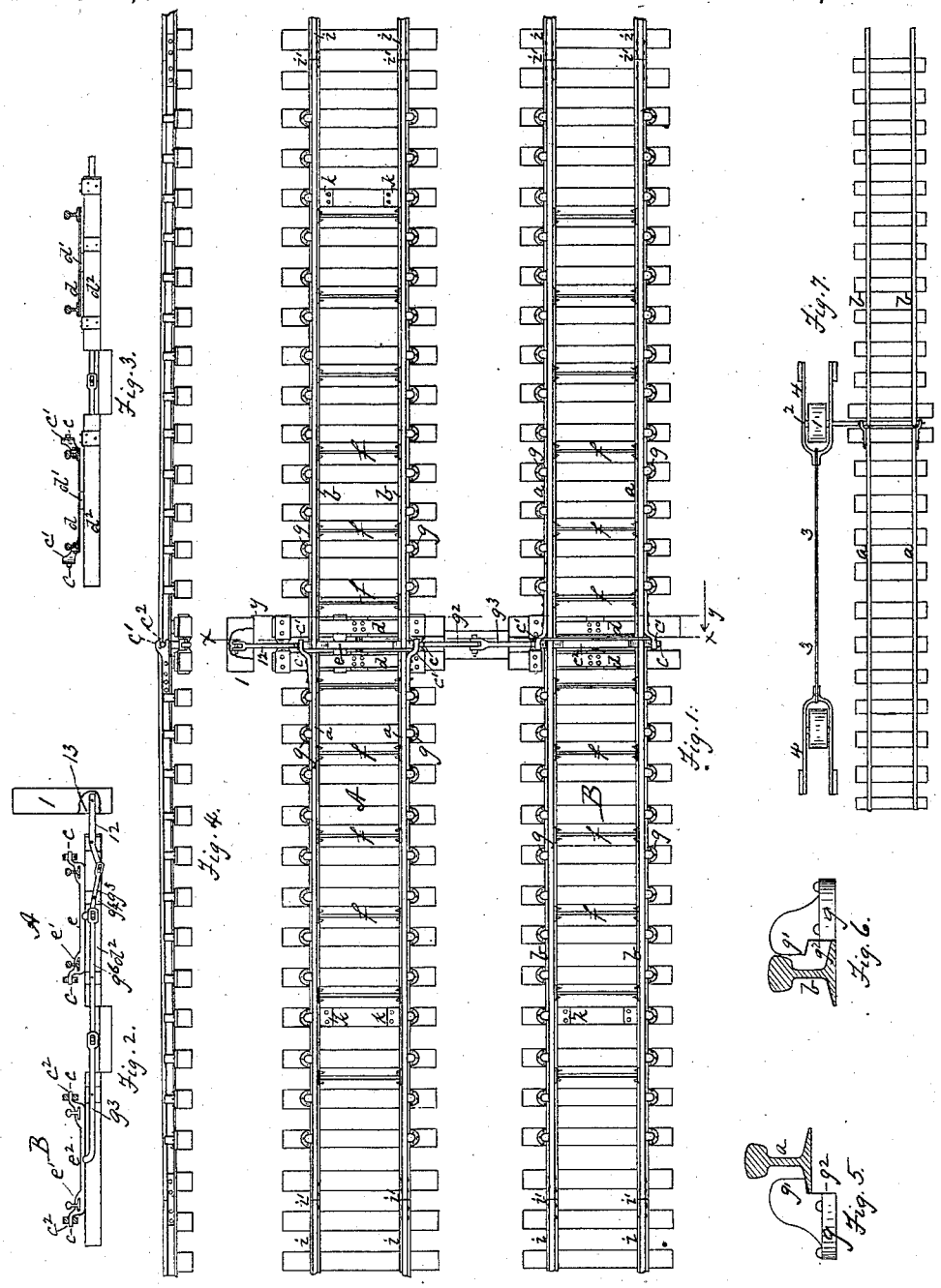
(No Model.) 2 Sheets—Sheet 1.

O. H. CLARK.

RAILROAD CROSSING GATE.

No. 307,099. Patented Oct. 28, 1884.



