(No Model.) 6 Sheets—Sheet 1.

O. H. CLARK.

RAILROAD CROSSING GATE.

No. 307,095. Patented Oct. 28, 1884.

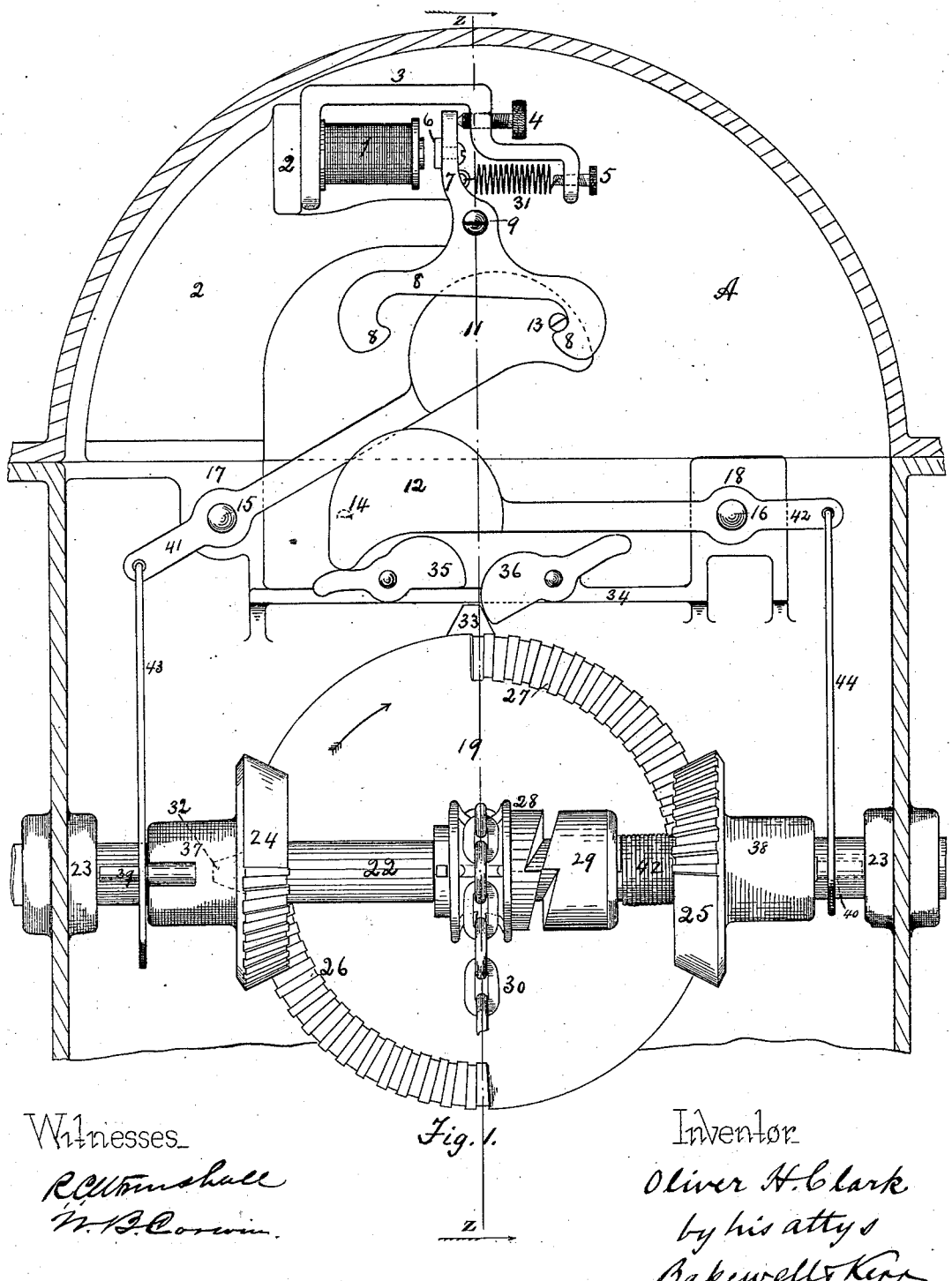

Fig. 1.

Witnesses.
R. Allen Marshall
W. B. Corwin.

Inventor.
Oliver H. Clark
by his attys
Bakewell & Kerr

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O. H. CLARK.

