(No Model.) 4 Sheets—Sheet 1.

J. BOLT.

AUTOMATIC RAILROAD GATE.

No. 457,247. Patented Aug. 4, 1891.

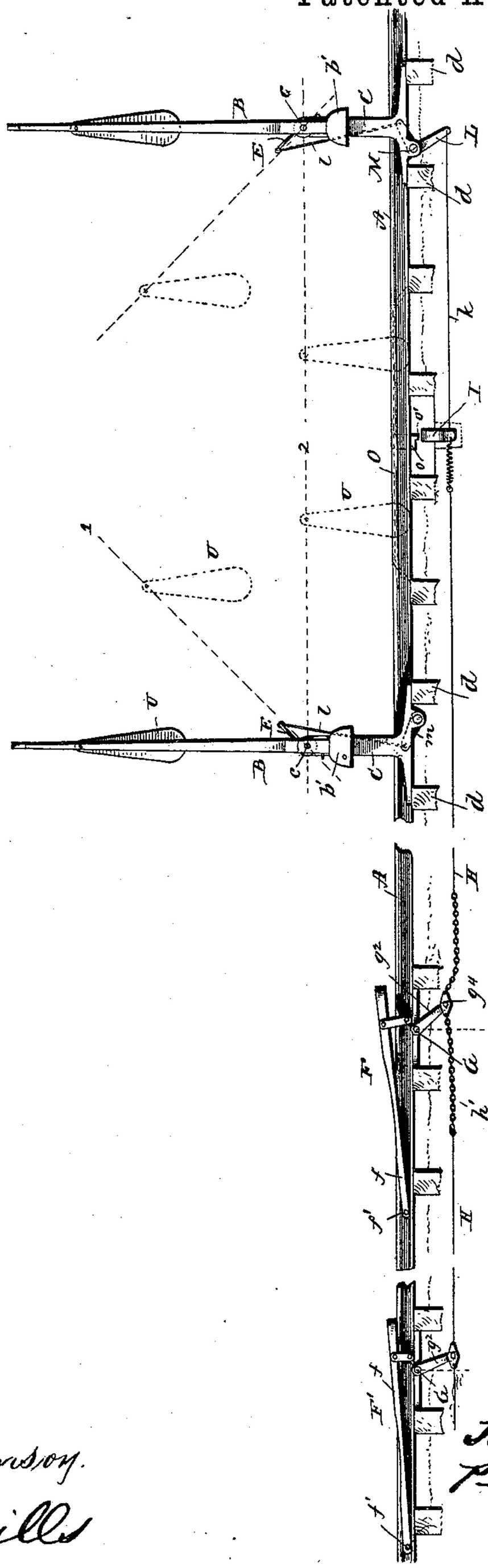

Fig. 1.

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Attorney.

(No Model.) 4 Sheets—Sheet 2.

