June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 1

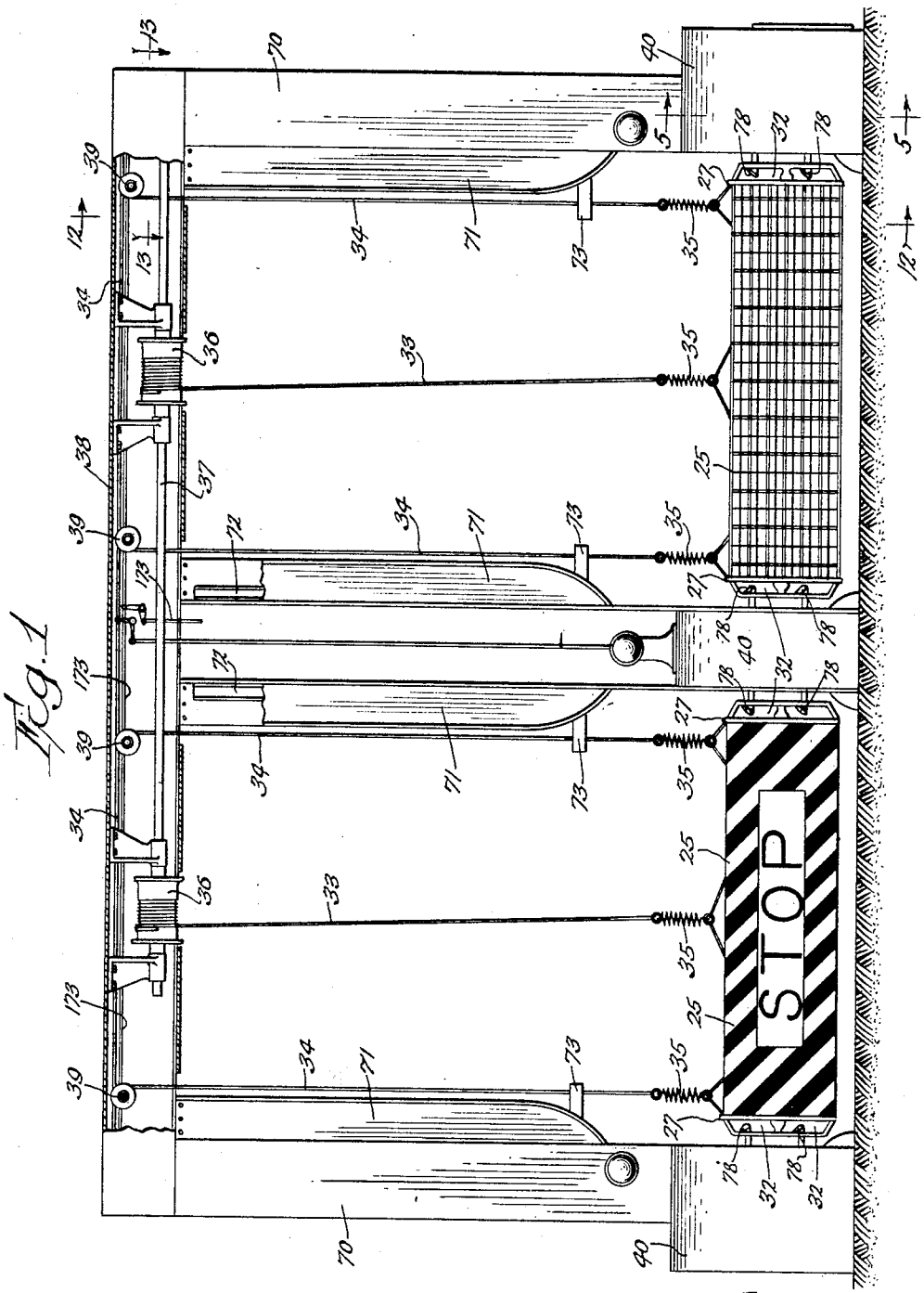


Fig. 1

Inventor:
Elmer C. Krage
By
Atty.