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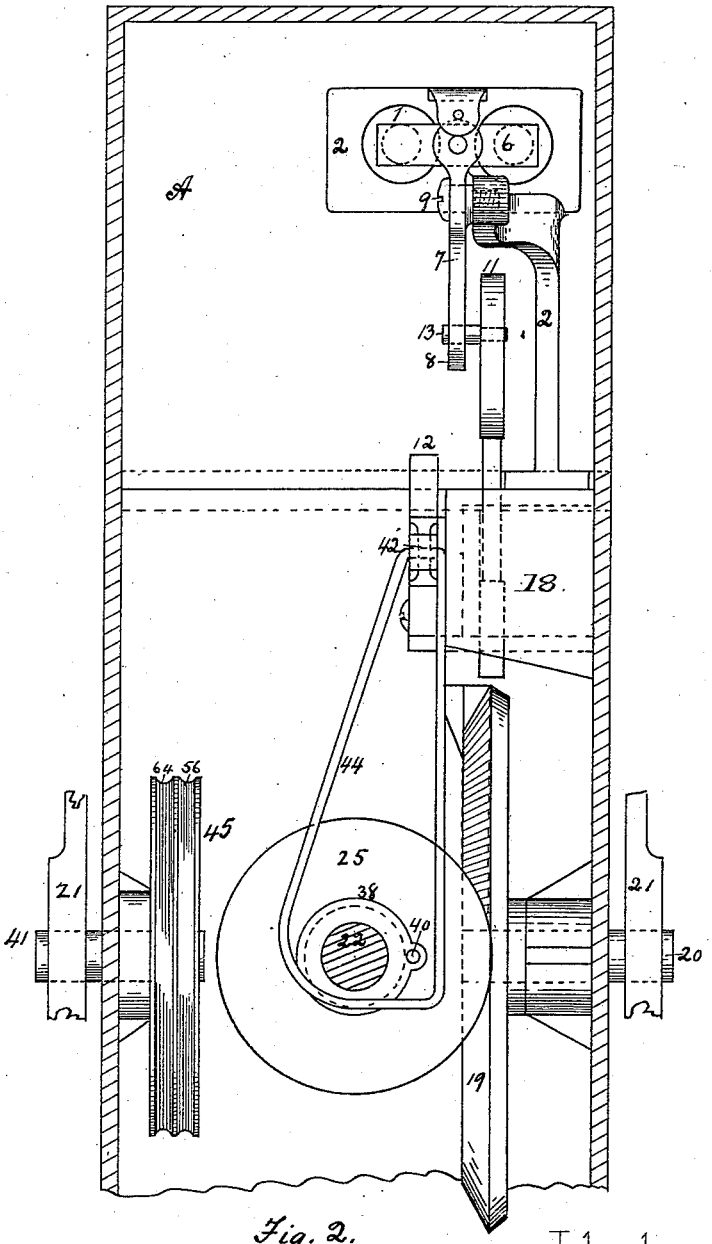

Fig. 2.

Witnesses.
R. Curtis Hall
W. B. Corwin

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O. H. CLARK.

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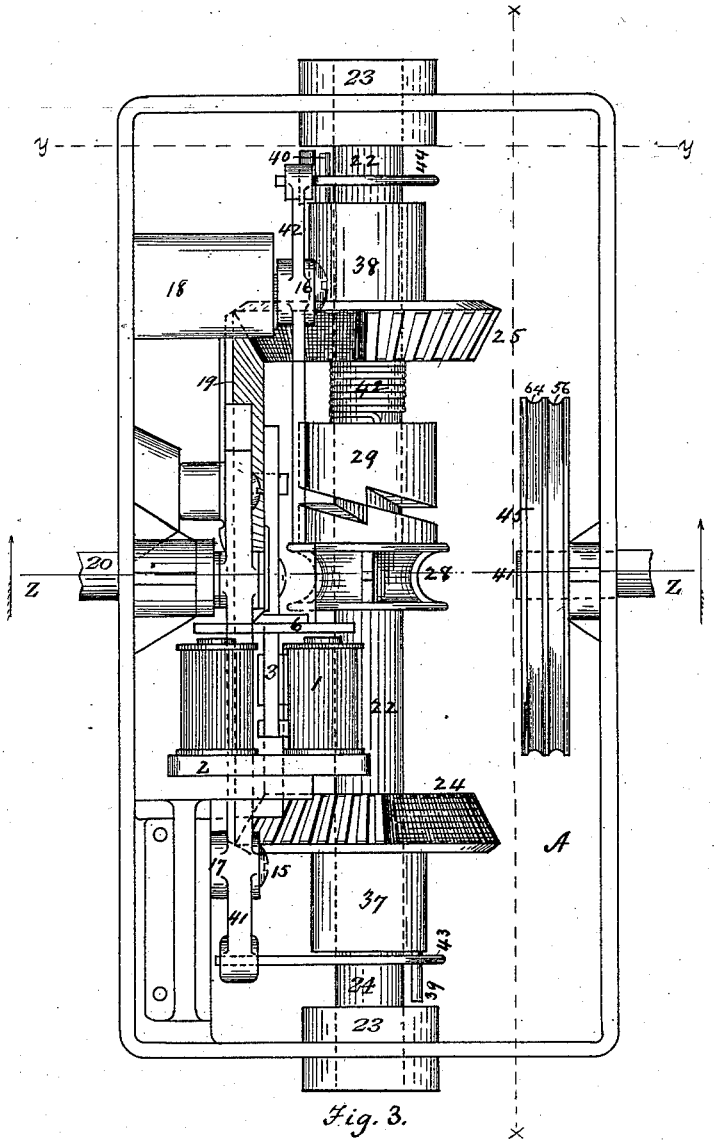

