weighted end thereof and the opposite end coming in contact with the pivotal member 107 breaks the circuit at the contact 109. The closing of the switch 156 completes the electric circuit through the wires 159 and 160 to the motor 29, thereby starting the said motor into operation. As the clutch on the shaft 31 is now reversed the cable 153 is wound upon the drum 37 and through the drum 9 and connecting gear swings the gates upwardly. Coincidently with the upward movement of the gates the sprocket 135 is rotated thus turning the shaft 134. The rod 139 is moved upwardly through the rack and pinion 138 and 137 to return the signals to normal and coincidently the cord 143 is wound upon the drum 142, thereby raising the lever 123. The rod 148 is operated by the movement of the shaft 134 to return the shaft 111 to its normal position and the rod 151 is moved downwardly to engage the latch 43, thereby freeing the lever 41. The lever 41 in swinging back to its normal position opens the electric switch 156 and allows the switch 121 to close, thereby bringing the connecting parts back to their normal position. The switch 88 is opened by the spring 88a.

The wiring and arrangement of parts shown and described are for a double track system, but it will be readily understood any number of tracks may be equipped so that a vehicle traveling in either direction will operate the device to protect the crossing.

What I claim as my invention is:—

1. In an automatic gate for railway crossings, a pivotal gate arm, a signal, an electric motor operatively connected to raise and lower said gate arm, an electric circuit to said motor, a switch arranged in said circuit normally held open, a gravity actuated member adapted to operate said signal and to engage and complete the electric circuit to said motor, and effect the closing of the gate, means for holding said gravity actuated member out of operation, means actuated by the movement of a train toward the crossing for releasing said gravity member, means for arresting the downward

movement of gate arm, and means for returning the gate arm and signal to their normal position.

2. In an automatic gate for railway crossings, a pivotal gate arm, a signal, an electric motor operatively connected to raise and lower said gate arm, an electric circuit to said motor, a switch arranged in said circuit normally held open, a gravity actuated member adapted to operate said signal and to engage and close said switch to complete the electric circuit to said motor and effect the closing of the gate, means for holding said gravity actuated member out of operation, electrically operated means for releasing said gravity member, an electric track circuit leading from said releasing means, a track switch arranged in said circuit and adapted to be closed by the movement of a train toward the crossing, means for arresting the downward movement of the gate arm and means operatively connected with said motor for returning said signal and gate arm to their normal position.

3. In an automatic gate for railway crossings, a pivotal gate arm, an electric motor operatively connected to raise and lower said gate arm, an electric circuit to said motor including a suitable electric current supply and having a switch normally held open, a pivotal weighted member operatively connected with said switch and adapted on being released to close the same, a latch engaging the free end of said weighted member and holding it in a raised position, a lever operatively connected to said latch and adapted to withdraw said latch from engagement with said weighted member, gravity operated means for swinging said lever on its fulcrum, means for holding said gravity operated means, electric means for releasing said holding means, an electric circuit connected to said electric means, a track switch included in the latter electric circuit and adapted to be closed by the movement of a train on the track, means operated by the movement of the gate arm for breaking the motor circuit, and means for returning said gate arm to its raised position.

4. In an automatic gate for railway crossings, a pivotal gate arm, an electric motor operatively connected to raise and lower said gate arm, an electric circuit to said motor including a suitable electric current supply and having a switch normally held open, a weighted member pivotally supported above said electric switch and adapted to swing downwardly and close the same, a latch engaging the free end of said weighted member and holding it in a raised position, a lever operatively connected to said latch and adapted to withdraw said latch from engagement with said weighted member, a shaft supported in suitable bearings, a flexible cord secured to said shaft and connected to the free end of said lever, a grooved pulley secured to said shaft and having a notch in its periphery, a weighted cord secured to said grooved pulley, a latch member spring held in engagement with the notch in said weighted pulley, an electro-magnet arranged adjacent to said latch and adapted to withdraw the same from engagement with said pulley, an electric circuit connected to said electro-magnet, a track switch included in said latter electric circuit and adapted to be closed by the movement of a train toward the crossing, means for arresting the downward movement of the gate arm, and means for returning said gate arm to its raised position.