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 2

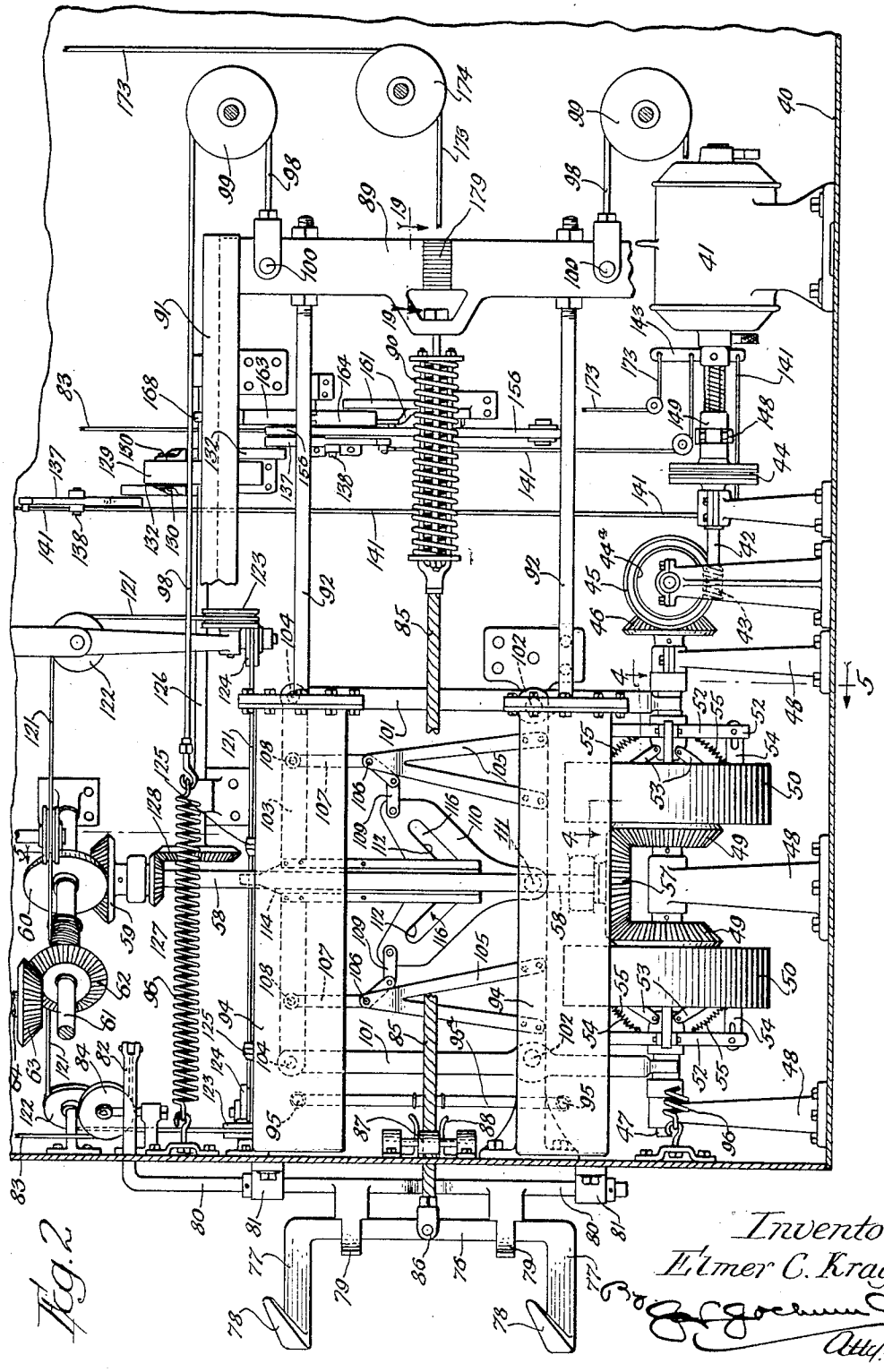


Fig. 2

Inventor:
Elmer C. Krage

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 3

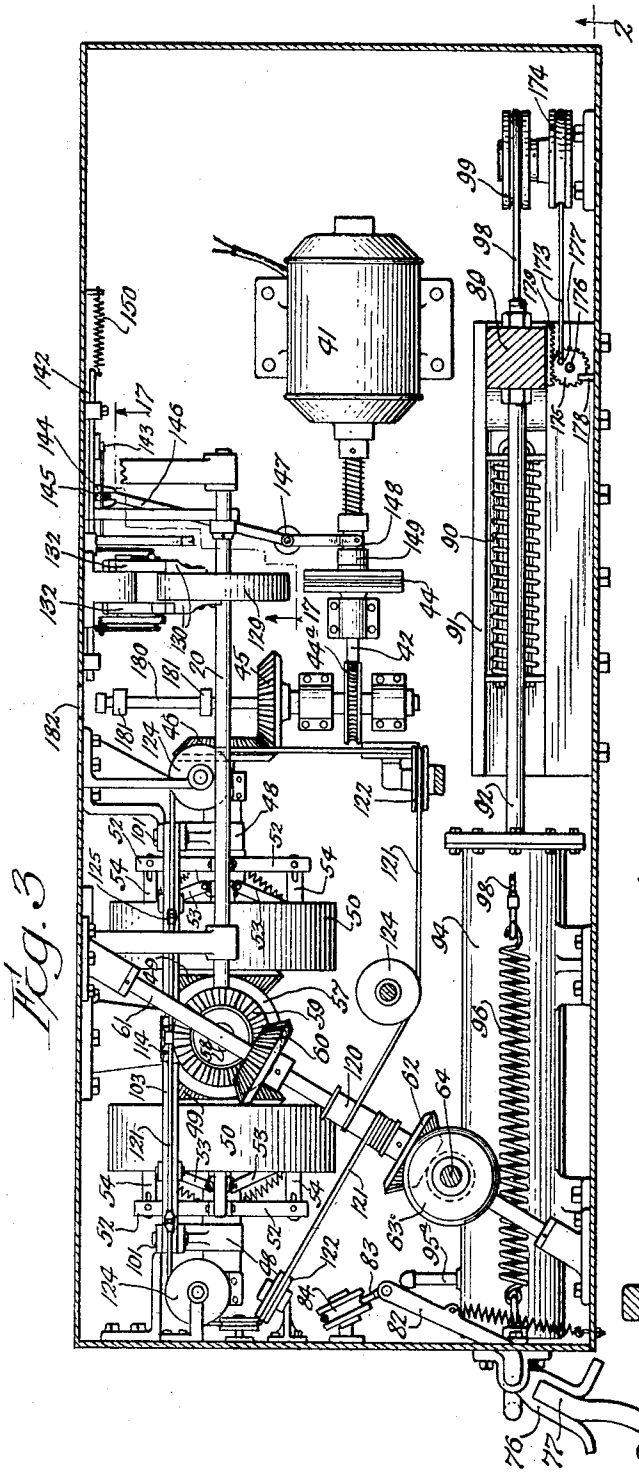


Fig. 3

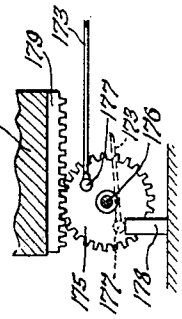


Fig. 10

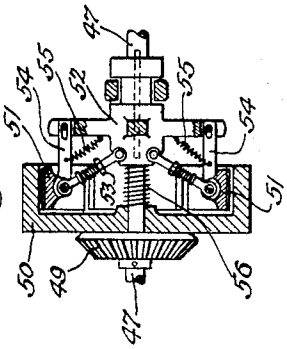


Fig. 4

Inventor:
Elmer C. Krage
By
Atty.

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 4.

Fig. 6

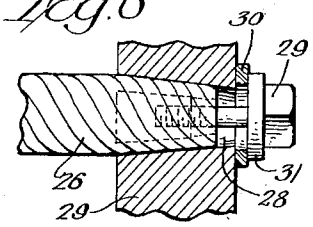


Fig. 5

Fig. 7

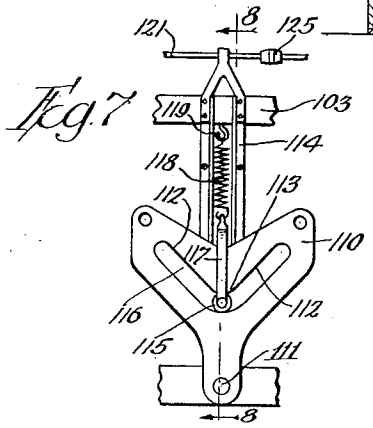


Fig. 8

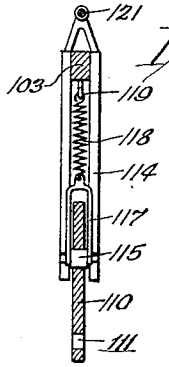
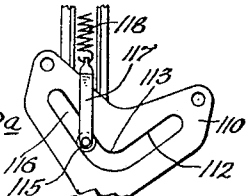


Fig. 8a



Inventor:
Elmer C. Krage
By
Atty.

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 5

Fig. 9

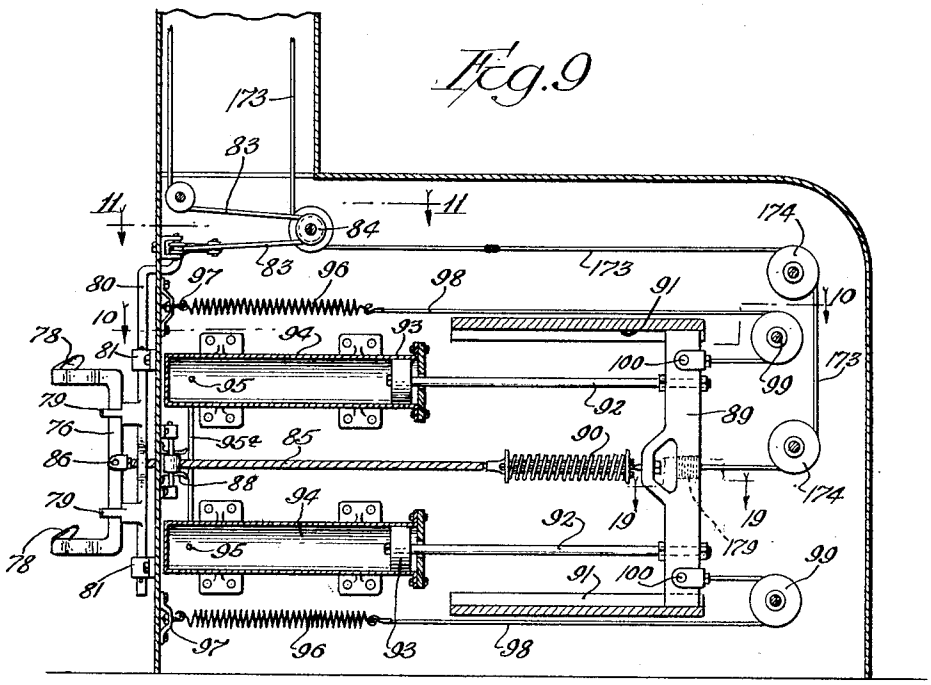


Fig. 10

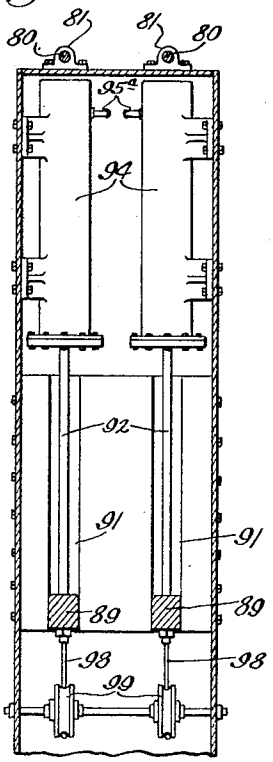
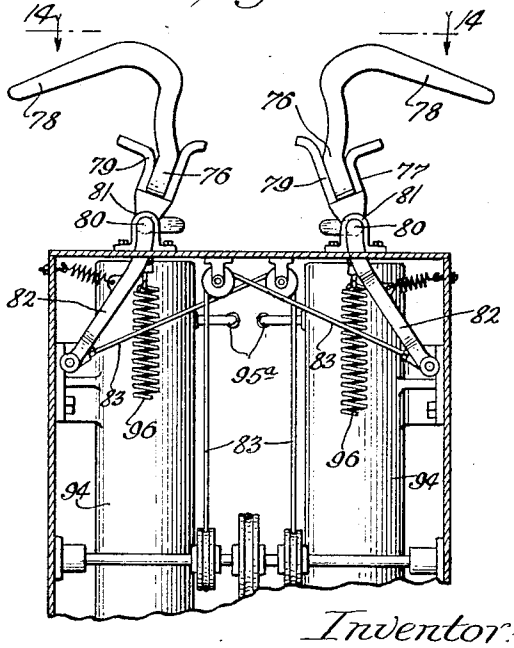