Fig. 3.

Witnesses
R. H. Whitehall
N. B. Comstock

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(No Model.) 6 Sheets—Sheet 4.

O. H. CLARK.

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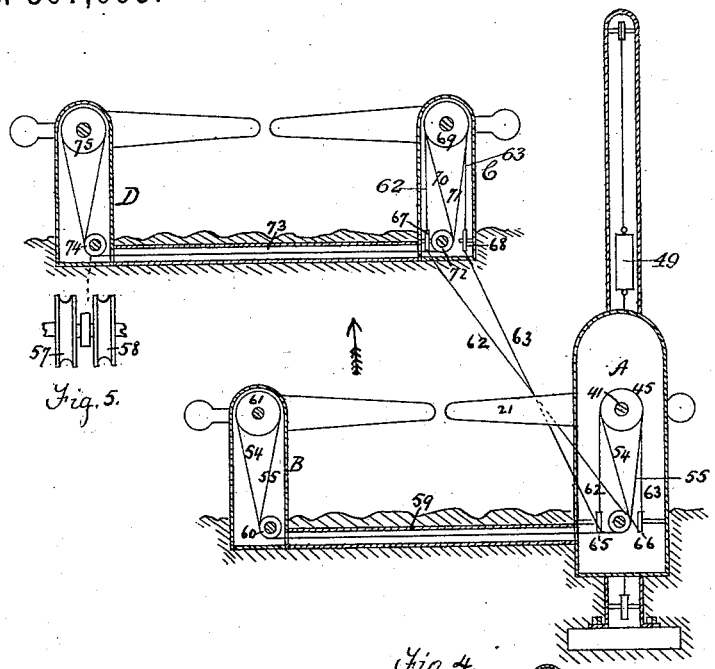

Fig. 5.

Fig. 4.

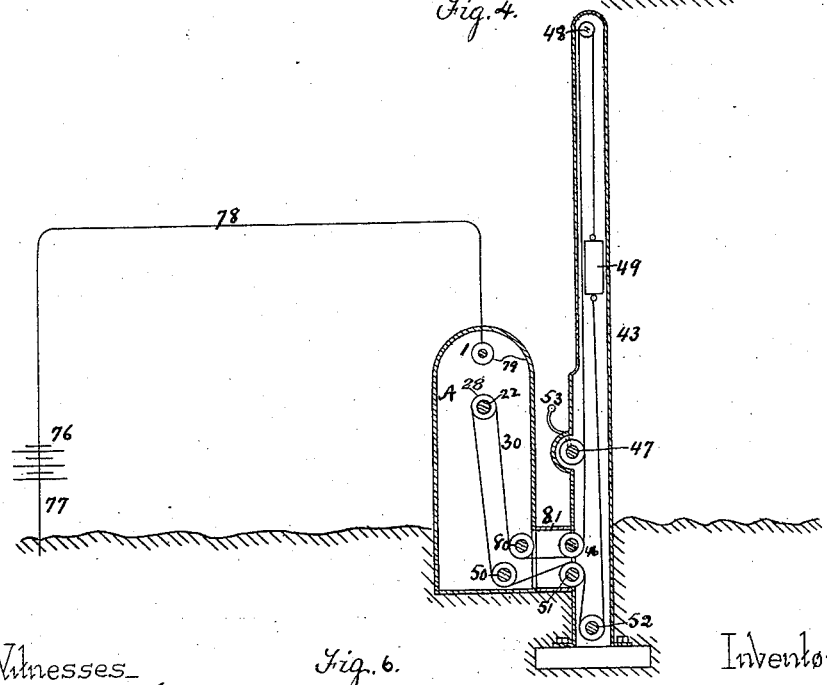

Fig. 6.