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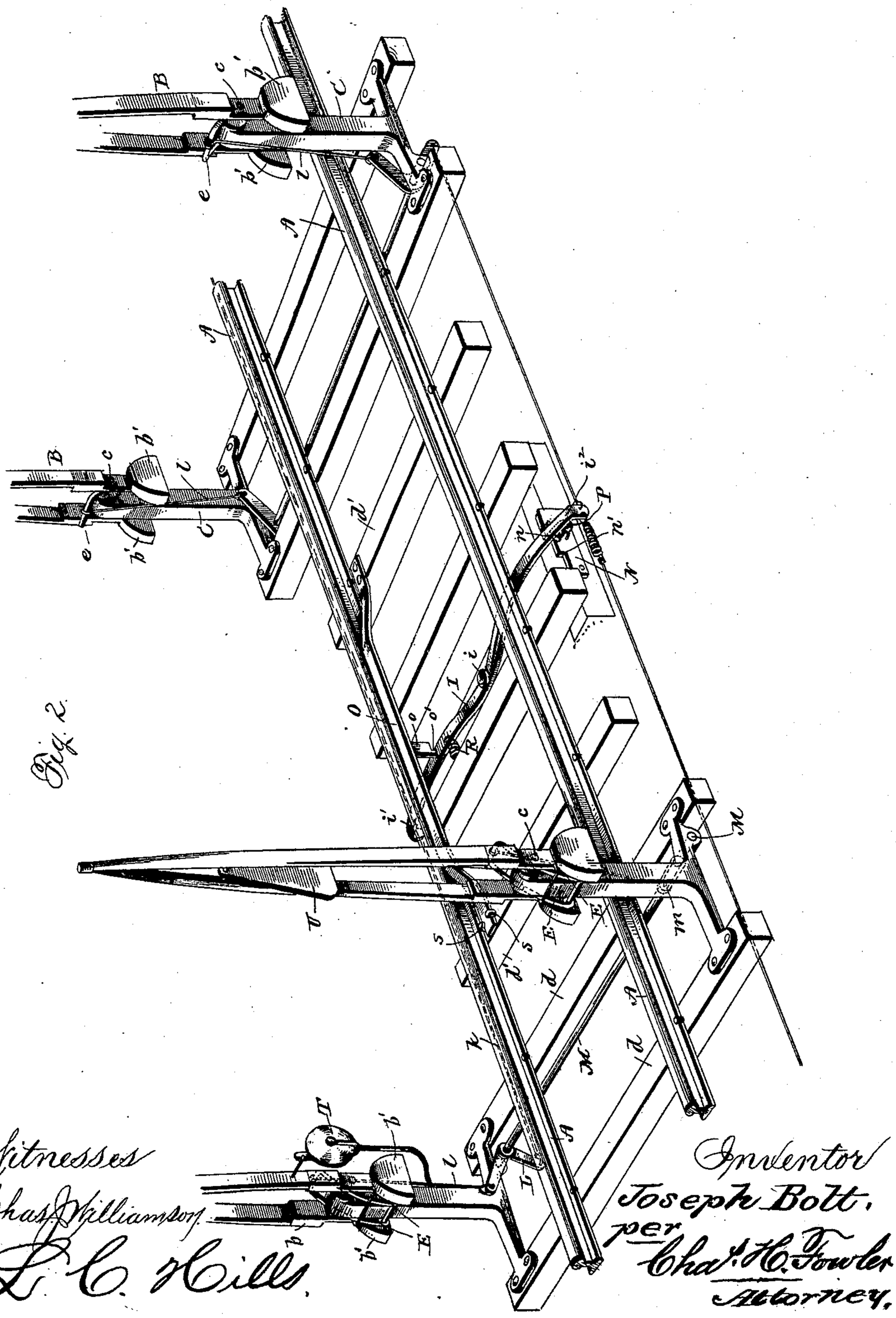

Fig. 2.

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AUTOMATIC RAILROAD GATE.

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Fig. 3.