Fig. 11



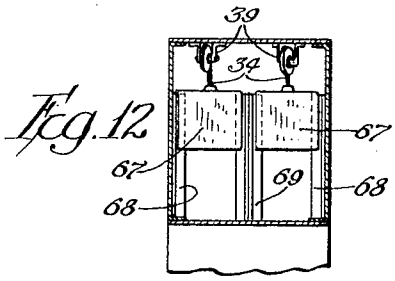
Inventor:
Elmer C. Krage
By
Atty.

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 6

Fig. 12



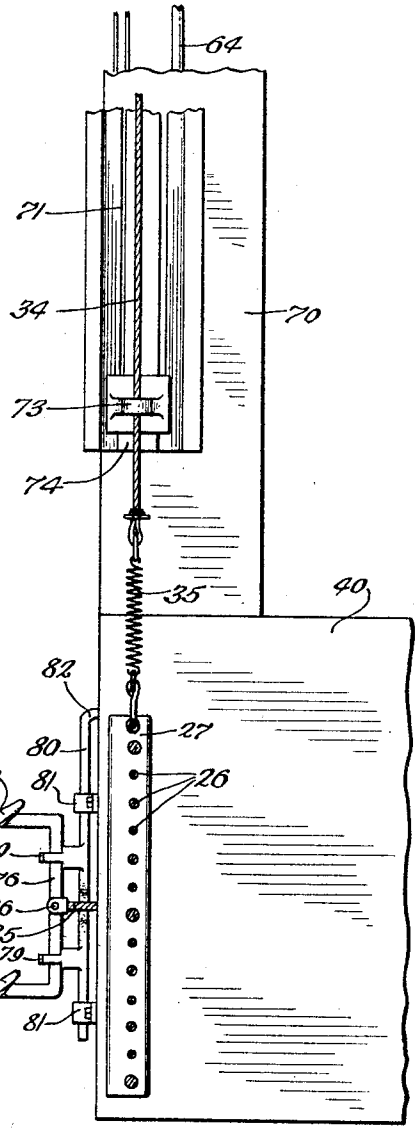


Fig. 13

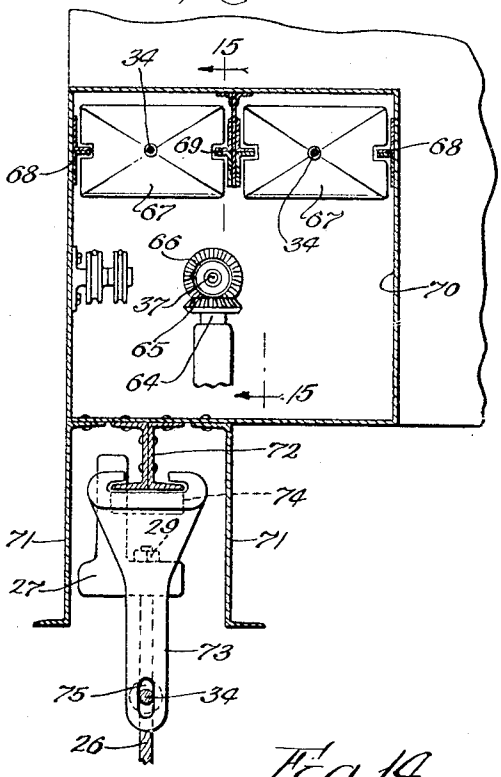
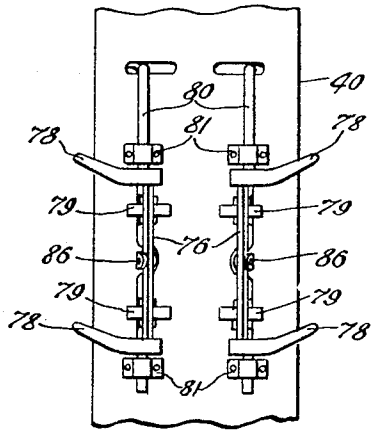


Fig. 14



Inventor:
Elmer C. Krage
By
Atty.

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 7

Fig. 15

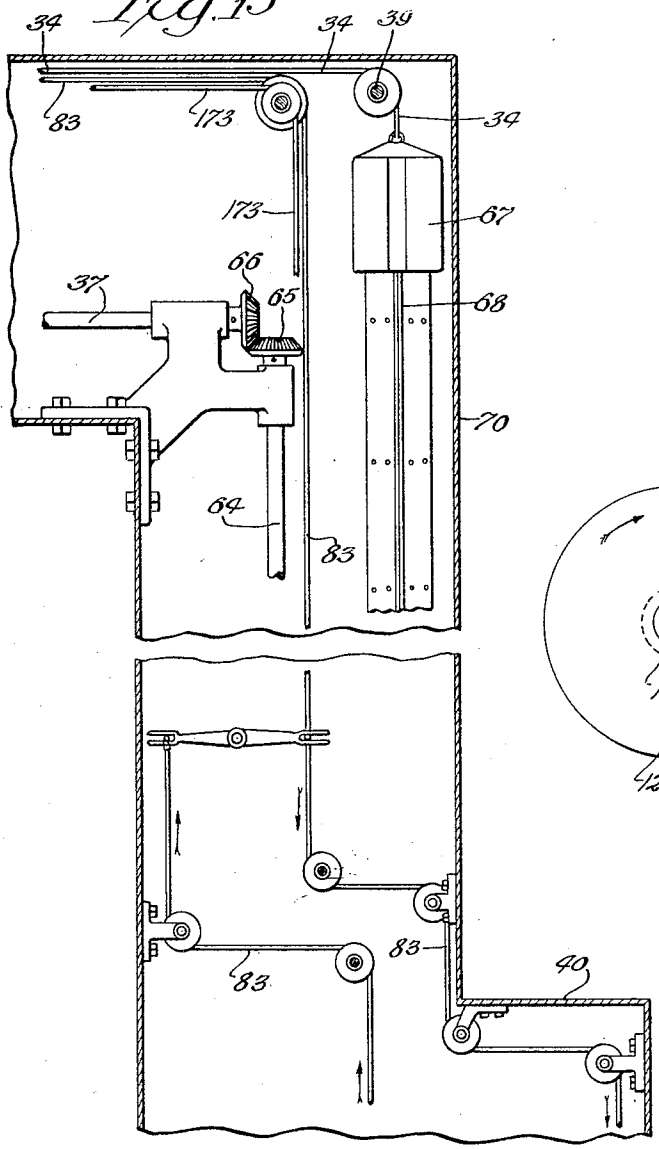
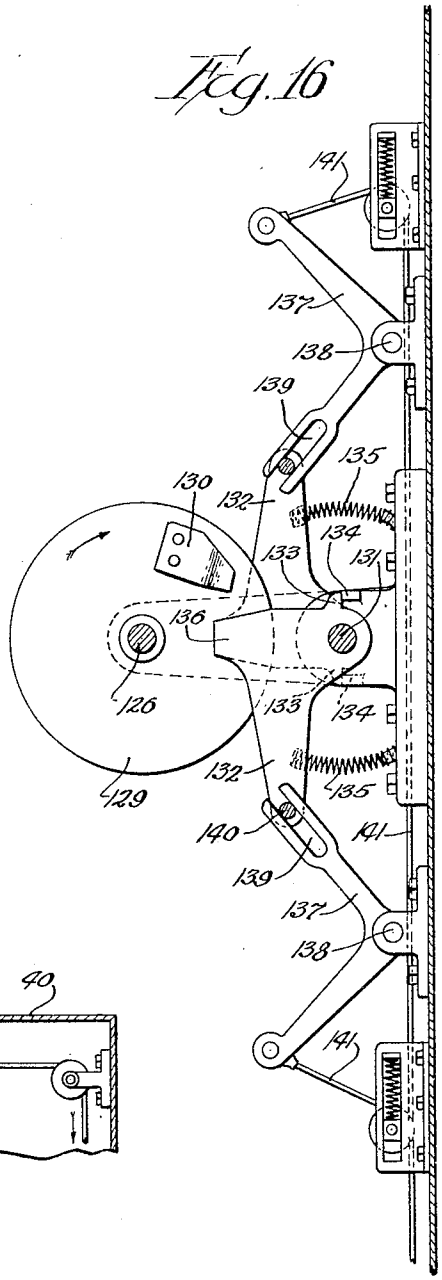


Fig. 16



Inventor:
Elmer C. Krage
By
Atty.