Witnesses.
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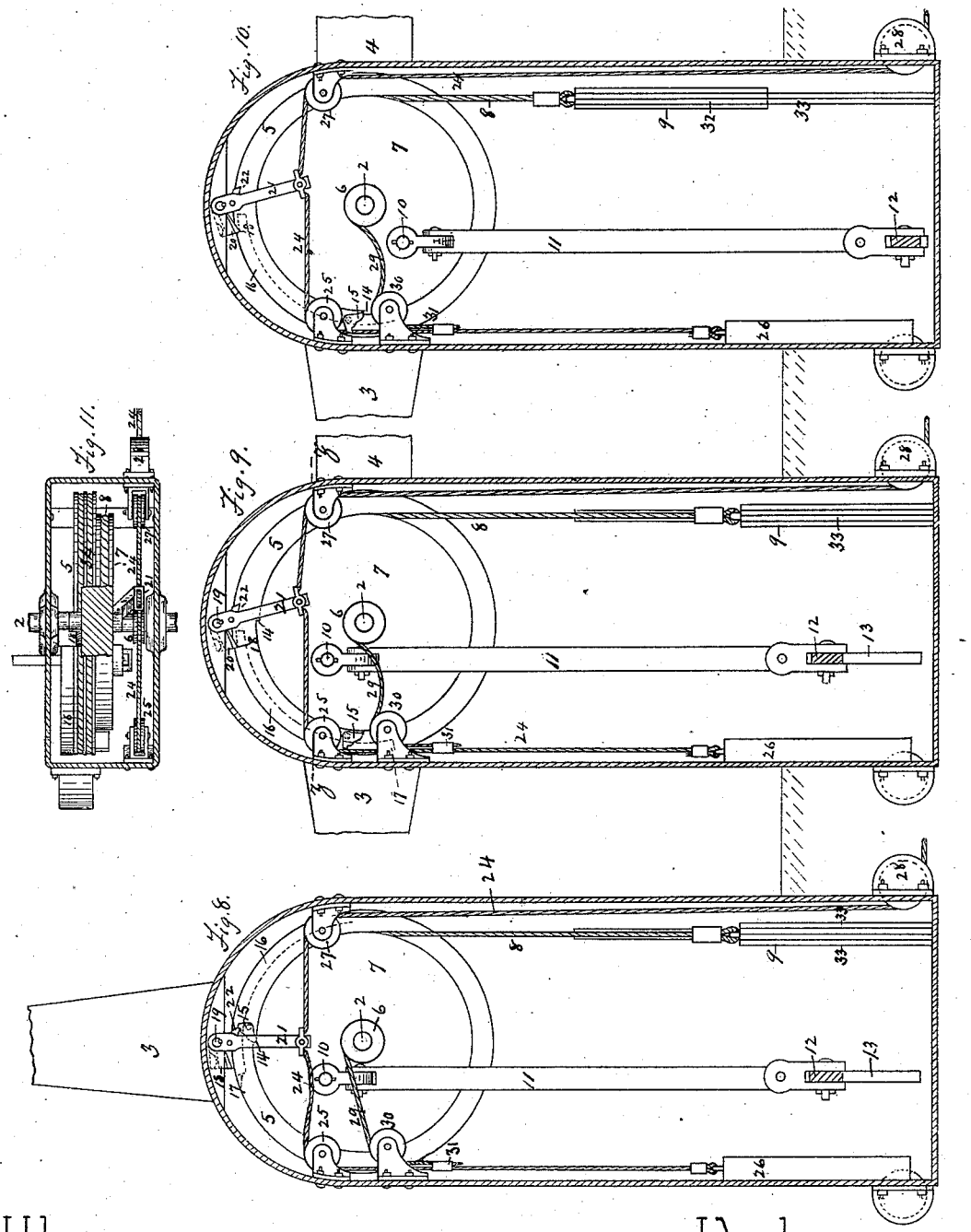

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UNITED STATES PATENT OFFICE.

OLIVER H. CLARK, OF PITTSBURG, PENNSYLVANIA.

RAILROAD-CROSSING GATE.

SPECIFICATION forming part of Letters Patent No. 307,099, dated October 28, 1884.