Witnesses—
R. Q. Winshall
W. B. Corwin

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(No Model.) 6 Sheets—Sheet 5.

O. H. CLARK.

RAILROAD CROSSING GATE.

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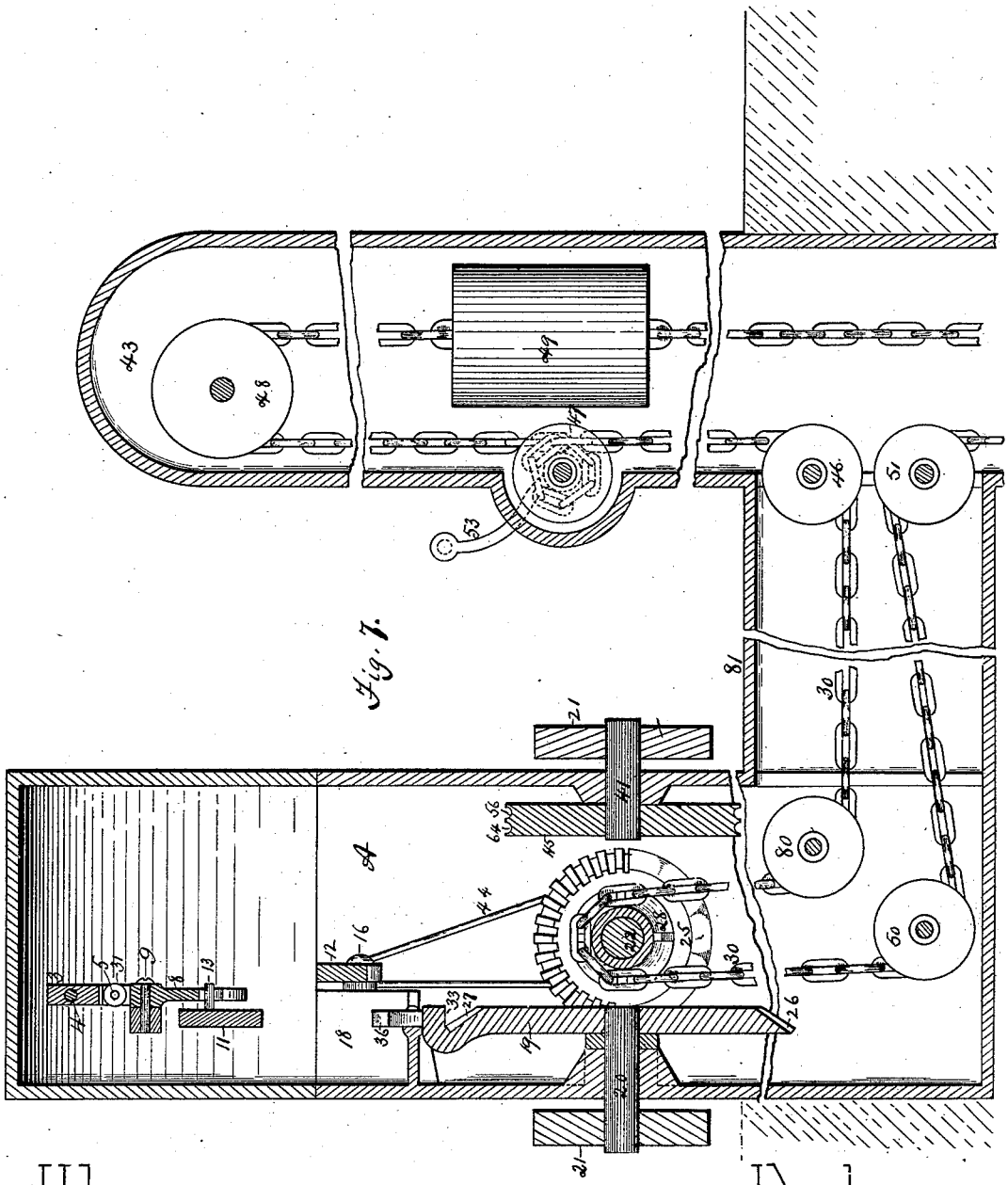

Fig. 7.

Witnesses.
J. A. Burns.
W. B. Corwin

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(No Model.) 6 Sheets—Sheet 6.

O. H. CLARK.

RAILROAD CROSSING GATE.