June 14, 1932. E. C. KRAGE 1,863,310

RAILROAD CROSSING GATE

Filed June 27, 1930 8 Sheets-Sheet 8

Fig. 17

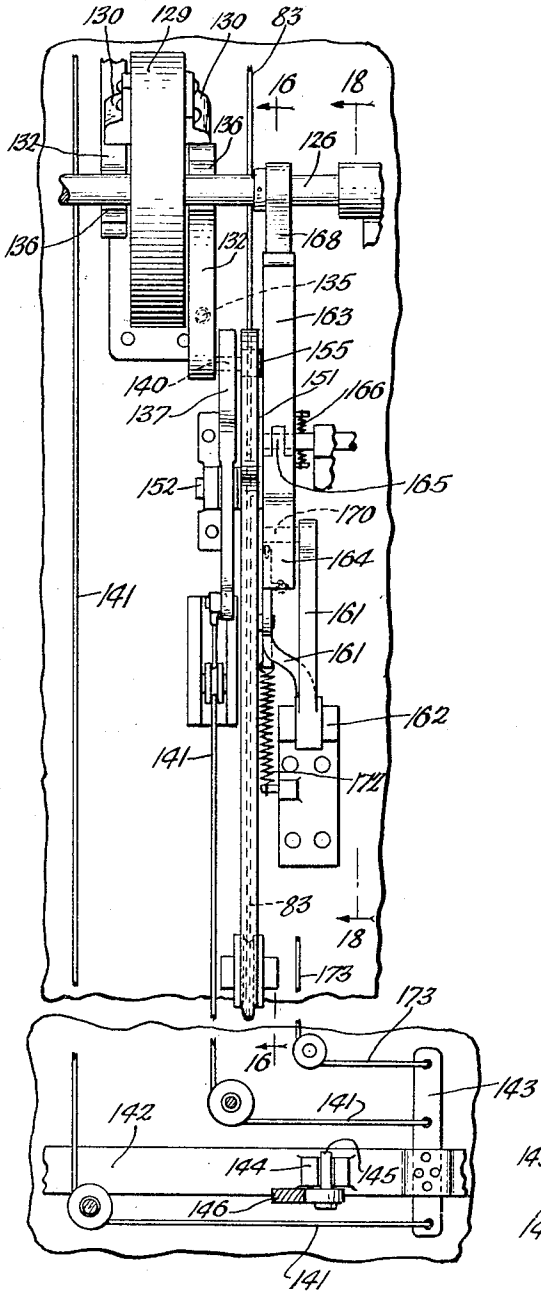
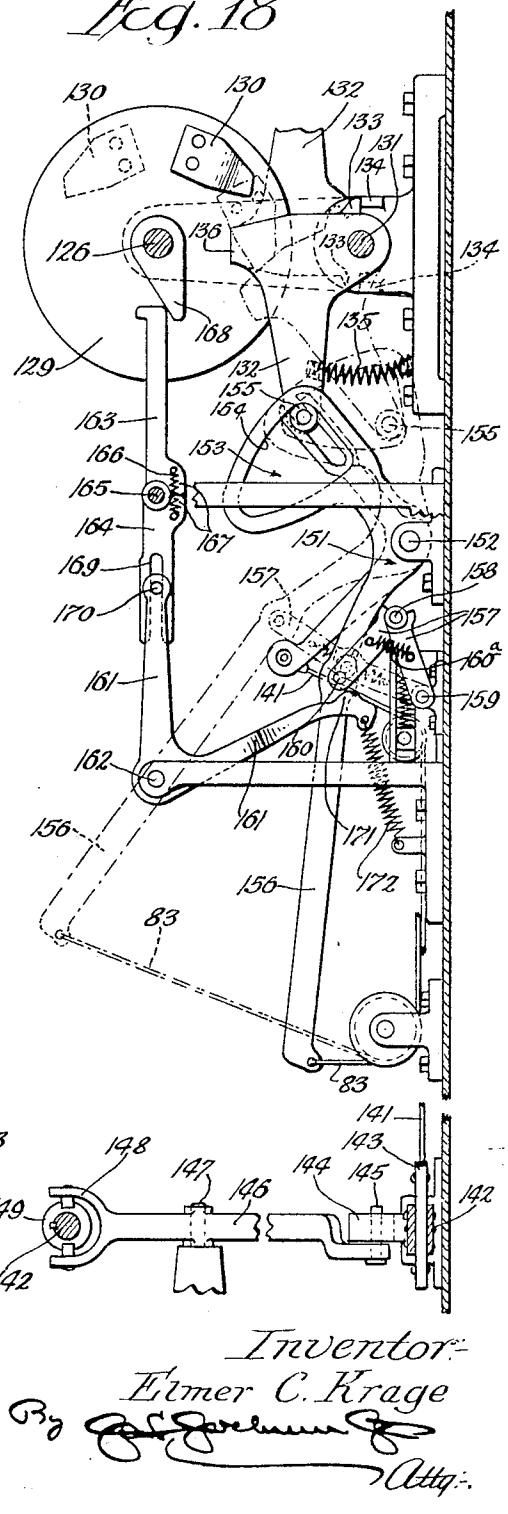


Fig. 18



Inventor:
Elmer C. Krage
By
Attys.

Patented June 14, 1932 1,863,310

UNITED STATES PATENT OFFICE

ELMER C. KRAGE, OF ELMHURST, ILLINOIS, ASSIGNOR OF ONE-HALF TO EDWARD F. STUENKEL, OF HIGHLAND PARK, ILLINOIS

RAILROAD CROSSING GATE

Application filed June 27, 1930. Serial No. 464,190.

This invention relates to improvements in gates for railroad crossings which will be automatic in operation upon the approach and departure of a train, and one of the objects of the invention is to provide an improved gate of this character which will operate to stop the vehicle, the driver of which disregards the signal, when a train is approaching, without injury to either the gate or the vehicle.

A further object is to provide in an improved gate of this character means for locking the gate in its lowered or barricading position and which gate is of a construction that when struck by a car or other vehicle will yield sufficiently, without becoming unlocked, to protect both the car and the gate, and the gate will, if a vehicle is advanced too far towards the track before the gate is lowered, yield and slide over the vehicle as the latter passes thereunder.

A further object is to provide improved means for locking the gate in its lowered position and which locking means will, if a vehicle is caught between the gates, permit the gate to swing laterally to permit the vehicle to escape. If the gate when lowered and locked is dislocated laterally by impact from a vehicle, it cannot be raised until the vehicle is moved clear of the gate.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Figure 1 is a view partly in front elevation, partly broken away and with parts omitted, of a railroad crossing gate of this character constructed in accordance with the principles of this invention, and showing the gates in a lowered or barricading position.

Figure 2 is a vertical sectional view taken on line 2—2, Figure 1, on an enlarged scale, with parts omitted and with parts broken away.

Figure 3 is a top plan view of Figure 2.

Figure 4 is a detail sectional view of one of the clutches as taken on line 4—4, Figure 2.

Figure 5 is an irregular sectional view taken on line 5—5, Figure 2.