5. In an automatic gate for railway crossings, a gate arm, means for raising and lowering said gate arm, gravity operating means for starting said gate operating means into operation to lower the gate, electrically operated means controlled by the movement of trains on the track for releasing said gravity operated means, a signal operatively connected with said gravity member and normally hidden and adapted on the release of said gravity member to be displayed, means for raising said gate arm, and means for returning said signal and gravity operating means to their normal position.

6. In an automatic gate for railway crossings, a gate arm arranged to extend across the high-way crossing, a casing arranged adjacent to said gate arm and having a pair of guides extending vertically above the top thereof, a pair of signal arms pivotally supported from said guides and having suitable inscriptions thereon, cords connected to the inner ends of said pivotal arms, a pair of weighted pivotal members supported within said casing and operatively connected one to each of said cords, means for holding said weighted members in their raised positions, means controlled by the movement of the trains on said tracks for releasing said holding means, means operated by said pivotal members on their release for actuating said gate lowering means, means for controlling the movement of said gate lowering means, and means operated by the movement of the train for causing said gates to be raised.

7. In an automatic gate for railway crossings, a gate arm, an electric motor operatively connected with said gate arm, an electric circuit leading to said electric motor including a suitable electric current supply, a three point switch included in said electric circuit, a signal light connected to one terminal of said three point switch and to the return wire to the electric current supply, an electric bell electrically connected to another of the terminals of said three point

switch and connected to the return wire to said electric current supply, a wire leading from the third terminal of said electric switch, an electric switch connected to the latter wire and to one of the wires leading to said electric motor, said latter switch being spring held to close the circuit to said motor, a flexible cord connected to the latter switch and to said gate arm and adapted to open said switch on the said gate arm reaching its lowermost position, a gravity operated member adapted to close the said three point switch against its spring holding means, means actuated by the movement of the train on the rail-way for releasing said gravity operating means, and means for returning said gate arms and said gravity operating means to their normal position.

8. In an automatic gate for railway crossings, a pivotal gate arm suitably supported, a casing arranged adjacent to said arm, a shaft supported in suitable bearings within said casing, a motor suitably geared to said shaft, a member rotatably supported on said shaft and operatively connected to said gate arm to lower said arm, said rotatable member having a clutch face on one side thereof, a drum rotatably mounted on said shaft and having a clutch face opposing the clutch face of the aforesaid rotatable member, a cable secured to said drum and operatively connected to said gate arm to raise same, a clutch member slidably and non-rotatively arranged on said shaft and adapted to be moved thereon to engage either one of said rotatable members, a clutch lever pivotally supported at one end and pivotally connected to said slidable clutch member, means connected to said lever for normally holding said clutch member in engagement with the first mentioned rotatable member, means for swinging said lever to disengage said clutch member from the first mentioned clutch member and moving it into engagement with the second rotatable member, means for locking said lever in the changed position, means for releasing said locking means, means operated by the movement of a train toward the crossing for starting said motor, means for stopping said motor, means for returning said starting means to normal, means for starting said motor following the first movement of said clutch lever, means operated by the train on said railway for stopping said motor on the raising of the gate, and means for returning said lever shifting and releasing means to normal.

9. In an automatic gate for railway crossings, a gate arm suitably supported, a shaft extending beneath said gate arm, a sprocket and chain gear connecting said shaft and arm, a sprocket wheel secured to said shaft, a cable drum secured to said shaft, a casing arranged adjacent to said shaft, a shaft journaled within said casing, a motor operatively connected to said shaft, a sprocket pinion loosely mounted on the latter shaft, a sprocket chain connecting said sprocket wheel and pinion, a cable drum loosely mounted on said latter shaft, a cable secured to and extending between said drum, a clutch member slidably arranged between said sprocket and rope drum on the latter shaft and adapted to engage either of them, a clutch lever operating said clutch member, a weighted cord attached to said lever and adapted to hold said clutch member in engagement with said sprocket pinion to lower the gate arm, means for swinging said clutch lever to free said sprocket pinion and to bring said clutch member into engagement with said cable drum, means for starting the motor to lower said gate arm, means for stopping said motor on the lowering of said arm, means for operating said lever shifting means, means for locking said lever in its shifted position, means for starting said motor to raise said gate arm, means for returning said lever shifting means and its operating means to normal, and means for stopping said motor when all the mechanism is returned to normal.