Application filed January 24, 1884. (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 of the invention, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of a section of a double-track railroad, illustrating the application of my improvement. Fig. 2 is a vertical section on *x x*, Fig. 1. Fig. 3 is a similar view on *y y* of Fig. 1. Fig. 4 is a side elevation of the track. Figs. 5 and 6 are views of the chair and rail, the latter being in section. Fig. 7 is a diagram of a complete gate, showing its arrangement with reference to the track. Figs. 8, 9, and 10 are views of the mechanism in the standard in various positions, the outer side being removed. Fig. 11 is a plan view of the standard, the cap being removed at the line *z z*, Fig. 9.

Like letters of reference indicate like parts in each.

The purpose of my invention is to utilize the weight of a passing train to raise the operating-weight of a railroad-crossing gate, so that it may be in position to open the barriers by its descent.

The gate to which I have applied my invention is one of the ordinary construction, having vertically-oscillating barriers.

I will first describe the construction of the appliances by means of which I use the weight of the train as a motor to raise the weight.

In Fig. 1 a section of a double-track railroad is shown, and one track is marked A and the other B. The rails *a a* and *b b* are of the ordinary form, and are joined to the other rails, *i*, of the track by fish-bars *i'*, in the usual way; but, instead of being spiked down to the cross-ties in the usual way, they are held in place by chairs *g*, Figs. 5 and 6, which have an inwardly-projecting head, *g'*, and straight vertical guiding-surface g^2. The rails are held in their proper relative position and are braced on their inner sides by the rods *f*, and the outer edges of their flanges are in contact with the guiding-surfaces g^2 of the chairs *g*, the heads of which extend over the said outer flanges. The inner ends of the rails *a a b b* rest on spring-plates *d*, which are bolted to blocks *d'*, placed on the middle of the sills d^2, Fig. 3, and they are connected together by a pivotal connection, *c*, which will be described.

Under the ends of rails *b b* is a tie-bar, *e*, having chair-sockets *e'* for receiving the flanges of the rails, which tie-bar is supported in the middle by one end of a lever, g^5, pivoted at g^4 to one of the sills d^2. The other end of the lever g^5 is pivotally connected to the short arm of a second lever, 12, also pivoted to the sill, the long arm of which extends through a slot, 13, into the weight-standard 1.

Pivotally connected to the lever g^5 at its inner end is another lever, g^6, also pivoted to the sill *d*, the outer end of which is pivotally connected to one end of a fourth lever, g^3, which is also pivoted on the sill, and with its outer end supports the tie-bar e^2 of the rails *b* of the second track, B, in the same manner as the lever g^5 supports the bar *e*. The connections between the levers g^5, g^6, and g^3 are made with slots, to afford the requisite play for the pivots.

Projecting from the ends of the tie-bars *e* e^2 are pins *c*, and fastened to the adjacent ends of the next rails are plates *c'*, bent outward and then parallel to the rails, in the ends of which plates are open slots or recesses c^2, for the reception of the pins *c*, the said slots being long enough to provide for the contraction and expansion of the joints, so that the expansion of the rails shall not break the pins and the contraction shall not cause them to be drawn out of the slots. This connection insures the preservation of the joint and procures the alignment of the rails. The pins and plates are so placed as not to be struck by the wheels of trains passing over the rails. The rails are further supported, if desired, on spring-plates *k*, secured to the ties in any desired number. The height of the guiding-surface decreases gradually in each successive chair from the joint *c* to the outer joints, *i*, for the reason the greatest motion is needed at *c*, and there should be none at *i*.

The construction of the track B is similar to that of the track A. The operation is as follows: When a train passes over the track A, it depresses the rails, which, acting on the

inner end of the lever g^5 through the medium of the tie-bar e, depresses it and raises its outer end, thereby depressing the inner end of the lever g^6 and raising its outer end. The journals of these levers being nearer the inner ends, the outer end of the lever 12 has considerable motion. This motion is applied, as will be described, to raising the weight which operates to open or close the barrier. As illustrated in Figs. 8 to 11, it is applied for the purpose of raising the barrier. In such case there is a preponderance of weight in the barrier 3, which causes it to fall when released. If a train passes over the track B, the weight of the train, acting through levers g^7, g^6, and g^5, moves the lever 12 in the same way.