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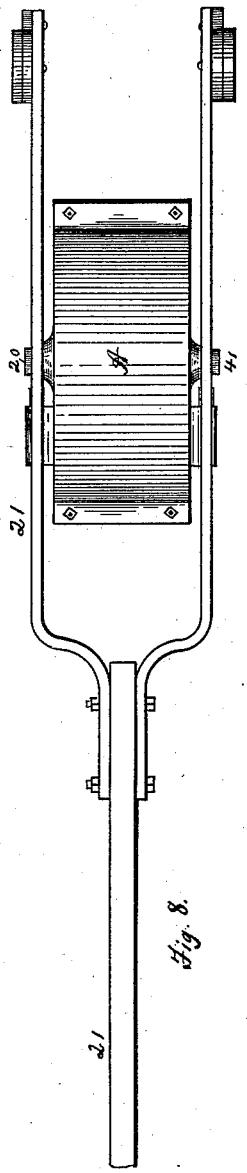

Fig. 8.

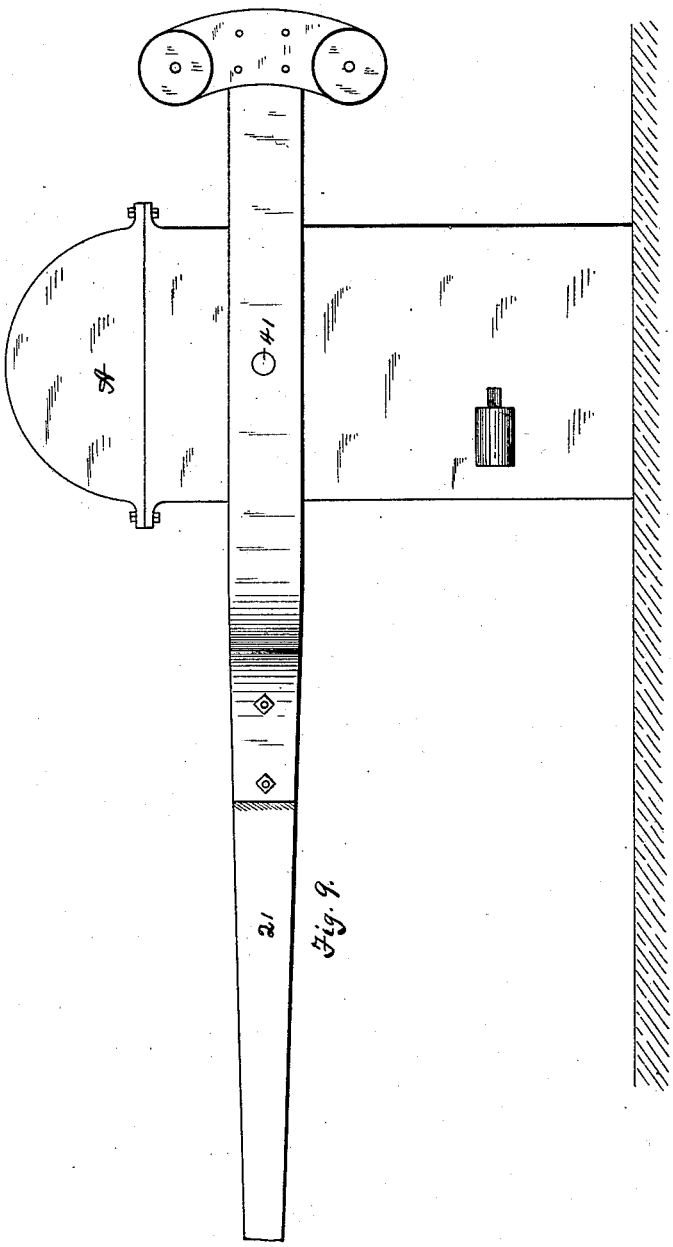

Fig. 9.

Witnesses.
J. A. Burns.
W. B. Corwin

Inventor.
Oliver H. Clark
by his attys
Baldwell & Kerr

UNITED STATES PATENT OFFICE.

OLIVER H. CLARK, OF PITTSBURG, PENNSYLVANIA.

RAILROAD-CROSSING GATE.

SPECIFICATION forming part of Letters Patent No. 307,095, dated October 28, 1884.

Application filed September 11, 1883. (No model.)

To all whom it may concern:

Be it known that I, OLIVER H. CLARK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Railroad-Crossing Gates; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical longitudinal section on line *x x* of Fig. 3 of the main or operating standard of my improved automatic gate for railroad street-crossings. Fig. 2 is a vertical cross-section on the line *y y* of Fig. 3. Fig. 3 is a horizontal section. Fig. 4 is a view of the entire gate. Fig. 5 is a detail view, and Fig. 6 is a sectional view, showing the movements of operating-weight. Fig. 7 is a sectional view, looking in the direction of the arrows on the line *z z*, Figs. 1 and 3, showing the application of the devices in the standards shown in Fig. 6. Fig. 8 is a plan view, and Fig. 9 is a side elevation of standard A and its barrier, showing the bifurcation of the latter.

