L. S. BLACK.

BARRIER GATE.

APPLICATION FILED OCT. 3, 1921.

1,416,162.

Patented May 16, 1922.

3 SHEETS—SHEET 1.

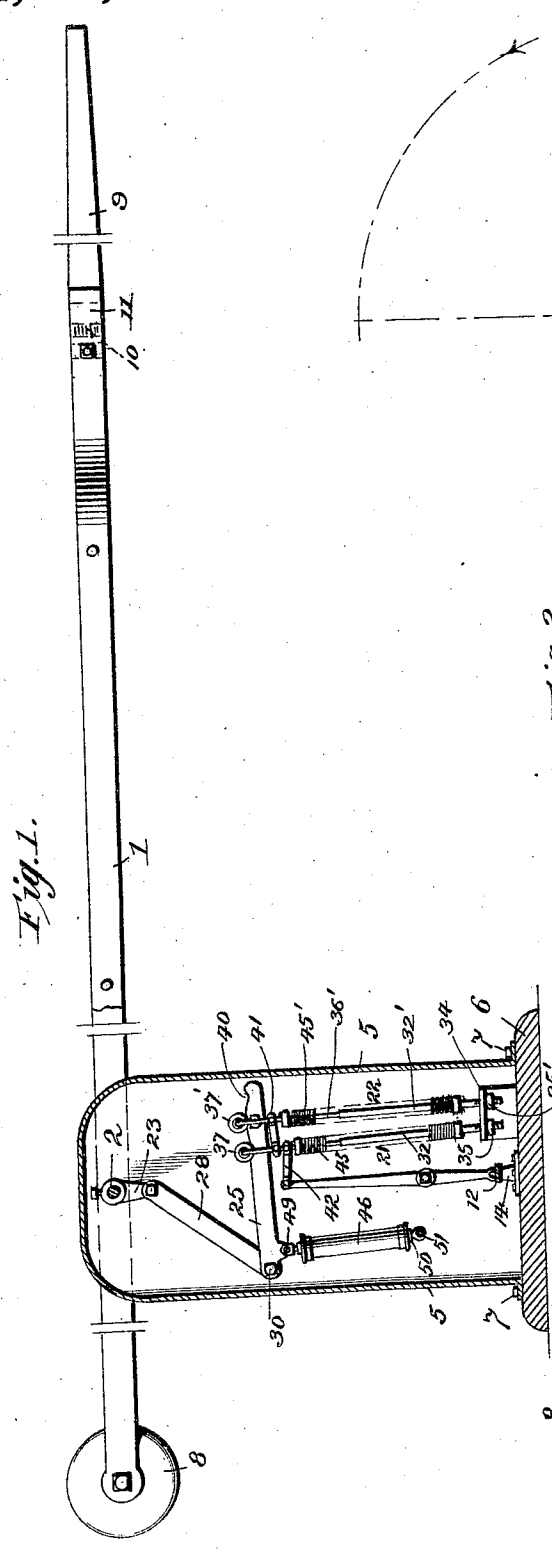


Fig. 1.