Referring to Figs. 8 to 11 an application of the invention will be shown, the general characteristics of which are as follows: Supported in the standard called the "main standard" is a loosely-mounted shaft, to which is rigidly secured at its outer ends the barrier and its counter-weights. Within the standard, and rigidly mounted upon the same shaft, is a grooved wheel, which, moving through the same arc as the barrier, transmits the movement to the other barriers on the opposite side of the track or crossing by rope or chain connections. Mounted loosely upon the shaft, and lying close to this wheel, is a second wheel, over the periphery of which, at one side, is suspended a weight, and from the exposed face of which, on the other side, is a rod or chain device which extends down and connects with a lever passing in through an opening in the standard. This lever, as before described, is carried down when the train passes over the crossing. In so doing the loosely-mounted wheel is rotated through ninety degrees, when it engages with a pawl or dog on the face of the rigidly-mounted wheel. The rotation of the first-named wheel causes the weight suspended therefrom to be lifted, when the wheels are mutually engaged, and the weight rotates them, and consequently the barrier, in the opposite direction when it is permitted to do so; but until then the wheels are retarded by the rigidly-mounted wheel resting against a pawl which forms part of an escapement manipulated at the will of the operator or gateman. This operator brings the barrier from a horizontal position to a vertical one, where it remains until the pawl interlocking the wheels is removed. The barrier and counter-weights are so journaled upon the shaft that their centers of gravity will not pass through it, but lie to the side of the shaft next the crossing, so that when left to themselves the part above the shaft of the barrier, preponderating over that below the shaft or the counter-weight, brings both to a horizontal position. From this position the barrier is brought to a vertical position, after the manner described, by the descent of the weight lifted for this purpose by the passing train. The operator has control of the escapement in the standard referred to by means of a rope or chain leading therefrom to the operating-station. This escapement consists, essentially, of two pawls, one of which drops into place upon the rigidly-mounted wheel as soon as the barrier is lowered, preventing it from rising immediately after the weight suspended over the loosely-mounted wheel has been lifted, or, in other words, preventing the backward movement of the weight, wheels, and barrier until said pawl has been thrown out of its position. The second pawl is upon the face of the rigidly-mounted wheel, and is pressed against by the tooth on the loosely-mounted wheel in raising the barrier. This pawl, remaining in such position after the barrier has been lifted, prevents its descent until it in turn is thrown out of this position and the wheels disengaged. These pawls, being suitably connected with a lever, may be thrown alternately out of position as the lever is moved to the right or left, to which the rope or chain leading to the operating-station is connected. The same rope thus secured to the lever continues in an opposite direction, and terminates in the standard with a weight. This weight is provided with a second chain or rope secured to a small wheel keyed upon the main shaft, so that when the shaft rotates in elevating the barrier the weight will be lifted, thereby causing slack in the rope which connects the weight with the lever. When it is desired to lower the barrier, the operator pulls the rope connected with the lever, thereby drawing it to the side a distance equal to the slack in the rope connecting the lever with the weight. The rope thus taut is secured. The barrier, then descending, rotates the shaft, and consequently the small wheel thereon, allowing the lever-weight to remain suspended from the rope connected with the lever, instead of that connected with the main shaft. When it is desired to again raise the barrier, the operator frees the rope, permitting the lever-weight to draw the lever back to its original position, by which movement the pawl in gear with the rigidly-mounted wheel is disengaged and the barrier is carried up. The small wheel upon the main shaft, rotating with the upward movement of the barrier, again lifts the lever-weight, making the rope connecting it with the lever slack, so that the lever may be thrown by the operator to lower the barrier, as stated.

In Figs. 8 to 11 the main standard 1 has a loosely-mounted shaft, 2, upon the extremity of which are mounted the barrier 3 and counter-weights 4. Upon the same shaft are the rigidly-mounted wheels 5 and 6 and the loosely-mounted wheel 7. Secured in a groove in the periphery of the wheel 7 is the rope or chain 8, which terminates at its lower end with the weight 9. Upon the face of the same wheel is a pin, 10, from which is suspended a rod or chain device, 11, connecting with the lever 12. The lever 12 passes out through an opening, 13, in the standard, and connects, as shown in Figs. 1 and 2, with the rails of the track. Upon the periphery of the wheel 7 is a tooth, 14,