Figure 6 is an enlarged detail sectional view taken on line 6—6, Figure 5.

Figure 7 is an elevation of a member for assisting in shifting the clutch.

Figure 8 is a sectional view taken on line 8—8, Figure 7.

Figure 8ª is a view similar to Figure 7, with parts broken away and showing the parts in a different position.

Figure 9 is an irregular sectional view taken on line 9—9, Figure 5.

Figure 10 is a sectional view taken on line 10—10, Figure 9.

Figure 11 is a sectional view taken on line 11—11, Figure 9.

Figure 12 is a sectional view taken on line 12—12, Figure 1, with parts omitted and with parts broken away.

Figure 13 is a detail sectional view on an enlarged scale, with parts omitted and parts broken away, and as taken on line 13—13, Figure 1.

Figure 14 is a view taken on line 14—14, Figure 11.

Figure 15 is a sectional view, on an enlarged scale, with parts omitted and parts broken away, as taken on line 15—15, Figure 13.

Figure 16 is a sectional view with parts omitted, taken on line 16—16, Figure 17.

Figure 17 is an irregular sectional view taken on line 17—17, Figure 3.

Figure 18 is a sectional view taken on line 18—18, Figure 17.

Figure 19 is a detail sectional view taken on line 19—19, Figure 2.

In the present exemplification of the invention there is shown two gates which operate in the same manner, and as the operation of both of the gates is the same, the specific description of one will apply equally as well to both.

Referring more particularly to the drawings the numeral 25 designates a barrier gate which is constructed of any suitable material

which will permit of the ends of the gate being anchored and the body portion therebetween being deflected without injury to the gate.

To that end any suitable means may be provided in the construction of the gate.

A simple and efficient construction, however, embodies a series of cables 26 (see particularly Figure 5) which are connected to end members 27 preferably by the ends of the cables passing into tapering openings 28 in the end member and fastening devices 29 which are threaded into the end of the respective members 26, a washer 30 being provided between the head 31 of the fastening member and the adjacent portion of the end member.

These end members are provided with open portions 32, for a purpose to be hereinafter set forth, and the gate is adapted to be raised and lowered by means of flexible cables 33—34, which are respectively connected to the top of the gate by means of resilient members 35 so that when the gate is lowered and an impact is made against the gate to deflect it laterally the resilient members 35 will yield.

The cable 33 passes over a pulley 36 and is adapted to be wound thereon, the pulley being secured to a shaft 37 for rotation therewith, and in the present form of the invention the shaft 37 and pulley 36 are arranged in a frame or housing 38 to protect them.

The cables 34 pass over suitable pulleys 39 also arranged within the housing.

Arranged in a suitable position, but preferably within a housing 40, is a motor 41 (see particularly Figure 2) and connected with the shaft 42 of the motor is a spiral gear 43, a clutch 44 being arranged between the motor and the spiral gear 43 for locking and unlocking the gear with respect to the motor shaft to cause the gear 43 to be rotated or to arrest the motion thereof. This gear 43 meshes with a gear 44*a* and connected to the gear 44*a* to rotate therewith is a beveled gear 45 which in turn meshes with a beveled gear 46 secured to a shaft 47 (see also Figure 4) journaled in suitable bearings 48. Rotatably mounted upon the shaft 47 are beveled gears 49 which are each connected for rotation with a clutch member 50 and keyed upon the shaft 47 and individual to the clutch members 50 are cooperating clutch members or shoes 51. The clutch members 51 are supported by and connected with the member 52 through the medium of links 53, and the member 52 is slidable upon and rotatable with the shaft 47. Supporting members 54 are also provided for connecting the clutch members 51 with the member 52, and springs 55 serve to normally move the clutch members 51 away from the clutch member 50 while a spring 56 tends normally to move the clutch member 52 upon the shaft 47 and away from the clutch member 50 to release the clutch members 51.

When, however, the member 52 is moved towards the clutch member 50 the clutch members 51 will be forced into engagement with the clutch member 50 and thereby lock the respective clutch members 50 and gear 49 for rotation with the shaft 47 according to which the clutch members is rendered active or inactive.

The method of shifting the member 52 and for controlling the clutches 50—51 will be hereinafter described.

Meshing with the gears 49 is a gear 57 connected to and rotatable with an upright shaft 58 journaled in suitable bearings. Secured also to the shaft 58 is a gear 59 which meshes with a gear 60 that is secured to a shaft 61. Secured also to the shaft 61 is a gear 62 (see particularly Figures 2 and 3) which meshes with a gear 63 secured to an upright shaft 64. This upright shaft 64 (see also Figure 15) has secured to it for rotation therewith a gear 65 which meshes with a gear 66 that is connected to the shaft 37.

It will therefore be manifest that when the motor is operating motion will be transmitted from the motor through the gear connections and shafts just described to the shaft 37 to rotate the drum 36 and thereby wind the cable 33 thereupon or cause the cable to be paid out from the drum 36 according to the direction of rotation of the shaft 37 and which direction of rotation is controlled by the clutch devices 50—51.

The gate is counterbalanced in its raising and lowering movements by means of weights 67 which are connected with the cables 34 (see particularly Figures 12, 13 and 15) and these weights move upon guideways 68 with an intermediate guideway 69 arranged in a housing 70.

Projecting beyond the housing 70 and adjacent each end of the gate are spaced guideways 71 into which the respective ends 27 of the gate are adapted to pass. These guideways 71 preferably terminate a considerable distance above the ground and movable between these guideways and upon a track or guideway 72 are members 73 through which the cables 34 and the members 73 are prevented from dropping off of the guides 72 by means of a suitable shoulder 74.

The members 73 drop by gravity toward the lower end of the guide 72 and project a sufficient distance beyond the guide that when the gate 25 is raised, they will remain stationary until they are contacted by a portion of the gate during its raising movement, with the result that the members 73 will then be carried upwardly by the rising gate. Likewise, when the gate is lowered the members 73 will fall by gravity to the lower end of the guide 72.

These members 73 are provided in order to

reduce to a minimum the swinging effect of the gate 25 when the latter is raised or in position, as it will be manifest that the cables 34 passing through the slots 75 in the members 73 will swing from the members 73 instead of from the pulleys 39.

When the gate is in its lowermost position means are provided for anchoring or locking the extremities thereof and for holding such ends while the body portion of the gate formed by the cables 26 or other suitable means is adapted to be deflected.

To that end there is provided a member 76 (see particularly Figures 2, 3 and 5) which is provided with vertically spaced arms 77 terminating in hooks 78. One of these members is arranged at each end of the gate and is removably supported between jaws or in open bearings 79 which are connected with a rock shaft 80 journaled in bearings 81.

The rock shaft 80 is provided with an arm 82 by means of which the latter is rocked through the medium of a cable 83 (see also Figures 5 and 9) that passes over a pulley 84 to a suitable operating mechanism, to be hereinafter described.

The member 76 is held seated in the jaws or bearings 79 by means of a cable or flexible member 85 secured by one end as at 86 to the member 76 and which cable passes between suitable guide rollers 87 and through a guide 88 and is connected at its other end to a sliding cross head or member 89, a compensating spring 90 being arranged between the end of the cable 85 and the cross head or member 89.

The cross head or member 89 moves between and is supported by guides 91 and connected with the cross head or member 89 are piston rods 92 which have connected therewith pistons 93 that operate in cylinders 94 suitably supported. The cylinders 94 are provided with a vent 95 through which air may be drawn into the cylinders and expelled therefrom and if desired, the vents 95 of the cylinders may be connected by a pipe 95^a (see Figure 5) having a portion 95^b open to the atmosphere. When the pipe 95^a is employed it acts to balance the pressure in the cylinders 94.

Springs 96 are anchored by one end as at 97 to a suitable fixed support and connected to the other end of the respective springs 96 are cables 98 which pass over suitable pulleys 99 and are connected by their other ends as at 100 with the cross head or member 89.

The springs 96 are of a tension to normally hold the pistons 93 approximately in the position shown in Figure 9 and by their stress will hold the cross head or member 89 in its retracted position as shown in Figure 9. This will cause the member 76 carrying the hook 78 to be seated in the bearings 79.