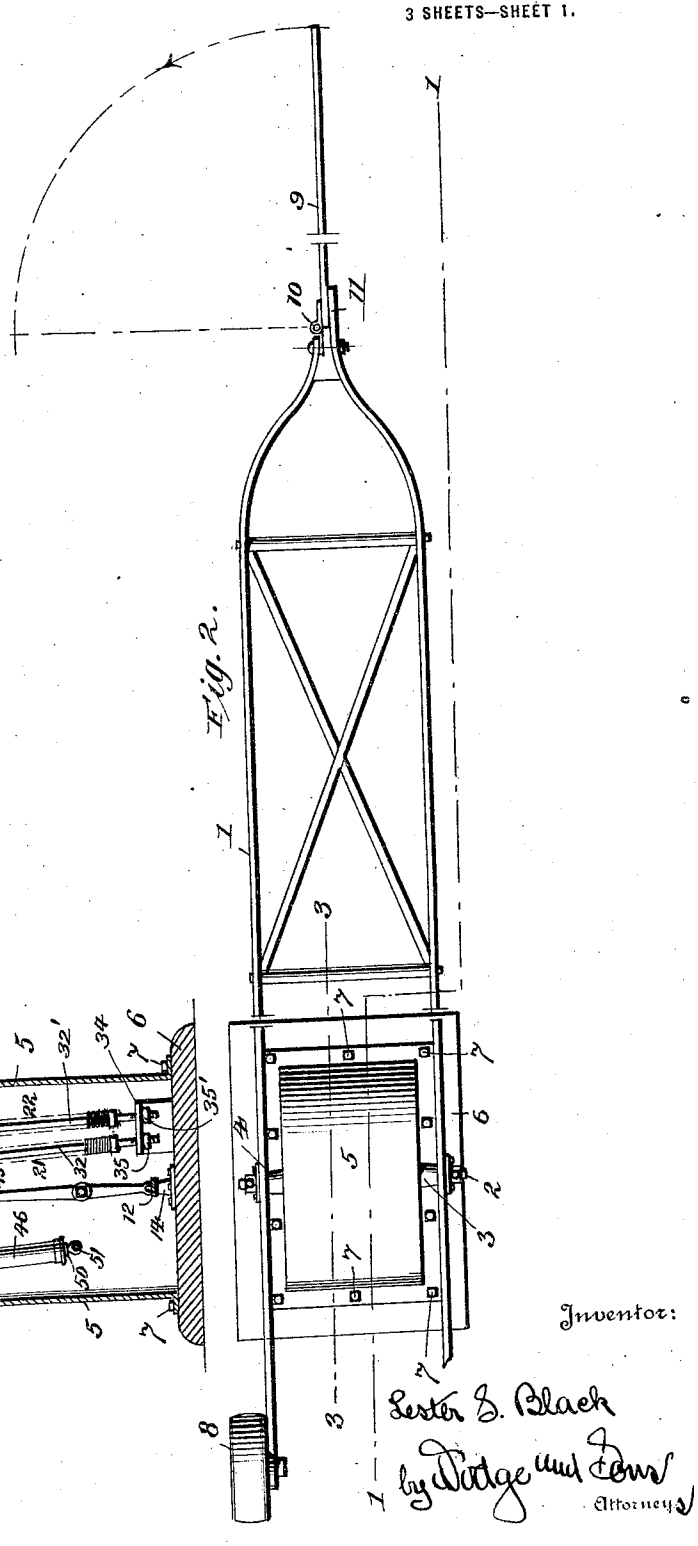


Fig. 2.

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3 SHEETS—SHEET 2.

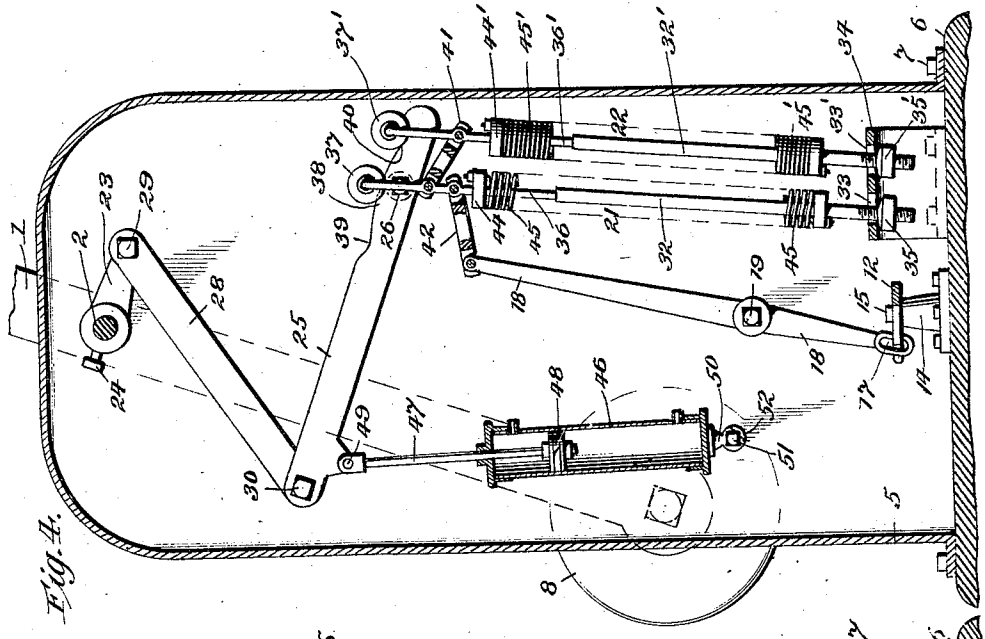


Fig. 4.