Like letters and numerals of reference indicate like parts in each.

This gate has vertically-oscillating counterweighted barriers, there being a perfect equilibrium between each barrier and its counterweight. The barriers are operated simultaneously by means of chains or ropes running from the main or operating standard to the others.

I will now describe the construction and operation of the main standard, and then the manner in which it operates to raise and lower the barriers.

In the main standard A is an electro-magnet, 1, which is supported on a bracket, 2, fixed to the standard. Extending from the bracket 2 around to the other end of the electro-magnet 1 is an arm, 3, in which is an adjustable stop or set screw, 4, designed to limit the vibration of the armature-lever 7, and also an adjustable tension-screw, 5, connected to the retracting-spring 31 of the armature-lever. An armature, 6, is mounted on the armature-lever 7 directly in front of the pole of the magnet 1, and the armature-lever 7 is so pivoted at 9 as to vibrate between the magnet and the stop 4, it being drawn forward by the power of the magnet acting upon the armature 6, and retracted, upon the opening of the circuit, by the spring 31. On the lower end of the armature-lever are hooks or catches 8, the purpose of which will be explained. Pivoted at 15 and 16 in the bosses 17 and 18, which project from the side of the standard, are hammers 11 and 12, which have pins 13 and 14 on their adjacent faces. A double quadrant-wheel, 19, whose plane is parallel to the face of the standard, is mounted upon a shaft, 20, the outer extremity of which supports one of the barriers 21 and its counterweights. A shaft, 22, extends parallel with the face of the quadrant-wheel 19, and is journaled in the bosses 23. Upon this shaft are mounted two bevel-wheels, 24 and 25, each of which is provided with teeth corresponding to those of the wheel 19 along one hundred and eighty degrees of their circumference, and they are so arranged that in their revolution they will alternately engage with the toothed quadrants 26 27 on the quadrant-wheel 19, thus giving to the quadrant-wheel alternately reverse motions through an arc of ninety degrees.

Mounted loosely upon the shaft 22 is a sprocket-wheel, 28, which carries an endless chain, 30, connected to a weight, as and for purposes hereinafter described. The wheel 28 is connected to the shaft 22, so as to turn therewith, by means of a clutch, 29, mounted on said shaft. Upon the periphery of the wheel 19, at two adjacent ends of the segments 26 and 27, are stops 32 and 33, and pivoted to the bar 34 are pawls 35 and 36, each of which is provided with a tail or rear projection back of its pivot, which tails are within the range of the points of the hammers or drops 11 and 12.

Projecting longitudinally from the sleeves 37 and 38 of the bevel-wheels 24 and 25, on opposite sides of the shaft 22, are pins 39 and 40, which turn with the shaft. Pivotally secured to the ends of the stems 41 and 42 of the hammers 11 and 12, back of the pivots 15 and 16, are links 43 and 44, which extend around the sleeves 37 and 38, (see Fig. 2,) so that when the shaft 22 revolves one or other of the pins 39 and 40 comes in contact with its link and draws it down, and thereby draws

down one of the hammer-stems and raises the hammer.

The magnetization and demagnetization of the magnet 1 corresponds with the vertical and horizontal positions of the gate, or vice versa. Assuming that the barriers occupy the vertical position when the magnet 1 is demagnetized, and the armature consequently drawn back by the retracting-spring 31, the parts will be in the positions represented in Fig. 1 of the drawings. To bring the barriers to a horizontal or closed position, an electric current is caused to pass through the magnet 1, which will then attract the armature 6, moving the armature-lever 7 and the hammer-catch 8 upon the pin 9. By this movement the support given by the catch 8 to the pin 13 upon the hammer 11 is withdrawn, and the hammer permitted to fall upon the tail of the pawl 36. The quadrant-stop 33, which bears upon the pawl 36, being thus relieved from contact therewith, the quadrant-wheel 19 and shaft 22 will be free to turn. The turning of the shaft 22 causes the pin 40 to come in contact with and draw down the link 44, and thereby raise the hammer 12 until the pin 14 slips over the beveled end of the catch 8, and enters the recess therein, in which position it is retained until, by the opening of the electric circuit, the electro-magnet is demagnetized and the spring 31 retracts the armature 7. The stop 36 being thrown up, the wheel 19 is turned in the direction of the arrow in Fig. 1, by means of the gear-wheel 25, until the projection 32 is brought to the position now occupied by the projection 33. During this quarter-movement of the wheel 19 the plain part of the wheel 24 is turning toward the wheel 19, so that the wheel 24 does not interfere with or prevent the turning of the wheel 19. The teeth on the wheels 24 and 25 extend around one-half of their circumference, and this toothed portion equals in length the toothed segment on the wheel 19. When the projection 32 reaches the position now occupied by 33, the toothed portion of the wheel 24 will have been brought around, so that the first tooth thereon begins to engage with the lower tooth on the segment 26. The wheel 24 will then cause the wheel 19 to turn backward and begin to rotate in the reverse direction. This rotation, however, is checked instantly by the stop 35, which, having been released by the raising of the weighted lever 12, stands down in front of the projection 32, and checks the motion of the wheel 19. The wheels 24 and 25, although mounted on the same shaft, and always turning in the same direction, cause the wheel 19 to turn in opposite direction when they come in gear therewith, by reason of their being arranged on the opposite sides of the center of the same, and alternately thrown in and out of gear therewith. This motion is repeated at every vibration of the armature, the reverse motion taking place when the circuit is opened.