The normal position of the rock shaft 80 and the hook member 76 is in the position shown in Figure 11, that is in what might be termed a retracted position but are adapted to be operated in a manner to be hereinafter set forth when an impact is made against the gate, to be swung from the position shown in Figures 9 and 11 to the position shown in Figure 3, that is so that the hooks 78 will enter the open portions 32 at the ends of the gate and thereby lock or anchor the ends of the gate.

In this position, or as shown in Figure 3, when an impact is made against the gate the hook member 76 will be dislodged with respect to the bearings or jaws 79 on the rock shaft 80 and stress will be exerted upon the cable 85 tending to move the cross head or member 89 forwardly in the guides 91 against the stress of the springs 96 and against the yielding resistance pressure of the air in the cylinders 94, thereby forming a cushion for the hooks 78 and also operating to yieldingly resist a car or vehicle which has impacted the gate and caused the gate to be deflected laterally.

As soon as the obstruction which has caused the impact or deflection of the gate has been removed, the springs 96 will return the cross head or member 89 and the pistons 93 in the cylinders 94 to their normal position. As the cross head or member 89 moves backwardly to its normal position the cable 85 will draw the hook carrying member 76 back to its normal position so as to be seated within the jaws or bearings 79.

The raising and lowering of the gates is controlled by the direction of rotation of the shaft 37 (see Figure 1) and the direction of rotation of this shaft is in turn controlled by the direction of rotation of the vertical shaft 58 (see Figure 2), which in turn is controlled by the clutch members 50. One of these clutch members is adapted to be rendered active with respect to the shaft 47 when the gate approaches the limit of its upward movement and the other of the clutch members is rendered active with respect to the shaft 47 when the gate approaches the limit of its lowering movement so that when the motor 41 is actuated, the latter being controlled by the approach and departure of the train as heretofore specified, the gate will be automatically raised or lowered.

Any suitable means may be provided for automatically rendering the clutch devices 50 and 51 active and inactive. A simple and efficient means, however, embodies a pair of levers 101, each pivotally mounted intermediate its ends as at 102. One end of each of the levers is connected by means of the usual yoke with the respective members 52 of the clutches. These levers extend upwardly for a considerable distance above their pivots 102 and are connected together by means of a cross bar 103, the levers being pivotally connected respectively as at 104 with said bar to

cause the levers to rock in unison when the bar is shifted longitudinally.

Mounted upon a suitable support are fulcrums 105 one for each of the clutches. Pivotally mounted upon each of the fulcrums 105 as at 106 is a bell crank lever, one arm 107 of which is pivotally connected as at 108 with the cross bar or member 103, and the other arm of each of the levers is connected by means of a link 109 with a member 110, the links being respectively pivoted to the bell crank lever and to the member 110.

The member 110 is pivotally mounted as at 111 (see also Figure 7) upon a fixed support and is provided with cam faces 112 which diverge from a point 113.

Connected to the cross bar 103 is a guide 114 embodying spaced members between which the member 110 operates. A roller 115 operates in a slot 116 in the member 110 and the cam faces 112 form one wall of the slot.

A yoke 117 is privided in which the roller 115 is journaled and the yoke stands astride of the member 110 and is of a sufficient length so as not to interfere with the rocking movement of the member 110. A spring 118 is connected with the yoke 117 by one end and is anchored at its other end as at 119 to the cross bar or member 103. The stress of the spring 118 is exerted upon the roller 115 to draw the latter against the cam faces 112 and owing to the arrangement of the cam faces 112 the roller 115 and the spring 118 assist in shifting the member 110 about its pivot 111 after the pivotal movement of the member 110 has been started by the movement of the bell crank levers 107.

This is effected in the following manner:

Mounted upon the shaft 61 (see particularly Figures 2 and 5) is a drum 120 to which is secured the ends of an endless flexible cable 121. The cable passes over suitable pulleys 122—123 and also over pulleys 124 and through an eye in the end of the guide member 114 (see also Figures 7 and 8), collars or buttons 125 being secured to the cable 121 and so positioned that they will be brought into engagement with the end of the guide 114 to shift the latter according to the direction of movement of the cable 121.

The collars or buttons 125 are so located that when the gate is approximately at the limit of its upward movement one of the collars will be brought into engagement with the guide 114, thereby longitudinally shifting the bar 103 to rock the levers 101, causing one of the clutch members 52 to be shifted upon the shaft 47 to render one of the clutch devices 50 active and the other inactive.

Assuming the cable 121 (see Figure 2) to be moving toward the left, and the button or collar 125 is in contact with the end of the guide 114, a further movement of the cable in the same direction will shift the guide toward the left moving with it the bar or rod 103, thereby rocking the levers 101, causing the lever on the left to render its respective clutch active with respect to the shaft 47 and the lever 101 on the right to render its respective clutch 50 inactive with respect to the shaft 47 so that when the shaft 47 is rotated the shaft 61 will be rotated to wind or unwind the cable 121 from the drum 120.

The shifting of the bar 103 will rock the bell crank levers 107 causing the member 101 to tilt upon its pivot 111 toward the right in Figure 2. Just at the time that the member 110 starts to move about its pivot, the stress of the spring 118 through the medium of the roller 115 will operate upon the cam face 112 and thereby assist in shifting the clutch and holding the clutch active. The collar or button 125 will start the movement of the levers 101, after which the spring 118 and roller 115 will cause a further movement of the member 110 in the same direction.

As soon as the gate reaches its upper or lowermost movement according to which of the clutches is rendered active, the active clutch will be rendered inactive and the inactive clutch will be rendered active to reverse the direction of movement of the gate when the motor again starts.

Thus it will be seen that the clutch members 50 are responsive in their operation to the position or travel of the gate.

The motor 41 is connected to or disconnected with respect to the shaft 42 (see Figure 2) to rotate the shaft 47 by means of the clutch 44 and the clutch 44 is controlled by the raising and lowering movement of the gate.

To that end there is provided a shaft 126 (see particularly Figures 2, 3, 16 and 18) and this shaft receives its motion from the shaft 58 through the medium of a gear 127 thereon which meshes with a gear 128 on the shaft 126.

Secured to the shaft 126 is a disc 129 which is provided on opposite faces thereof with shoulders or projections 130, and secured to a rocker shaft 131 are rocker members 132, each of which is provided with a shoulder 133 to co-operate with a stop 134 to limit the pivotal movement of the respective rocker members 132 in one direction. Springs 135 individual to the members 132 tend normally to hold the respective shoulders 133 against the respective stops 134.

A portion 136 of each of the members 132 is arranged in the path of movement of the respective shoulder or projection 130 and the members 132 together with the shoulders 130 are so arranged that during the movement of the disc 129 in one direction one of the members 132 will be rocked by its respective shoulder 130 and during the movement of the member 129 in the opposite direction the

respective member 132 will be rocked by its shoulder 130.

Co-operating with each of the members 132 is a bell crank lever 137 pivotally supported as at 138. One end of the bell crank lever is bifurcated as at 139 to receive a pin or projection 140 carried by the respective members 132 so that when the members 132 are rocked in the manner already described, the bell crank levers 137 will be correspondingly rocked.

Connected with the other end of each of the bell crank levers 137 is a cable 141 (see also Figure 2) and these cables are connected to a slide 142 through the medium of a member 143 secured to the slide. The slide 142 is provided with a bifurcated laterally projecting extension 144 into which a projection 145 extends and the projection 145 (see also Figure 3) is connected to one end of a lever 146, the latter being pivotally mounted intermediate its ends as at 147, the other end of the lever 146 being bifurcated as at 148 and has connection with a collar 149, which in turn is connected with one of the clutch members 44.

A spring 150 (see particularly Figure 3) is connected with the slide 142 and tends normally to move it in a direction to render the clutch 44 active.

When, however, one or the other of the rocking members 132 is actuated by the shoulders or projections 130 on the member 129 the slide 142 will be moved against the stress of the spring 150 and thereby render the clutch 149 inactive to disconnect the motor 41 with respect to the shaft 42 and thereby allow the gate to remain in its adjusted position.

This operation takes place just at the time when the gate reaches its uppermost or lowermost position.