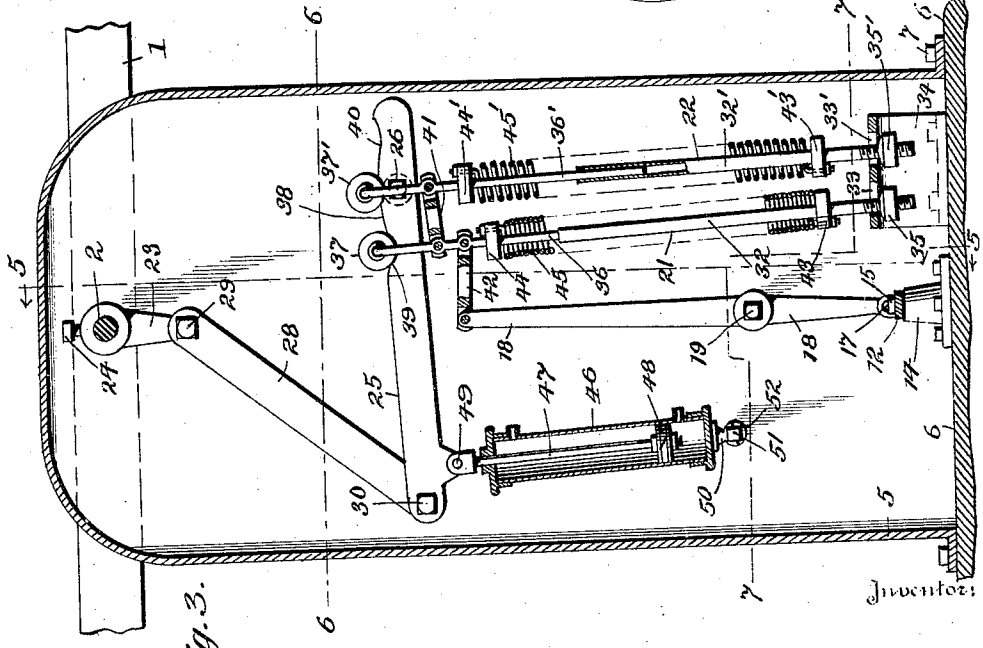


Fig. 3.

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Fig. 5.