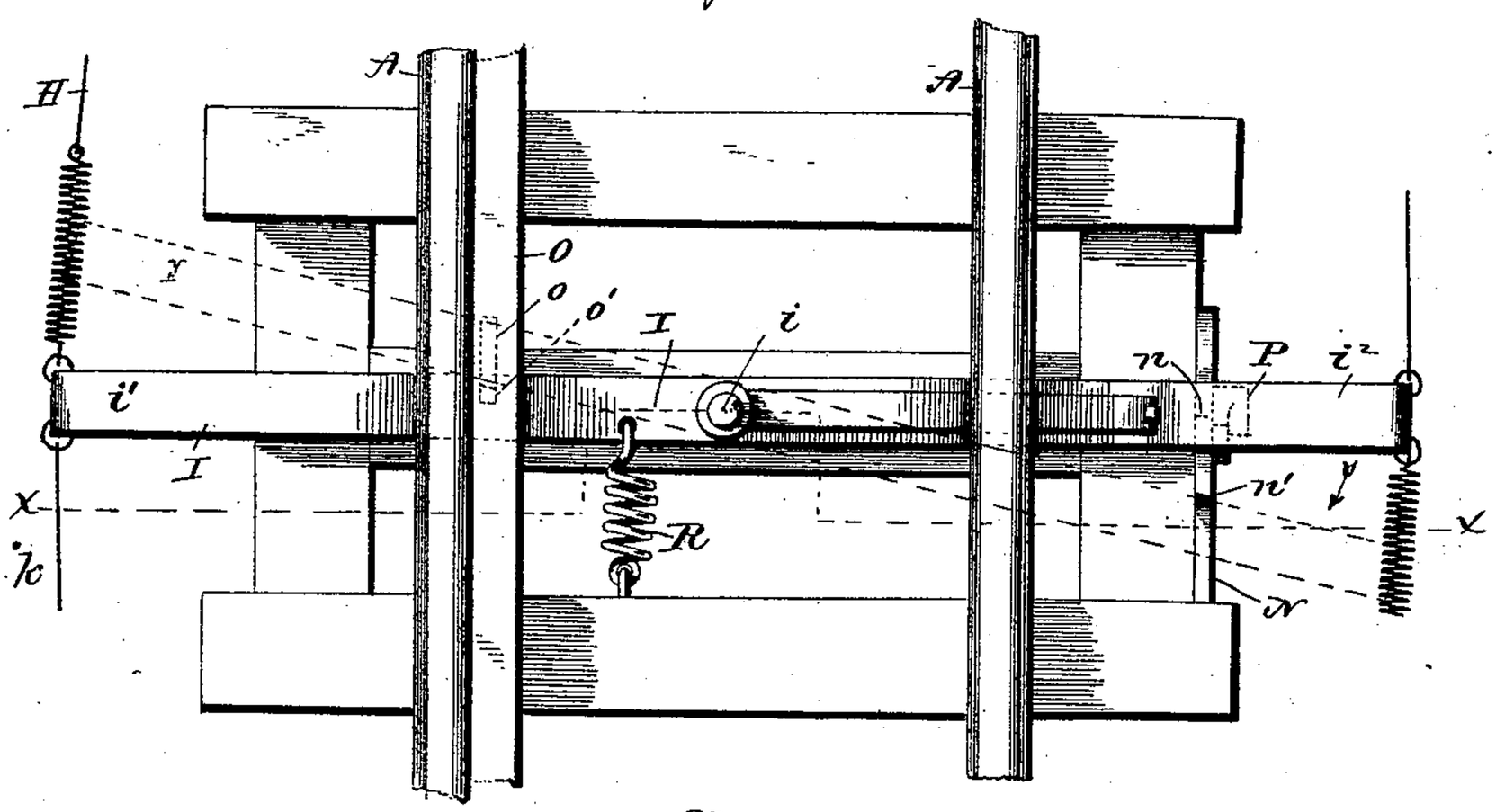


Fig. 4.