The disc or member 129 does not make a complete revolution but oscillates backwardly and forwardly, one of the shoulders 130 operatively engaging its respective rock member 132 approximately at the end of one direction of oscillation, while the other member 132 engages its respective rock member 130 just at the limit of the oscillation of the member 129 in the opposite direction, so that the member 41 will be connected and disconnected with respect to the shaft 42 and the raising and lowering mechanism of the gate at the proper time in the cycle of operation of the device.

When the gates reach the limit of their lowermost movement the hook members 76 are positioned so that the hooks 78 thereon will engage in the open end portions 32 of the gate and the positioning of these hooks is controlled by the rocking movement of the members 132, the hooks being moved through the medium of one of the rocking members 130. To that end there is provided a bell crank lever 151 (see particularly Figure 18) pivotally mounted intermediate its ends as at 152. One end of the bell crank lever is provided with an opening 153 therein having a surface 154 over which a roller 155 carried by the rocker arm 136 moves to rock the bell crank lever 151 in one direction.

Connected to the other arm 156 of the bell crank lever 151 is one end of the cable 83 that in turn is connected with the arm 82 of the rock shaft 80 (see also Figures 5 and 9) that move the hook members 76 into and out of active position. When the rock member 132 (see Figure 18) is moved about its pivot from the full line to the dotted line position in said figure, it will move the bell crank lever 151 to the position shown in dotted lines and in order to maintain the hooks in this adjusted position a pair of links 157 are pivotally connected as at 158, one of the links being pivotally mounted as at 159 and the other being pivotally connected as at 160 to the arm 156 of the lever 151. When the lever 151 assumes the position shown in full lines in Figure 18, the links 157 will be knuckled with respect to each other but when the lever 151 is moved to the position shown in dotted lines in Figure 18, to hold the hooks in a locking position with respect to the gate the links 157 will be locked with respect to each other to maintain the arm 156 of the lever 151 in the dotted line position. These parts will remain in this position until just before one of the shoulders or projections 130 on the disc 129 engages the rock member 136 to shift the clutch 44 on the motor and at this time the links 157 will be knuckled with respect to each other against the stress of the spring 160, through the medium of an arm 161 which is pivotally mounted as at 162. A pair of links 163—164 are pivotally connected as at 165 and a spring 166 tends normally to hold the links 163—164 in the position shown in Figure 18 so that the shoulders 167 will abut and at this time the end of the link 163 will be held in the path of movement of a cam or finger 168 connected with the shaft 126. The link 164 is provided with a bifurcation 169 in which a pin 170 on the end of the arm 161 operates.

The arm 161 is provided with a projection 171 which is normally held in a retracted position by means of a spring 172.

When the arm 156 of the bell crank lever 151 is in the dotted line position shown in Figure 18 and the links 157 locked with respect to each other, to hold the hooks 78 in a locking position with respect to the gate, they will remain in this position until the cam or finger 168 on the disc 129 engages the end of the link 163 to rock the same about its pivot 165 and in turn rock the arm 161 to cause the projection 171 to knuckle the links 157 with respect to each other, thereby unlocking the bell crank lever 151 and the

arm 156 thereof to permit the same to be returned to their normal position under the influence of the spring 135 and thereby retract the hooks 78.

It will thus be seen that the hook members 78 will be automatically positioned or retracted by the operation of the members 132 and these members 132 are controlled in their operation by the raising and lowering of the gate.

It is thought that the operation of this apparatus will be clearly understood from the foregoing, but briefly stated it is as follows: The gates are adapted to be raised and lowered by controlling the direction of rotation of the shaft 37 and this in turn is controlled by the clutches 50 and 51 which are shifted by means of the cable 121. The cable operating to shift the bar 103 to rock the levers 101 at the limit of the upper and lower movement of the gate, the member 110 being shifted by the member 103 through the bell crank levers 107 to assist in throwing the clutches.

As the gate reaches the limit of its movement in one direction or the other, the shoulders or projections 130 on the disc 129 will rock the respective member 132 to render the clutch 44 of the motor active and inactive to arrest the movement of the gate.

When the gate is down the rock member 132 will rock the lever 151 and position the hooks 78 to engage in the open portions 32 of the gate and thereby lock the same against lateral swinging movement. Should an impact be made upon the gate when the latter is down, the hooks 78 will yield, being unseated from their bearings 79 (see Figure 2), causing the cross head 89 (see Figure 9) to be moved forwardly, thereby moving the pistons 93 in the cylinder 94 to cushion such movement.

As soon as the obstruction or impact is relieved from the gate 25 the springs 96 will retract the coss head 89 and withdraw the pistons 93 as well as seat the hook member 76 in its seat or bearings 79.

In the event that no impact has been made upon the gate 25 and it is desired to raise the gate, the hooks 78 are withdrawn by the action of the cam or finger 168 on the disc 129 rocking the links 163—164 to knuckle the links 157, allowing the bell crank lever 151 to be returned to their normal positions under the influence of the spring 135 which will retract the hooks and allow the gate to be subsequently raised.

The clutch 44 which controls the connection of the motor with the apparatus is also adapted to be rendered inactive by the deflection of the gate, that is when the members 76 carrying the hooks 78 are dislocated or disconnected from the seat 79 on the member 80 and to that end there is provided a cable 173 (see particularly Figures 2, 3, 9, 15 and 17) and which cable passes over suitable pulleys 174 and is connected by one end with a member 175 rotatable on a horizontal axis 176, see particularly Figure 19, the member 176 being provided with a lateral projection 177 adapted to engage a stop 178.

The normal position of the member 175 is in the position as shown in Figure 19, but is adapted to be moved about its pivot when the cross head 89 is advanced, through the medium of a rack 179 which engages the toothed periphery of the member 175. As the member 89 advances the rack 179 will turn the member 175 until the pojection 177 moves to the other side of the center of the axis 176 so as to engage the shaft 178 and will be held in this position as the stress of the spring which controls the clutch 44 will hold the projection 177 against the stop 178. During the advancement of the member 89, and should the rack 179 not pass out of engagement with the teeth of the member 175, the latter will be held against return movement by the engagement of the rack therewith, but when the rack passes out of engagement with the member 175, the connection 177, as before stated, will pass over the center and engage the stop 178.

When the cross head 89 returns, and the rack 179 engages with the teeth of the member 175, the latter will be rotated backwardly to a normal position and thereby permit the clutch 44 to become active.

The other end of the cable 173 is connected with the member 143 on the bar or rod 142 which shifts the lever 146 (see particularly Figure 3) about the pivot 147 to control the clutch 44.

In the event that the power should fail and the motor 41 should not operate, means are provided whereby the apparatus may be operated by hand.

To that end there is provided a shaft or extension 180 (see particularly Figure 3) connected with the shaft upon which the gear 45 is mounted. This extension is mounted in suitable bearings 181 and the end of the extension is preferably angular in cross section so as to receive a crank, by means of which the apparatus may be operated by hand, access being had to apply the crank to the shaft 180 through a suitable opening 182 in the casing wall and which opening may be closed by means of any suitable closing device.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. A railroad crossing gate embodying a gate proper, means embodying a motor for

raising and lowering the gate, means operating automatically to render the raising and lowering means inactive with respect to the gate when the latter reaches the limit of its movement in the respective directions, and means for automatically reversing the direction of operation of said raising and lowering means while the direction of operation of the motor remains constant.

2. A railroad crossing gate embodying means for actuating the gate, said means embodying an actuating shaft, a plurality of clutches associated with the shaft, one for raising and one for lowering the gate, means operating to automatically render one of the clutches active and the other inactive when the gate approaches the limit of its travel in the respective directions, power mechanism, means embodying a clutch device for connecting said power mechanism with said shaft, and means operating automatically to render the last said clutch device inactive when the gate reaches the limit of its travel in either direction.

3. A railroad crossing gate embodying means for actuating the gate, said means embodying an actuating shaft, a plurality of clutches associated with the shaft, one for raising and one for lowering the gate, means operating to automatically render one of the clutches active and the other inactive when the gate approaches the limit of its travel in the respective directions, power mechanism, means embodying a clutch device for connecting said power mechanism with said shaft, and means operating automatically to render the last said clutch device inactive when the gate reaches the limit of its travel in either direction, the second recited means embodying means for imparting an initial movement to the respective clutch and additional means for imparting a quick movement to the clutch beyond the limit of the said initial movement thereof.