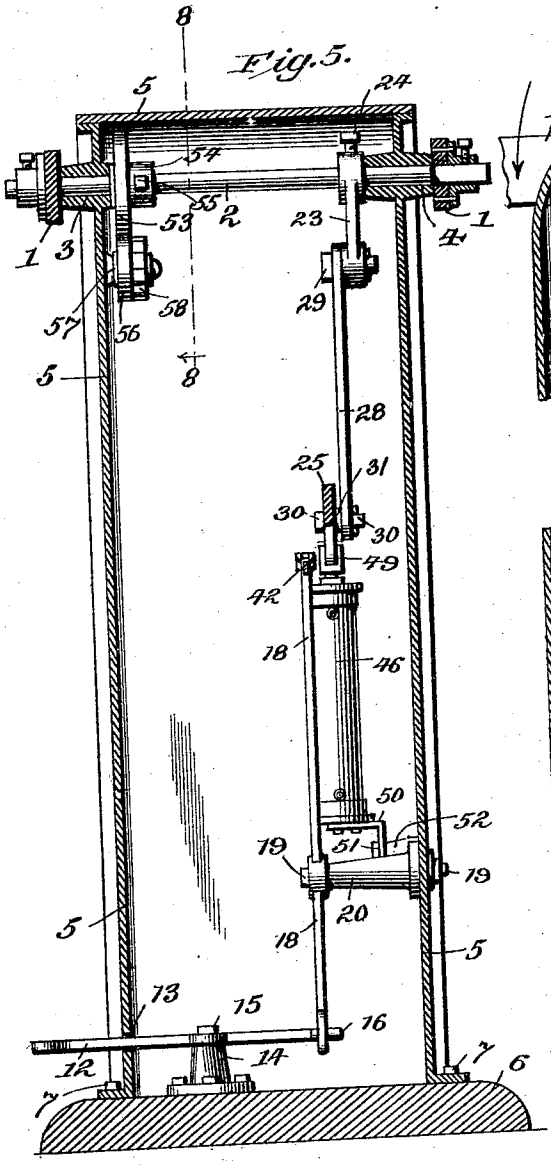


Fig. 8.

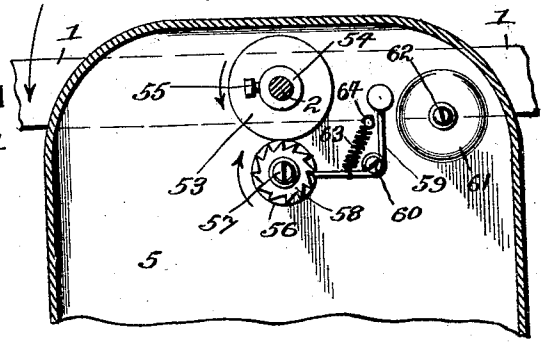
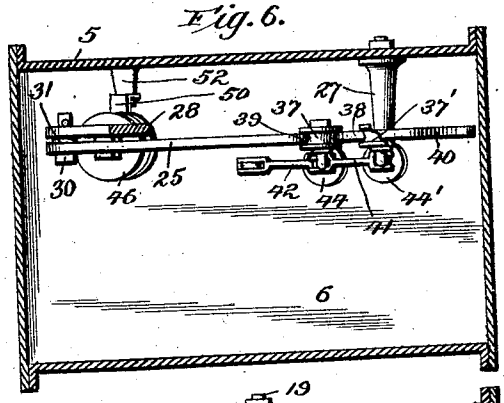


Fig. 6.



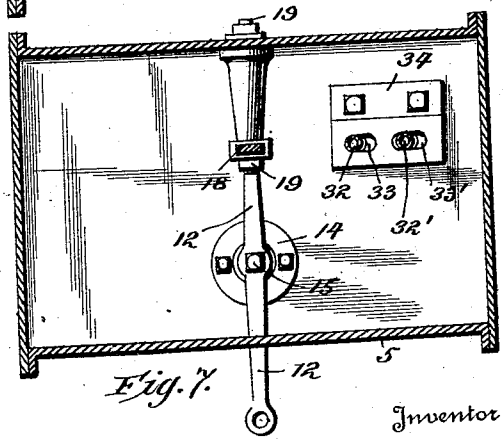


Fig. 7.

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UNITED STATES PATENT OFFICE.

LESTER S. BLACK, OF WHITE PIGEON, MICHIGAN.

BARRIER GATE.

1,416,162. Specification of Letters Patent. Patented May 16, 1922.

Application filed October 3, 1921. Serial No. 505,111.

To all whom it may concern:

Be it known that I, LESTER S. BLACK, a citizen of the United States, residing at White Pigeon, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Barrier Gates, of which the following is a specification.

This invention relates to means for operating gates of any type but is particularly directed to mechanism for effecting prompt and efficient raising and lowering of railroad gates or similar road barriers used by railroads.

Broadly the invention consists in providing certain spring-power gate-operating devices within the gate pedestal adapted to operate the usual rock-shaft on which the gate is mounted and with which it oscillates between raised and lowered positions. The operation and arrangement of these spring-power devices with reference to the other parts of the mechanism is such that as they are shifted from one to another of their two positions by suitable means to be later described, they will automatically effect the raising or lowering of the gate due to the application of the contractile force of the spring devices to the rock-shaft through a suitable arrangement of levers. The invention also includes certain other features, such as means for cushioning the raising and lowering movements of the gate and a frictionally driven bell-ringing mechanism adapted to operate as the gate is lowered.