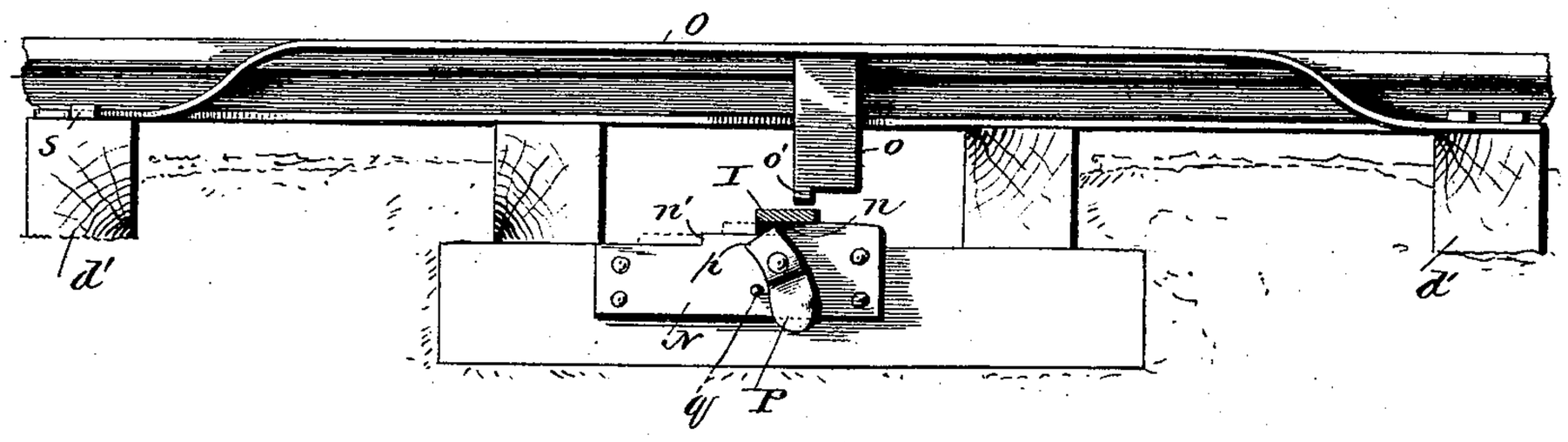
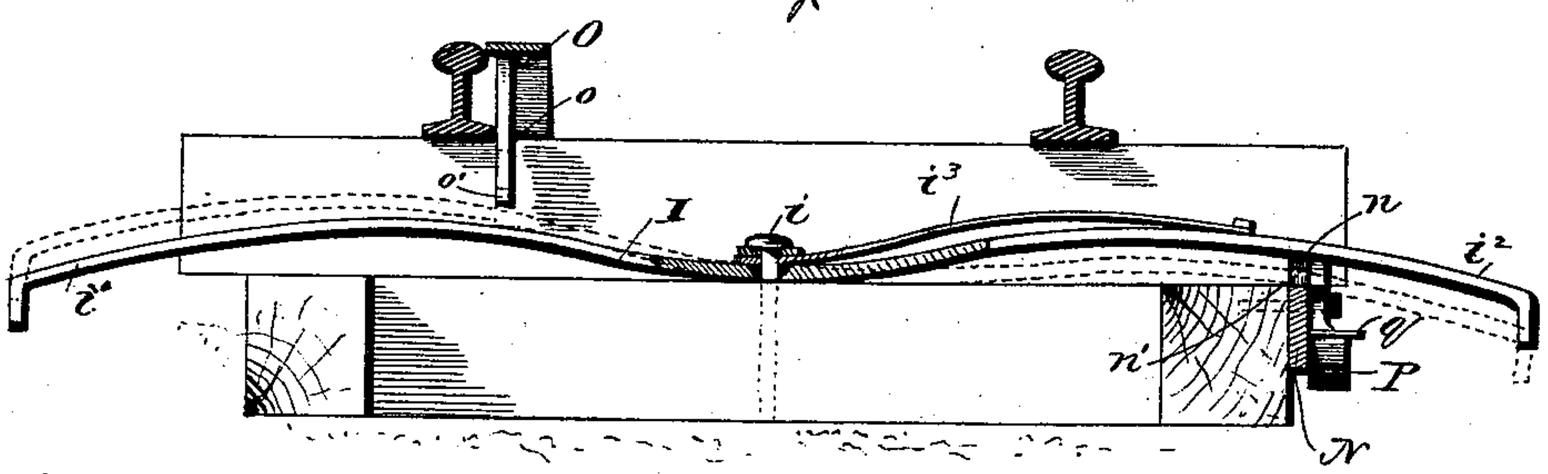


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

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AUTOMATIC RAILROAD GATE.