which engages at certain times with a pawl, 15, upon the face of the wheel 5. The opposite face of the wheel 5 has a curved rib or projection, 16, about ninety degrees in length, which forms at one extremity the tooth 17. The tooth 17 at certain times engages with a pawl, 18, loosely mounted on the shaft 19. Secured to the shaft 19 is a short lever, 20, and a long lever, 21, so arranged that when the lever 21 is carried to the right the pawl 18 may drop into the tooth 17, and when the lever 21 is carried back to the left the lever 20 may lift the pawl 18 above the tooth 17. On the side of the lever 21 next to the face of the wheel 5 is a pawl, 22, so arranged as to lift the pawl 15 from the tooth 14 when the lever 21 is carried to the right. The shaft 19 is supported in bearings in the standard. Fastened to the end of the lever 21 is the rope or chain 24, which, passing to the left over the sheave 25, terminates with the weight 26, and which, leading to the right, passes over sheaves 27 and 28, to the point from which the gate is to operated. A short rope or chain, 29, has one end secured in the wheel 6, and, passing over a sheave, 30, is also secured either directly to the weight 26, or, as shown, to the rope or chain 24 at the point 31, by which arrangement the weight 26 is lifted into the position shown as the shaft 2 is rotated to the right in raising the barriers, and left in the same position suspended from the rope 24 when the barrier descends. The weight 9 has grooves 32 in opposite sides, into which fit guides 33, which serve to guide the weight and keep it from swinging or binding on the standard. The wheel 5 is provided with grooves 34, which carry the rope or chain connecting with the other barriers. Fig. 8 shows the barrier vertical and the parts in the standard occupying the relation corresponding with that position. Fig. 9 shows the barrier lowered and the parts correspondingly changed. Fig. 10 also shows the barrier lowered, but with the weight 9 lifted into place ready to restore the barrier to its vertical position, as shown in Fig. 8.

The operation is as follows: Desiring to lower the barrier, the operator draws the rope 24, carrying the lever 21 to the right, as shown in Fig. 9, disengaging the pawl 15 from the tooth 14, when the barrier 3, preponderating over its counter-weight 4, descends. In throwing the lever 21 to the right, as shown in Fig. 9, the slack shown in Fig. 8 below the sheave 30 is taken up and the rope secured by the operator. The descent of the barrier immediately follows, and the wheel 6, rotating to the left at the same time, uncoils the rope 29, allowing the weight 26 to act against the lever 21, so that if left to itself it would carry the lever from the position shown in Fig. 9 to that shown in Fig. 8; but, the rope 24 being secured at the operating-station, the lever 21 remains in the position shown in Fig. 9. As stated, when the lever 21 is carried to the right, the pawl 15 is disengaged from the wheel 7 and the barrier gravitates to a horizontal position. When the shaft 2 and wheel 5 rotate to the left, the pawl 15 will move from the position shown in Fig. 8 to that shown in Fig. 9, and the pawl 18 drops upon the tooth 17, holding the barrier. The barrier lowered as shown in Fig. 9, the train approaches and passes over the crossing, causing the lever 12 to be carried down as shown in Fig. 10, and the wheel 7 rotated to the left, lifting the weights 9 until the tooth 14 is brought from the position shown in Fig. 9 to that below the pawl 15, with which it engages to restore the barrier to a vertical position, when the weight 9 is permitted to descend. But until the pawl 18 is disengaged from the tooth 17 the barrier will remain lowered. When the train has passed over the crossing, the operator frees the rope 24 from its fastening, allowing the weight 26 to descend, carrying the lever 21 back to the position shown in Fig. 8, and causing the short lever 20 to lift the pawl 18 away from the tooth 17. The weight 8, then descending, rotates the wheels 7 and 5, interlocked by the tooth 14 and pawl 15, until the barrier 3 and weight 9 occupy the position shown in Fig. 8. As stated, when the rope 24 is freed from its fastening at the farther end, the weight 26 descends, carrying the lever 21 to the left. This releases the wheel 7 and permits the weight 9 to descend, rotating the wheels 5 and 7 together and raising the barriers. The wheel 6, being also rotated, winds the rope 29, lifting the weight 26, holding it suspended while the barrier is in a vertical position, as illustrated in Fig. 8. The weight 26, thus suspended by the rope 29, acts against the shaft instead of the lever 21, so that the latter may be thrown to the right to again lower the barrier, as previously described.