Reference is had to the accompanying drawings illustrating a preferred embodiment of the invention. In the drawings, the same reference characters represent like parts throughout the several views, of which,—

Figure 1 is a horizontal sectional view of the gate taken on line 1—1 of Fig. 2;

Fig. 2 is a plan view;

Fig. 3, an enlarged vertical section taken on line 3—3 of Fig. 2, showing in detail the position of the several parts of the gate-operating mechanism when the gate is in lowered position;

Fig. 4, a similar view with the gate in its raised or normal position;

Fig. 5, a vertical section taken on line 5—5 of Fig. 3;

Fig. 6, a horizontal section taken on line 6—6 of Fig. 3;

Fig. 7, a similar view taken on line 7—7 of Fig. 3; and

Fig. 8, a framentary sectional view taken on line 8—8 of Fig. 5, showing the bell-operating mechanism in side elevation.

In the drawings, 1 denotes the gate proper which is mounted on and rigidly connected by any suitable means to the usual rock-shaft 2 having bearings 3, 4 in the front and back walls respectively of the hollow pedestal or casing 5. Pedestal 5 contains the gate-operating mechanism and rests on a base 6 to which it is secured by means of a series of screw-bolts 7. The inner end of the gate 1 is provided with the usual counterweighting means 8 which serve to balance the longer outer arm of the gate. As shown in Figs. 1 and 2 of the drawings, this longer arm is provided near its outer end with a swinging or pivoted section 9 secured to the gate proper by means of a spring-hinge 10. On the side facing the railroad tracks, gate 1 provided with an extension 11 against which section 9 of the gate abuts when in line with the gate proper. It will thus be seen that extension 9 serves as a one-way barrier when the gate is down so that should a vehicle be caught on the tracks, it may be driven through this horizontally swinging barrier and out of danger without harm to the vehicle, spring 10 returning the barrier to its normal position against abutment 11.

The mechanism for raising and lowering the gate will now be described. In general, this comprises the horizontally-pivoted operating arm or lever 12 located at the bottom of pedestal 5 and the intermediate mechanism connecting arm 12 with rock-shaft 2 to which gate 1 is rigidly connected as heretofore stated. In raising and lowering the gate 1, the outer end of operating arm 12, i. e., the end extending outside of pedestal 5 through a suitable slot 13 provided therein, is adapted to be oscillated in any suitable manner, either manually through suitable

connections or automatically by a passing train operating suitable trip-mechanisms located on the track, one on either side of the crossing and connected by cables or other suitable means with the outer end of operating rod 12. Since the means for securing this movement of arm 12 forms no part of the present invention, the same are not illustrated or described, but as an instance of a suitable automatic trip mechanism for this purpose, attention is directed to that shown in Patent 463,485, granted to W. H. Close, November 17, 1891. As will be seen, no further reference to the drawings, movement of the outer end of arm 12 towards the right raises the gate, as shown in Fig. 4, while movement of the arm towards the left and into the position shown in Fig. 3, serves to lower the gate.

A trunnion 14 bolted to the base 6 of pedestal 5 provides a support for operating arm 12, the latter being perforated intermediate its ends to receive a screw-bolt 15 which engages with trunnion 14 to form a pivot about which arm 12 may be oscillated. The inner end of arm 12 is formed with a reduced portion 16 which passes through a vertically elongated opening or slot 17 in the lower end of a vertical lever 18. Lever 18 is also perforated intermediate its ends and mounted to swing on a bolt 19 secured in the rear wall of pedestal 5, a trunnion or collar 20 serving to properly space lever 18 from the pedestal wall. It will thus be seen that a movement of the outer end of the operating arm to the right or left will cause a corresponding movement to the right or left of the upper end of vertically pivoted lever 18.

The purpose of this movement of the upper end of lever 18 is to provide for the shifting of spring-power devices 21, 22, which through an arrangement of levers connecting with rock-shaft 2, serve to oscillate rock-shaft 2 and thereby raise or lower gate 1. This arrangement of levers comprises a short lever 23 rigidly secured by any suitable means, such as set screw 24, to rock-shaft 2; a lever 25 pivoted near its lower end on a bolt 26 secured in the rear wall of pedestal 5, lever 25 being spaced from said wall by a trunnion 27; and a lever 28 pivotally connected at its ends in any suitable manner to the lower end of lever 23 and the left end of lever 25. As shown in the drawings, the ends of levers 23 and 25 to which lever 28 is connected and the ends of lever 28 are perforated to receive bolts 29, 30, suitably secured therein to maintain the pivotal connection between the levers. A washer 31 on bolt 30 serves to hold the ends of levers 25 and 28 in properly spaced relation.