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Fig. 6

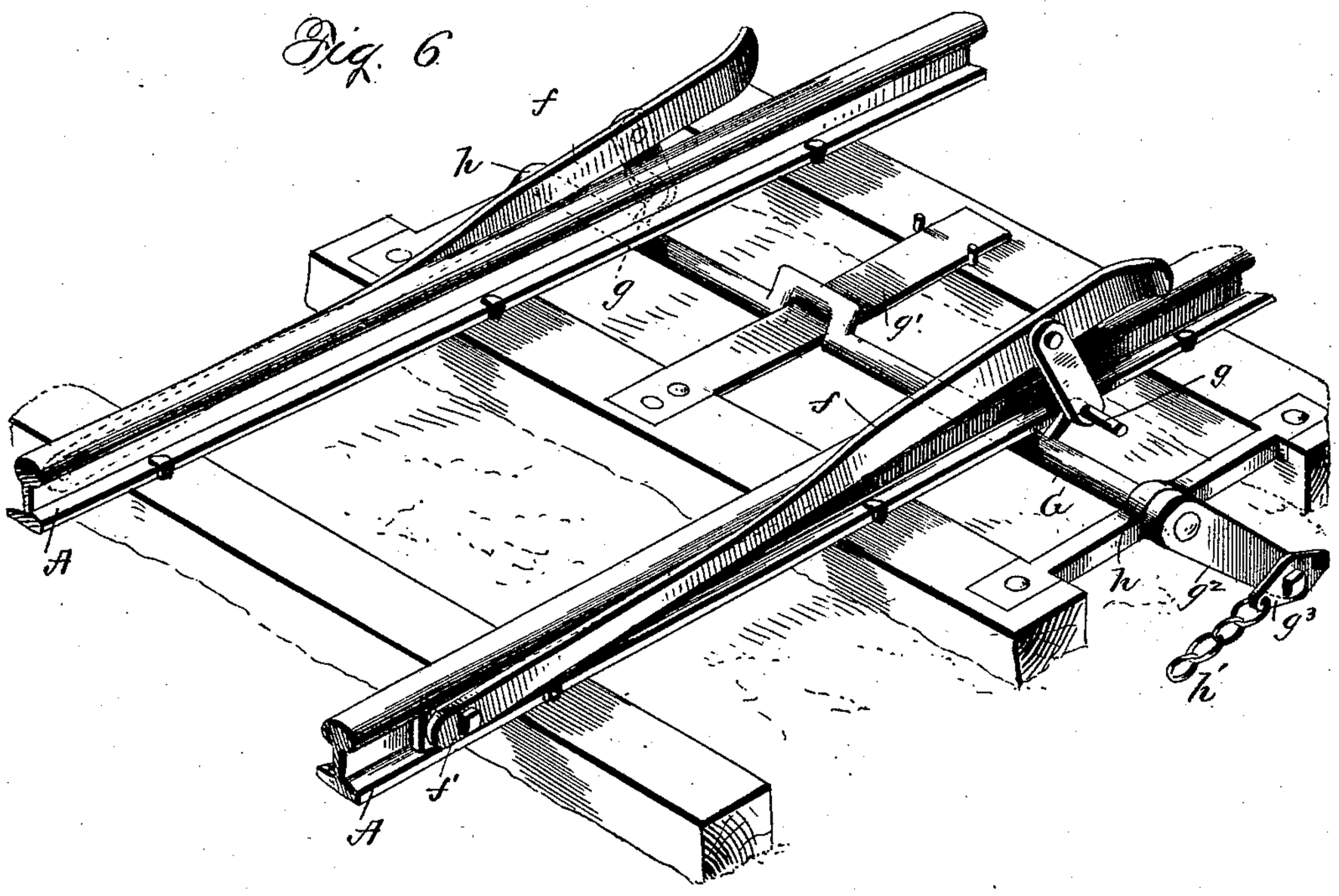


Fig. 7

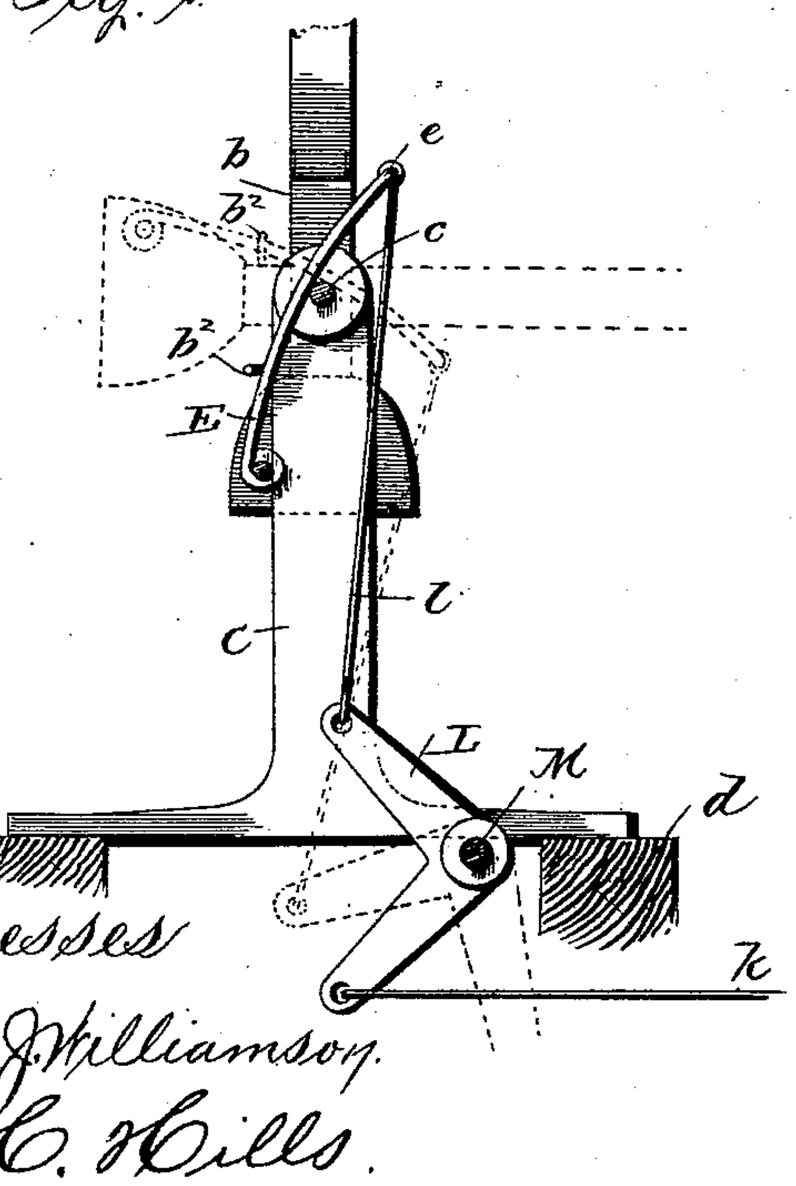
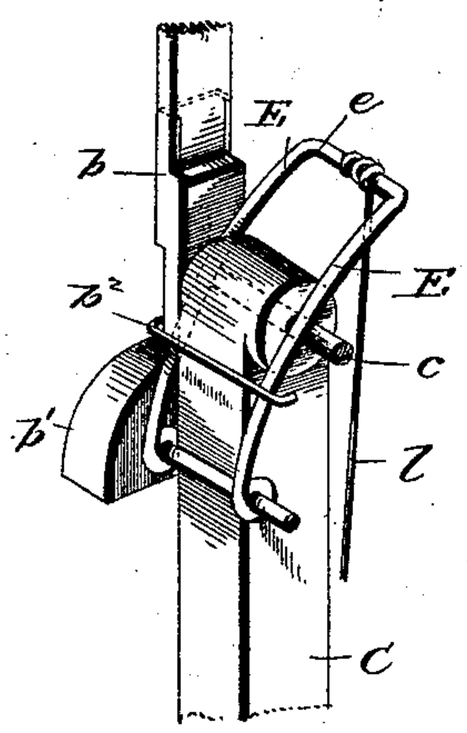