Other escapements for the wheels 5 and 7 may be employed instead of the one shown, and may be operated by electrical, hydraulic, pneumatic, or other devices, either through the direct agency of an operator or automatically.

The construction shown may be departed from in other ways without affecting the nature of the invention. The rope 8, instead of being secured to a weight, 9, may be secured to a spring of suitable form fixed to the side or bottom of the standard, and which, after being carried out of its normal position by the depression or elevation of the lever 12, will in its recovery perform the same offices as the weight 9.

While the barrier and counter-weight have been considered as so arranged that the weight of the former will preponderate over the latter, such arrangement, though preferable, is not essential. The parts named may be so journaled upon the shaft 2 that the counter-weight will preponderate so as to carry the barrier to a vertical position, in which event the weight 9 would be suspended upon the wheel 7 to the left of the shaft, the pawl 15 and tooth 14 arranged to engage in rotating to the left, the device 11 would be suspended

from the wheel 7 at the right of the shaft 2, and the escapement for the wheels 5 and 7 modified to suit each construction.

My invention enables me to utilize the weight of the moving train in raising the operating-weight to its effective position, thereby dispensing with manual labor for this purpose, and is cheap, simple, and efficient. It constitutes one of the steps toward the attainment of an automatic system of operating crossing-gates, and is designed to be used in connection with the electrically-operated gates and electric circuits applications for patents for which have heretofore been filed.

Fig. 7 shows two barriers with their standards, a section of track, and the track-levers leading therefrom to the main standard. The latter may contain the construction shown, or it may contain any of my previously-devised mechanisms shown in other applications now on file, capable by the proper track-connections of automatically lowering the barrier when the train has entered upon a certain section of track lying between it and the crossing, and of raising the same when the crossing has been passed. In such case the power necessary may be both automatically obtained and applied by the employment of the track-lever arrangement shown, and at the same time simplification of construction attained over the other constructions referred to by dispensing with a weight standard, winding device, connections therefrom with the main standard, and certain sprocket and ratchet wheels in the main standard over which said connections pass.

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

1. The combination, with the pivoted tied rails *a a*, of the transverse spring-plate *d* and a pivoted lever actuated by the vertical play of the rails, substantially as and for the purposes specified.

2. The combination, with the pivoted tied rails *a a*, of chairs having extended vertical guide-faces g^2 and inwardly-projecting heads g', which limit the upward movement of the rails, and a pivoted lever actuated by the rise and fall of the rails, substantially as and for the purposes specified.

3. The combination of the pivoted tied rails *a a*, the transverse spring-plate *d*, arranged below the same, guide-chairs *g*, having the extended vertical guide-faces and inwardly-projecting stop or head g', and a pivoted lever actuated by the vertical movement of the rails, substantially as and for the purposes specified.

4. The combination of the rails *a b*, capable of a vertical movement, with tie-bar *e*, lever g^5, and lever 12, substantially as and for the purposes described.

5. The combination of the rails *a b*, capable of a vertical movement, with tie-bar *e*, levers 12, g^5, g^6, and g^3, and tie-bar e^2, substantially as and for the purposes described.

6. The combination of railroad-rails having a limited vertical movement with the weight-pulley of a railroad-crossing gate, and an intermediate system of levers for transmitting the movement of the rails to the weight-pulley for the purpose of raising the weight for operating the barrier, substantially as and for the purposes described.

7. The combination of railroad-rails having a limited vertical movement with the operating weight-pulley of a railroad-crossing gate, an intermediate system of levers for transmitting the movement of the rails to the weight-pulley, and a stop mechanism for releasing the weight-pulley to permit the weight to fall and actuate the gate, substantially as and for the purposes described.

8. The combination of the following elements: railroad-rails having a limited vertical movement, the weight-operating pulley of a railroad-crossing gate mounted loosely on the barrier-shaft, devices for transmitting the movement of the rails to the weight-pulley for the purpose of raising the weight, devices for connecting the weight-pulley to the barrier-shaft, stops for sustaining the weight in a raised position, and a trip mechanism for releasing the weight to permit it to fall and operate the barrier, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 18th day of January, A. D. 1884.

OLIVER H. CLARK.

Witnesses:
W. B. CORWIN,
THOMAS B. KERR.