On the side of the standard A opposite to that in which the shaft 20 is journaled is a second shaft, 41, on which a grooved wheel, 45, is mounted inside of the standard. The barriers 21 are bifurcated at their rear ends, so as to be journaled on both sides of the standards, and the counter-weights are mounted on the ends of the furcations.

It will be noticed that while the barrier is secured by one arm to the shaft 20 of gear-wheel 19, and on the descent of the weight is actuated through chain 30, it in turn actuates the wheel 45, to the shaft of which its other arm is secured, and, through devices hereinafter specified, moves the barrier on the opposite side of the street.

In standard A one arm of the barrier is journaled by the shaft 20 and the other by the shaft 41. On the shaft 22 is a strong coiled spring, 42, which bears against the wheel 25 and the sliding clutch 29, so as to hold the clutch up to place against the wheel 28. When the weight which is fastened to the chain 30 is falling, the wheel 28, which is turned thereby, is in gear and works against the square faces of the clutch, and so turns the shaft 22; but when the weight is being wound up, as hereinafter described, the wheel 28 turns against the beveled surfaces of the clutch, forces it back along the shaft 22 against the spring 42, and so revolves on the shaft without turning it. The position of the clutch 29 with relation to the ratchet-wheel 28 during the winding up of the operating-weight is shown in Fig. 1.

In Figs. 6 and 7 I show the mechanical means by which the shaft 22 is operated. In Fig. 6 all of the parts contained in the upper part of the standard A are omitted, except the shaft 22 and wheel 28, and the chain 30 is shown as a single line, instead of in links, for greater clearness of illustration. In any convenient position near the standard A, I place a hollow column, 43, of any desired height, and extending to any desired depth below the surface of the ground. The chain 30 passes around the wheel 28, down around the sheave 80, through the box 81, around the sheave 46, up to and around the drum 47, thence up to and around the sheave 48 at the top of the column, and thence down to the weight 49, to which it is fastened. The other end of the chain is fastened to the lower end of the weight, and passes down to and around the sheave 52 at the lower end of the column, thence around the sheave 51, through the box 81 to the standard, and then around the sheave 50 up to the wheel 28, thus forming an endless chain, with the weight 49 included in it. The shaft 22 is operated by the descent of the weight 49 whenever, by the making or breaking of the circuit in which the magnet 1 is included, the armature-lever 7 is moved, and by the intermediate mechanism releases the shaft 22 by tripping the stops 35 and 36. The range of the weight 49 is such as to give a desired number of movements of the gates during each descent of the weight 49. When the weight

reaches the bottom of the column, it is wound up to the top by means of a crank, 53, fitted on the shaft of the winding-drum 47, the inclined surfaces on the ratchet-wheel 28 forcing back the clutch 29, and permitting it to turn without turning the shaft 22, as before explained.

I will now explain how the barriers on the other standards, B, C, and D, are operated from the standard A.