Fig. 8



Witnesses
Chas. J. Williamson.
L. C. Hills.

Inventor
Joseph Bolt.
per Chas. H. Fowler

UNITED STATES PATENT OFFICE.

JOSEPH BOLT, OF POTTSVILLE, PENNSYLVANIA.

AUTOMATIC RAILROAD-GATE.

SPECIFICATION forming part of Letters Patent No. 457,247, dated August 4, 1891.

Application filed November 25, 1890. Serial No. 372,630. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BOLT, a citizen of the United States, residing at Pottsville, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Railroad-Gates; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon.

My invention relates to gates for use at railroad-crossings to close or bar the same during the passage of trains, and more especially to that class of gates which are operated automatically by passing trains; and it has for its object to improve and simplify their construction and to render them more satisfactory and efficient in operation.

With this object in view said invention consists in the construction, combination, and arrangement of parts, as hereinafter specified and claimed.

In the accompanying drawings, Figure 1 is a side elevation showing a section of railroad equipped with my crossing-gates. Fig. 2 is a perspective view of the mechanism employed at the crossing. Fig. 3 is a plan view of the gate locking and releasing mechanism. Fig. 4 is an elevation thereof, one of the track-rails being removed. Fig. 5 is a transverse section on the line *x x* of Fig. 3. Fig. 6 is a perspective view of one of the wheel-engaging mechanisms for imparting a partial movement to the gates, and Figs. 7 and 8 are detail views.

It has been my special aim to invent a gate whose lowering or closing shall be done slowly, so that timely warning of its movement may be given persons in vehicles approaching or upon the track at the commencement thereof and opportunity had for the exercise of care, or escape in the latter instance, before the complete closing.

I wish it understood that as features of my device are applicable to gates other than automatic, and to other automatic gates than those of the above special character, I deem myself at liberty to make such application, as I regard the same to be within the scope of my invention.