Since spring-devices 21, 22 are duplicates in every respect, both devices will be described together. The devices comprise upright tubular members 32, 32′ whose lower ends pass through openings 33, 33′ respectively provided in the upper face of a bracket 34 bolted to base 6 of pedestal 5. The lower ends of tubular members 32, 32′ are exteriorly threaded, and nuts 35, 35′ placed thereon to prevent removal of the tubular members from bracket 34. Openings 33, 33′ are made large enough to allow for a limited swinging movement of the upper ends of tubular members 32, 32′, and yet small enough to prevent the passage of nuts 35, 35′. These nuts are provided with convex upper faces to better allow for the swinging movement of members 32, 32′. Mounted so as to slide within the upper ends of tubular members 32, 32′ are rods 36, 36′ the upper ends of which are bent rearwardly at right angles to receive grooved wheels or rollers 37, 37′ which may be secured thereon in any suitable manner. The grooved peripheries of rollers 37, 37′ rest upon the upper rounded edge of lever 25 and thus support spring devices 21, 22, in proper position. The upper edge of lever 25 is also curved longitudinally on its upper edge so as to form a convex curved portion 38 extending over and substantially equal distances on either side of the pivot point or fulcrum of the lever, i. e., bolt 26, and concave curved portions 39, 40, adjacent either end of the convex portion 38. When gate 1 is lowered, roller 37 rests in concavity 39 and roller 37′ on the crest of convex portion 38 substantially above the fulcrum point of lever 25, as shown in Fig. 3, whereas when the gate is raised, or in its normal position, roller 37 assumes the position occupied by roller 37′ in Fig. 3, and roller 37′ moves into concavity 40. The proper spacing of rollers 37, 37′ is maintained at all times by a link 41 pivotally connected at either end to rods 36, 36′, while the above described back and forth movement or shifting of spring-devices 21, 22 is produced by the hereinbefore described movement of upright lever 18, the upper end of which is pivotally connected to rod 36 of spring-device 21 by means of link 42.

Tubular members 32, 32′ of spring-members 21, 22, are provided just above member 34 with collars 43, 43′ fixed thereto, while rods 36, 36′ are provided with similar fixed collars 44, 44′ intermediate their ends. Between these collars and secured thereto at their ends in any suitable manner are heavy contractile springs 45, 45′ surrounding the telescoping parts 32, 32′ and 36, 36′. It is the contractile force of these two springs that is used to move the gate 1 from raised to lowered position or vice versa.

The operation of the entire mechanism is as follows:—

Assuming gate 1 to be in its raised or

normal position and the parts therefore in the positions shown in Fig. 4, then movement of the outer end of operating lever 12 towards the left, by reason of its being moved either manually or by any suitable train-operated trip mechanism as hereinbefore mentioned, will cause the upper end of lever 18 to more to the left, swinging the upper ends of the spring-devices 21, 22 with it by reason of the connecting links 41 and 42. Rollers 37, 37′ will thereupon assume the positions shown in Fig. 3. It will be seen that as the roller of either spring device assumes its position over the fulcrum point, i. e., bolt 26 of lever 25, and the corresponding spring expands, the contractile force of this spring device is neutralized as far as having any tendency to rotate lever 25 on its pivot is concerned. The other spring device, however, which is also expanded will simultaneously move away from its neutral position at the pivot point until its roller reaches either concavity 39 or concavity 40. In its movement from the fulcrum point, the outwardly moving spring device exerts a gradually increasing leverage on lever 25, this leverage force reaching its maximum as the roller reaches either of the depressions 39, 40. At this time the other roller has assumed its neutral position and the only resistance to be overcome is that necessary to raise or lower the counter-balanced gate 1 through rock-shaft 2 and the levers connecting it to lever 25. Springs 45, 45′ are made sufficiently heavy to readily overcome this resistance and accordingly as roller 37 reaches depression 39 and roller 37′ assumes its neutral position, the tendency of spring device 21 to contract exerts a downward pull on lever 25 to the left of the pivot point and gate 1 is lowered, the parts assuming the positions shown in Fig. 3; while on the reverse movement of the rollers 37, 37′ to the positions shown in Fig. 4, i. e., roller 37 in neutral position and roller 37′ in depression 40, the tendency of spring device 22 to contract will exert a downward pull on lever 25 to the right of its pivot point and gate 1 will be raised. Hence it will be seen that with operating lever 25 in the position shown in Fig. 4, and gate 1 raised, movement of the outer end of lever 12 to the left by any suitable means will readily cause gate 1 to be lowered, whereas a reverse movement of the outer end of lever 12 will cause gate 1 to be raised.