10. In an automatic gate for railway crossings, a gate arm, means for lowering said gate arm, means for raising said gate arm, a clutch member movably supported and adapted to bring said gate lowering or raising means into operation, a lever connected to said clutch member, means for normally holding said lever to hold said clutch in operating connection with said gate lowering mechanism, a weighted lever supported above said clutch lever, a flexible cord connected to said clutch lever and weighted lever, a latch adapted to hold said weighted lever in its raised position, means for withdrawing said latch member actuated by the movement of a train on the rail-way, means for locking said clutch lever to hold the clutch member in operating contact with said gate raising means, means for actuating said gate lowering means operated by the movement of a train on the rail-way toward the crossing, means for actuating the gate raising means actuated by the passage of a train on the rail-way, means for releasing said lever locking means, and means for returning the actuating mechanism to normal during the raising of the gate.

11. In an automatic gate for railway crossings, a gate arm, means for raising said gate arm, a clutch member movably supported and adapted to bring said gate lowering or raising means into operation, a lever connected to said clutch member, means for normally holding said lever to hold said clutch in operative connection with said gate lowering mechanism, a weighted lever supported above said clutch lever, a flexible cord connected to said clutch lever

and weighted lever, a latch adapted to hold said weighted lever in its raised position, a shaft rotatably supported adjacent to said latch a flexible cord secured at one end to said latch and at the other end to said shaft, a weighted pulley secured to said shaft having a notch therein, a latch member having a tooth extending into the notch in said pulley and spring held thereto, an electro-magnet arranged adjacent to said latch and adapted on being energized to withdraw said latch to release said pulley, electric means for controlling the energization of said electro-magnet operated by the movement of a train on the rail-way, automatic means for operating said gate lowering means actuated by the movement of a train approaching the crossing, and means for returning the aforesaid mechanism to normal during the raising of the gate.

12. In an automatic gate for railway crossings, a rail-way having a section at the crossing electrically insulated from the main line, a gate arranged at said crossing, mechanical means for raising and lowering said gate, electrical means actuating the gate lowering mechanism actuated by a train approaching the crossing, wires connected one to each rail of the insulated section and connected to a suitable electric current supply, an electro-magnet included in the open circuit formed by said wires and rails, a lever armature pivotally supported above said electro-magnet and spring held from the core of said electro-magnet, a pivotal member having a weighted end supported by said lever armature, a pivotal arm arranged above the opposite end of said pivotal member and engaging same, an electric current supply connected to said pivotal arm, an electric contact arranged in close proximity to said pivotal arm when it is in its normal position, an armature secured to said pivotal member at the opposite end to the weight, an electro-magnet electrically connected to said electric contact and arranged beneath the armature on said weighted pivotal member, a wire leading from said electro-magnet to the latter electric supply, means for disconnecting and arresting the gate lowering mechanism, gravity operated means for starting said disconnecting means into operation, a latch holding said starting means, an electro-magnet adapted to release said latch, a wire connecting said latch operating magnet with the magnet arranged beneath said weighted pivotal member, means for breaking the circuit through said pair of electro-magnets, means for operating the gate raising mechanism, and means for returning the whole mechanism to normal.

13. In an automatic gate for railway crossings, a pivotal gate arm, mechanical means for lowering said gate arm, mechanical means for raising said gate arm, an electric motor operatively connected to said lowering and raising means, an electric current supply, a wire leading from said current supply to said motor, a return wire from said motor to said current supply, an electric switch arranged in the first wire and spring held open, means actuated by a train on the rail-way for closing said switch, an electric switch spring held closed arranged in the latter return wire, means connected to said gate arm for opening the latter switch to break the motor circuit when the gate arm is lowered, means for shifting the mechanical connection of said motor from engagement with the gate lowering means to engagement with the gate raising means, an electric circuit connected to said electric current supply, a switch in said electric circuit spring actuated to close the circuit and normally held open by said shifting means and allowed to close on the shifting of said mechanical connection, an electric circuit connected to said electric current supply and normally held open, means included in the latter electric circuit for actuating said shifting means, and electrical means for closing said latter circuit operated by the movement of a train on the rail-way.