4. A railroad crossing gate embodying means for actuating the gate, said means embodying an actuating shaft, a plurality of clutches associated with the shaft, one for raising and one for lowering the gate, means operating to automatically render one of the clutches active and the other inactive when the gate approaches the limit of its travel in the respective directions, power mechanism, means embodying a clutch device for connecting said power mechanism with said shaft, and means operating automatically to render the last said clutch device inactive when the gate reaches the limit of its travel in either direction, the second recited means embodying means for imparting an initial movement to the respective clutches and a cam device and a spring pressed roller co-operating with the cam device for imparting a quick movement to the clutch beyond the limit of the said initial movement.

5. A railroad crossing gate, means for raising and lowering the gate, means for automatically rendering the respective raising and lowering means inactive at the limit of the movements of the gate, locking means disposed only adjacent the outer ends of the gate for locking said ends when the gate is in a barricading position, and means operatively related to said securing means whereby the entire gate intermediate the said outer ends may be adapted for lateral deflection while the said locking means remain active.

6. A railroad crossing gate, means for raising and lowering the gate, means for automatically rendering the respective raising and lowering means inactive at the limit of the movements of the gate, locking means for securing the outer ends of the gate when the gate is in a barricading position, means whereby the gate may be adapted for lateral deflection while the said locking means remain active, and means other than the raising and lowering means and operating automatically to render said locking means active and inactive.

7. A railroad crossing gate embodying means for raising and lowering the gate, means automatically rendered active when the gate is in a barricading position for anchoring the ends of the gate, resilient means for maintaining the locking means in an active position and adapted to yield to permit the gate to be deflected laterally, and means for automatically rendering said locking means active and inactive, said resilient means embodying a cushioning device for retarding such deflection of the gate.

8. A railroad crossing gate embodying means for raising and lowering the gate, locking members separate from the gate and adapted to be moved into interengagement with the ends of the gate for anchoring said ends when the gate is in a barricading position, resiliently yielding means for anchoring said locking members, whereby the gate when the ends thereof are anchored will be adapted for lateral deflection, and means operating automatically at predetermined times in the cycle of operation of the gate for moving said locking members into and out of active positions with respect to the ends of the gate.

9. A railroad crossing gate embodying means for raising and lowering the gate, locking members separate from the gate and adapted to be moved into interengagement with the ends of the gate for anchoring said ends when the gate is in a barricading position, resiliently yielding means for anchoring said locking members, whereby the gate when the ends thereof are anchored will be adapted for lateral deflection, means operating automatically at predetermined times in the cycle of operation of the gate for moving said locking members into and out of ac-

tive positions with respect to the ends of the gate, and cushioning means for yieldingly resisting the lateral deflection of the gate.

10. A railroad crossing gate embodying means for raising and lowering the gate, locking members separate from the gate and adapted to be moved into interengagement with the ends of the gate for anchoring said ends when the gate is in a barricading position, resiliently yielding means for anchoring said locking members, whereby the gate when the ends thereof are anchored will be adapted for lateral deflection, means operating automatically at predetermined times in the cycle of operation of the gate for moving said locking members into and out of active positions with respect to the ends of the gate, and cushioning means embodying relatively movable cylinder and piston members for yieldingly resisting the lateral deflection of the gate.

11. A railroad crossing gate, means for raising and lowering the gate, locking members, supports upon which the locking members are removably seated, means for automatically swinging the supports to cause the said locking members to move into interengagement with the ends of the gate when the latter is in a barricading position to anchor said ends, and means for yieldingly holding said locking members upon their support whereby the locking members will yield with respect to their support to permit the gate to be deflected laterally while the locking members remain active for maintaining the ends of the gate anchored thereby.

12. A railroad crossing gate, means for raising and lowering the gate, locking members, supports upon which the locking members are removably seated, means for automatically swinging the supports to cause the said locking members to move into interengagement with the ends of the gate when the latter is in a barricading position to anchor said ends, and means for yieldingly holding said locking members upon their support whereby the locking members will yield with respect to their support to permit the gate to be deflected laterally while the locking members remain active for maintaining the ends of the gate anchored thereby, the last recited means embodying cylinder and piston elements movable one with relation to the other by the displacement of said locking members with respect to their support.

13. A railroad crossing gate, means for raising and lowering the gate, locking means for anchoring the ends of the gate when the latter is in a barricading position, means responsive to the lowering movement of the gate and automatically rendered active at a predetermined time in the cycle of operation of the gate for rendering said locking means active, and means operating to permit the gate to be deflected laterally when the ends thereof are anchored by said locking means, the last said means also operating to return the gate to normal position after deflection thereof and while its ends are anchored.

14. A railroad crossing gate embodying means for raising and lowering the gate, locking means for anchoring the ends of the gate when in a barricading position, means for rendering the locking means active and inactive, resiliently yielding means mounting said locking means for lateral movement thereby adapting said gate for lateral deflection when the ends thereof are anchored, and cushioning means for resisting said lateral deflection, said cushioning means and said resiliently yielding means operating one in opposition to the other.

15. A railroad crossing gate embodying means for raising and lowering the gate, said means embodying cables by which the gate is suspended, guideways, and followers mounted to move freely upon said guideways and through which followers the respective cables loosely pass, said followers being movable upon the guideways by the said gate only at predetermined times in the cycle of operation of the gate and serving to reduce to a minimum the swinging action of the gate by said cables.

16. A railroad crossing gate embodying means for raising and lower the gate, said means embodying cables by which the gate is suspended, guideways for receiving and guiding the ends of the gate during its raising and lowering movements, and followers mounted to move freely upon said guideways and through which followers the respective cables loosely pass, said followers being movable upon the guideways by the said gate only at predetermined times in the cycle of operation of the gate and serving to reduce to a minimum the swinging action of the gate by said cables.

17. A railroad crossing gate embodying means for raising and lowering the gate, locking members for engaging the ends of the gate when in a barricading position, means adapting said gate for lateral deflection while said locking members are active, means for rendering said locking members active and inactive, the last said means embodying a pivotally mounted lever, an actuating member, means tending normally to move the actuating member in one direction to correspondingly shift said lever, and positive means automatically rendered active at a predetermined time in the cycle of operation of the gate for moving said actuating member against the stress of the fourth recited means to move said lever in the opposite direction.

18. A railroad crossing gate, means for raising and lowering the gate, said means embodying a motor and a clutch operatively

connecting said motor and the said means, locking members, means for automatically rendering said locking members active to lock the end of said gate when the latter is in a barricading position, means for automatically rendering said clutch inactive during the time that the said locking means are active with respect to the gate, and means adapting said gate for lateral deflection while the said locking means are active.

19. A railroad crossing gate, means for raising and lowering the gate, said means embodying a motor and a clutch operatively connecting said motor and the said means, locking members, means for automatically rendering said locking members active to lock the end of said gate when the latter is in a barricading position, means for automatically rendering said clutch inactive during the time that the said locking means are active with respect to the gate, means adapting said gate for lateral deflection while the said locking means are active, the said raising and lowering means embodying a driving shaft, a driven shaft, a plurality of clutches for connecting the driving and driven shafts, and means common to the last said clutches and operating to render one of them active when the gate approaches the limit of its movement in one direction and to render the other active when the gate approaches the limit of its movement in the opposite direction.

20. A railroad crossing gate, means for raising and lowering the gate, said means embodying a motor and a clutch operatively connecting said motor and the said means locking members, means for automatically rendering said locking members active to lock the end of said gate when the latter is in a barricading position, means for automatically rendering said clutch inactive during the time that the said locking means are active with respect to the gate, means adapting said gate for lateral deflection while the said locking means are active, and means responsive to the lateral deflection of said gate while the ends thereof are locked, for also rendering said clutch inactive.

In testimony whereof I have signed my name to this specification, on this 20th day of June, A. D. 1930.

ELMER C. KRAGE.