Nuts 35, 35′ on the lower ends of tubular members 32, 32′ provide means for varying the tension of spring devices 21, 22 to secure the most efficient operation of gate 1. In order to cushion and steady the raising and lowering of gate 1, a check 46 is located in pedestal 5, and the upper end of piston rod 47 on piston 48 of the check pivotally connected at 49 to lever 25. At its lower end check 46 is pivotally connected to the rear wall of pedestal 5 to allow for the swinging movement of piston rod 47 due to its connection with lever 35. This pivotal connection consists of a bracket 50 bolted at one end to the lower end of check 46, and secured at its other end to the wall of pedestal 5 by means of a bolt 51 provided with a trunnion 52 which serves to properly space the bracket from the wall of the pedestal. In addition to the gate operating mechanism there are provided means for ringing a warning bell as the gate 1 is lowered.

In Figs. 5 and 8, there is shown a friction-driven bell ringing mechanism adapted to be driven by a disk or wheel 53 having a hub 54 formed thereon. Disk 53 has a central opening therethrough and is mounted on rock-shaft 2, being secured thereto by means of a set-screw 55 passing through hub 54. A second vertical disk member 56 adapted to be frictionally driven by member 53 is mounted on a stub-shaft 57 secured in the front wall of pedestal 5 with its periphery in contact with that of disk 53. Mounted also on stub-shaft 57 and either formed integrally with the inner face of disk 53 or rigidly secured thereto, is a rachet-wheel 58. When rotated, ratchet wheel 58 serves to swing bell clapper 59 about screw-bolt 60, by which it is secured to the wall of pedestal 5, and away from bell 61, which is secured to the wall of pedestal 5 at 62. The return movement of clapper 59 against bell 61 is effected by spring 63, one end of which is attached to the lower arm of clapper 59 and the other end secured at 64 to the wall of pedestal 5. Hence it will be seen that as gate 1 is lowered friction wheels 53 and 56 will be driven in the direction indicated by the arrows in Fig. 8, and the ringing of bell 61 continued until gate 1 reaches its lowermost position.

It is contemplated that various modifications may readily be made in the structure illustrated and described without departing from the invention except as the same is limited by the terms of the appended claims.

What is claimed is:—

1. A barrier gate structure comprising in combination, a gate pedestal; a horizontal rock-shaft mounted therein; a counterbalanced gate mounted on and adapted to oscillate with said rock-shaft; a lever pivoted intermediate its ends within said pedestal; connections between one end of said lever and said rock-shaft to rock the latter upon movement of said lever about its pivot; a spring-power device for causing rotation of said lever about its pivot in one direction; a second spring-power device for causing rotation of said lever about its pivot in the opposite direction; means for moving one of said spring-power devices into operative position to rotate said lever; and means for

simultaneously rendering the other of said spring-power devices inoperative to rotate said lever.

2. A barrier gate structure comprising in combination, a gate pedestal; a horizontal rock-shaft mounted therein; a counterbalanced gate mounted on and adapted to oscillate with said rock-shaft; a lever pivoted intermediate its ends within said pedestal; connections between one end of said lever and said rock-shaft to rock the latter upon movement of said lever about its pivot; a spring-power device adapted to engage said lever on one side of its pivot to oscillate the lever in one direction; a second spring-power device adapted to engage said lever on the other side of its pivot to oscillate the lever in the opposite direction; and means for shifting one of said spring-power devices into neutral engagement with said lever at a point substantially over its pivot and the other spring-power device into operative engagement with said lever to the side of its pivot.