In Fig. 4 I show two gates at a railroad-crossing, the street extending in the line of the arrow, and the railroad at right angles thereto. The barrier of standard B is operated by two ropes, 54 and 55, both of which are fastened in the groove 56 of wheel 45, (see Fig. 3,) at the top, when in the position shown in Fig. 4. Thence they pass down on opposite sides of the wheel 45 to separate sheaves 57 and 58 at the base of the standard, such sheaves being shown by an enlarged view in Fig. 5. Thence they pass side by side under the surface through the box 59, across the street to the standard B, then around sheaves 60, similar to those in Fig. 5, up to the opposite sides of the single-grooved wheel 61, to which they are fastened at the top. When the barrier 21 of standard A rises, the rope 54, pulling on the opposite side of the wheel 61, raises the barrier of standard B, and when the barrier 21 of standard A falls the rope 55, pulling on the inner side of wheel 61, draws down the barrier of standard B. The same is true of the opposite standards, C and D, except that the standard D is operated by the standard C, instead of by the standard A directly. The ropes 62 and 63, which lead to the standard C, are fastened in the grooves 64 of the wheel 45. They extend down on opposite sides of the wheel 45, around the sheaves 65 and 66, across under the railroad-track, around the sheaves 67 and 68, up to and around opposite sides of the double-grooved wheel 69, and are fastened thereto in one of the grooves. The ropes 70 and 71, which connect the standard D with standard C, are fastened at the top, in the other groove of the wheel 69, pass down in it on opposite sides, thence to and around sheaves 72, similar to those shown in Fig. 5, through box 73, to the sheaves 74, thence up in standard D, around the opposite sides of the single-grooved wheel 75, and are fastened at the top.

The electric circuit, which includes and operates the magnet 1, is shown in Fig. 6. A battery, 76, provided with a suitable circuit-breaker, is placed in a switch or block house, and is there grounded by the wire 77. The circuit-wire 78 leads to the magnet 1, which is grounded by the wire 79, leading to the metallic standard-frame. When it is desired to close or open the gates, the circuit is closed or opened, as the case may be. I prefer that the closing of the circuit should cause the closing of the gates, as it causes less expenditure of the current, for under ordinary circumstances the gates will be open the greater part of the time, and during such time no current will be expended, as the circuit also is open. I propose to use this construction with circuit-breakers or circuit-changers which are operated by the passing train, and thus secure the entirely automatic operation of the gates.

If desired, a pair of grooved guide-wheels may be arranged in the standard A below the wheel 28, for the purpose of guiding the chain 30, and preventing its running over the flanges of the wheel. In order to keep the chain 30 taut, the sheave 52, at the base of the column, may be attached to a weight, which, being suspended on the chain, will prevent slack therein.

My invention enables crossing-gates to be operated from a distance and brings the oversight of several crossings under the control of one person. It therefore increases precision and saves labor.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a railroad-crossing gate, having counterweighted oscillating barriers, with an oscillating double-quadrant gear-wheel attached to the axis of one of the barriers, and a power-shaft connected by mutilated gearing to said oscillating double-quadrant gear-wheel, and a chain and weight for actuating said power-shaft, substantially as and for the purposes described.

2. The combination of the barriers of a railroad-crossing gate with a double-quadrant gear-wheel having an alternately-reversed movement to lower and raise the barriers, a shaft having mutilated gearing for actuating the gear-wheel, and a loose sprocket-wheel and clutch, substantially as and for the purposes described.

3. The combination, in a railroad-crossing gate, of an oscillating double-quadrant gear-wheel, a power-shaft having mutilated gearing, a sliding clutch mounted thereon, a chain or sprocket wheel mounted loosely on said shaft and having a ratchet for engaging with the clutch, a chain running over said sprocket-wheel, and a falling weight connected to said chain, substantially as and for the purposes described.

4. The combination, in the operating-standard of a railroad-crossing gate, of a shaft operated by the continuous pressure of the weight, an oscillating double-quadrant gear-wheel which is secured to the barrier-shaft or axis and actuated from the shaft first named, stops for limiting the movement of said double-quadrant gear-wheel and arresting the motion of the shaft, tripping devices for tripping said stops and releasing the gear-wheel, and an electro-magnet and armature for sustaining and releasing the tripping devices, substantially as and for the purposes described.

5. The combination of an electro-magnet and an armature operated thereby, said armature being provided with sustaining-hooks, and weighted levers which are alternately sustained and released by the vibration of the

armature, substantially as and for the purposes described.

6. The combination, in the main standard of a railroad-crossing gate, of a power-shaft and segmental gear-wheel operated thereby, pivoted stops for arresting the motion of the gear wheel and shaft, pivoted weighted levers for tripping the stops, links connecting the pivoted levers with the power-shaft, and pins mounted on said shaft for operating in connection with the links to alternately raise the opposite weighted levers, substantially as and for the purposes described.

7. The combination of the stops and weighted tripping devices with links and pins operating in connection with the power-shaft to raise the tripping devices, and an electromagnet and armature to alternately sustain and release the said tripping devices, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 4th day of October, A. D. 1882.

OLIVER H. CLARK.

Witnesses:

W. B. CORWIN,

L. C. FITLER.