14. In an automatic gate for railway crossings, a pivotal gate arm, electrically operated means for lowering and raising said gate arm, a shaft suitably journaled adjacent to said operating means, a sprocket wheel secured to said shaft, a sprocket chain connecting said operating means with said sprocket wheel, means for shifting the operating connection of said operating means from the gate lowering mechanism to the raising mechanism, means connected to said shaft for returning said shifting means to normal, means operated by a train on the rail-way for actuating said electrical operating means, means operated from said shaft for returning said actuating means to normal, signals for indicating the approach of a train operated by the movement of a train toward the crossing, and means operated from said shaft for returning said signals to normal.

15. In an automatic gate for railway crossings, a gate arm, mechanical means for lowering and raising said gate arm, means operated by a train approaching the crossing for actuating said lowering means, signals operated by the means for actuating said lowering mechanism to display a danger sign, means for actuating said gate raising mechanism operated by the movement of a train on the rail-way, a shaft operatively connected to said mechanical lowering and raising mechanism, a gear wheel secured to one end of said shaft and operatively connected with the means for actuating the gate lowering mechanism and adapt-

ed to return it to normal, a plurality of spur pinions secured to said shaft, a rod slidably supported and having a rack meshing with one of said spur pinions and adapted to return said signals to their normal position through the rotation of said shaft, a rack slidably supported and meshing with another of the pinions on said shaft and adapted to return the mechanism for actuating the gate raising mechanism to its normal position, means for shifting the mechanical connection from the gate lowering means to the raising means, and means operated by said shaft for returning said shifting means to normal.

16. In an automatic gate for railway crossings, a gate arm, a casing arranged adjacent to said gate arm, a pair of signals pivotally supported above said casing and adapted to swing outwardly therefrom, a pair of weighted members arranged within said casing and operatively connected to said arms to swing them outwardly, a pair of latch members supporting said weighted members, a pair of short shafts journaled in suitable bearings within said casing, means operatively connecting said shafts with said latch members and adapted on the rotation of said shafts to operate said latches to release said weights, weighted members secured to said shafts and adapted to turn said shafts in their bearings, means for holding said shafts stationary, electric switches arranged on the track-way one to each side of the crossing and adapted to be operated by the movement of a train toward said crossing, electro-magnets arranged to release the means for holding said shafts from turning and electrically connected to a suitable electric current supply and electrically connected one to each of said track switches, bevel gears secured to the adjoining ends of said shafts, a shaft arranged in right angular relation to the said pair of shafts and mid-way between the bevel gears thereon, a bevel gear secured to the latter shafts and arranged to engage both of the bevel gears on said pair of shafts and having gaps in the toothed face thereof arranged diametrically opposite the one to the other, means for rotating the latter shaft to return the aforesaid shafts to their normal positions, means for lowering said gate arm coincident with the displaying of said signals, means for raising said gate arm, and means for returning said signals to normal coincident with the raising of said gate arm.

17. In an automatic gate for railway crossings, a gate arm, mechanical means for lowering and raising said gate arm, electrically operated means for actuating the movement of said mechanical means, a pair of pivotal arms arranged beside the rail-way and adapted to overlap at their inner ends and spring held apart, an electric contact arranged on the upper side of one of said arms electrically connected to a suitable electric current supply and to said electric actuating means, an electric contact arranged on the underside of the other pivotal arm adapted to engage the aforesaid contact on the overlapping of said arms in one direction, said latter electrical contact being electrically connected through suitable wires to the said actuating means, said pair of arms being adapted to be depressed by the movement of the wheels of a train on the track toward the crossing to close the electric circuit to said actuating means.

Signed at the town of Cobourg, in the county of Northumberland, in the Province of Ontario, in the Dominion of Canada, this 27 day of September 1910.

NORMAN E. DELL.

In the presence of—
J. McKenzie,
Margaret Dell.