3. In a barrier gate structure, the combination of a pedestal; a rock shaft mounted thereon; a gate mounted on said shaft and adapted to oscillate therewith; a lever pivoted intermediate its ends within said pedestal; connections between said lever and said rock-shaft to cause oscillation of said gate upon rotative movement of said lever; a spring-power device pivotally secured at one end within said pedestal; a roller mounted on the other end of said device and engaging the upper edge of said lever at one side of its pivot for causing rotation of said lever in one direction; a second spring-power device pivotally secured at one end within said pedestal; a second roller mounted on the other end of said second-mentioned device and engaging the upper edge of said lever on the other side of its pivot for causing rotation of said lever in the opposite direction; means for shifting one of said spring-power devices and its roller longitudinally of said lever; and a link pivotally connecting said spring-power devices to shift one of said rollers into neutral engagement with said lever at its pivot point as the other roller assumes an operative position on the lever to the side of the pivot.

4. In a barrier gate structure, the combination of a pedestal; a rock-shaft mounted thereon; a gate mounted on said shaft and adapted to oscillate therewith; a lever pivoted intermediate its ends within said pedestal, the upper edge of said lever being provided with a convex portion overlying its pivot and a concave portion adjoining said convex portion on either side of the pivot; connections between said lever and said rock-shaft to cause oscillation of said gate upon rotative movement of said lever; a spring-power device pivoted at its lower end within said pedestal; a roller mounted on the upper end of said device and adapted to engage one of said concave portions to rotate said lever; a second spring-power device pivoted at its lower end within said pedestal; a roller mounted on the upper end of said second device and adapted to engage the other concave portion to rotate said lever in the opposite direction; means for shifting one of said rollers into engagement with the corresponding concave portion; and a link pivotally connecting said spring-power devices to simultaneously cause the movement of the other roller into engagement with said convex portion.

5. In a gate-operating mechanism, the combination of a gate pedestal; a rock-shaft mounted thereon; a gate rigidly mounted on and adapted to oscillate with said shaft; a lever pivotally mounted intermediate its ends in said pedestal; connections between said lever and said rock-shaft to cause said shaft to oscillate upon movement of said lever; a pair of telescoping members, the lower member whereof is pivotally secured to the lower part of said pedestal; a second pair of telescoping members, whereof the lower member is also pivotally secured to the lower part of said pedestal; springs surrounding and tending to contract said pairs of telescoping members longitudinally; rollers mounted on the upper ends of the upper telescoping members and adapted to engage the upper edge of said pivoted lever on either side of its pivot to rotate said lever in either direction; means for shifting one of said rollers longitudinally of said lever; and means holding said rollers in proper spaced relation on said lever so that as one roller comes into engagement with said lever in close proximity to its pivot, the other roller assumes a position on said lever to the side of said pivot.

6. A barrier gate structure comprising in combination, a gate pedestal; a horizontal rock-shaft mounted therein; a counterbalanced gate mounted on and adapted to oscillate with said rock-shaft; a lever pivoted intermediate its ends within said pedestal; connections between one end of said lever and said rock-shaft to rock the latter upon movement of said lever about its pivot; a spring-power device adapted to engage said lever on one side of its pivot to oscillate the lever in one direction; a second spring-power device adapted to engage said lever on the other side of its pivot to oscillate the lever in the opposite direction; means for shifting one of said spring-power devices into neutral engagement with said lever at a point substantially over its pivot and the other spring-power device into operative engagement with said lever to the side of its pivot; and means for varying the tension of said spring-power devices.

7. The combination of a closure; a lever pivoted intermediate its ends and operatively connected to said closure to open or close the latter; a pair of spring-power devices; and means for shifting said devices to alternately engage said lever at either side of its pivot to open or close said closure, one of said devices engaging said lever in a neutral position substantially in line with its pivot when the other device is in operative engagement with said lever.

In testimony whereof I have signed my name to this specification.

LESTER S. BLACK.