As shown in the drawings, my invention is applied to a line of single tracks composed of the rails A A, at a crossing of which are provided the two sets of pivoted swinging gates B, B, B, and B—four in number—the gates of one set being arranged directly opposite those of the other, and adapted to swing on their pivots each toward the opposite one to close or bar the way, in this respect being similar to gates commonly used. Said gates may be of any desirable form and construction; but I prefer that shown, which consists of a light structure composed of two pieces of wood bowed or bent so as to come together and be united at their upper or outer ends and separated or forked at their lower or inner ends sufficiently to embrace their supporting-standards C, C, C, and C. These latter, as shown, are mounted on the extended ends of the cross-ties *d d*, to which they are securely fastened by bolts or otherwise. At its upper end each of said standards carries a pivot pin or shaft *c*, whose ends project beyond the sides thereof into the parts of the gate which extend down over or embrace said standard, and so form for said gate the pivotal support on which it may be turned or swung. Preferably the lower ends of the two pieces of wood which form a gate are contained within metal sockets *b b*, provided with openings in which the ends of said pivot-pins *c* are journaled. Suitable weights *b' b'* are attached to each divergent or forked end of each gate, of such gravity as to open or raise the gate to and maintain it in a vertical position, without at the same time, of course, being so heavy as to offer an impediment to an easy closing or lowering.

In order to apply my power to close or lower the gates most advantageously and to relieve the same of the strain incident to raising the weights *b' b'*, which would ensue from attaching the operating devices to be hereinafter described directly to said gates at a point on the side of the pivots opposite said weights, I connect such operating devices to the weights themselves or to parts adjacent thereto on the same side of the pivots, so as to apply the power directly to them. This I do in the present instance by means of two rods E E, connected one each at one end to one of said weights and passed between the side of the standard C and the

gate part adjacent thereto, a space between said parts being provided for the purpose. Said rods on the other side of the standard opposite the weights are connected together at *e* by a cross bar or piece, so that they form a substantially U-shaped piece. These rods or levers E E rest upon the pivot-pin *c*, and rock upon the same as their fulcrum for raising the weights to lower the gates.

The downward or closing movement of the gates I effect automatically by providing at points suitably distant from the crossing to be barred devices adapted to be engaged and operated by the passing car-wheels, and as a feature of my invention is to close the gates by several or a series of movements, instead of one continuous movement, I have provided a series of such wheel-engaging devices to be successively acted upon. The gates, as shown in the drawings, are designed to be closed by but two movements, and hence but two of such devices are shown, and they are designated, respectively, F and F′, (see Fig. 1,) the former being placed farthest from the crossing. Said devices, except in particulars hereinafter pointed out, are substantially alike, and, as clearly shown in Fig. 6, consist each of two similarly-shaped bars *f f*, pivotally secured at their ends *f′* away from the crossing to the rails A on the outer sides thereof and in a position so as to project normally above the top face thereof, where they can be engaged by the tread of the wheels of passing cars. Near their free ends said bars are connected by links to cranks *g g*, that are provided upon a transverse rock-shaft G, which is placed beneath the rails and supported in suitable bearings *h h*, bolted or otherwise secured to the ends of the cross-ties or sleepers. Said rock-shaft G is cranked at its transverse center for engagement by a flat spring *g′*, secured at one end to an adjacent tie, but whose other end is free, whose function is to co-operate with said cranked rock-shaft and connected parts to restore said wheel-engaging levers to and maintain them in their normal position of projection above the upper face of the rail. It will be observed that the free ends of said levers are curved outwardly and that their upper edges from a point about one-third the distance from said ends toward their pivoted ends are cut away. The object of these constructions will hereinafter appear.

Each rock-shaft G at one end carries a crank-arm g^2, to which is connected a rod or wire H. That in the case of the device farthest from the crossing is connected to the crank-arm of the other device, while from the latter the rod is connected to a lever I, arranged across the track midway between the gates at the crossing, where at its transverse center it is secured beneath the rails to a suitable beam or support by attaching means, such as the bolt *i*, which permits it to oscillate in a horizontal plane and to a limited extent in a vertical plane. As shown, its ends on each side extend beyond the track, and to one *i′* is connected the wire or rod which extends from the second crank-arm g^2. This connection, however, is not direct, but is through a short length of coil-spring, which is at one end attached to said lever end and at its other to the rod or wire, which spring is provided to operate as a cushion to sustain sudden shocks or jars to which this mechanism is likely to be subjected. Said lever end *i′* has also connected to it one end of a second wire or rod *k*, extending alongside the track, whose other end is attached to an arm of a bell-crank lever L, mounted on a transverse shaft M, arranged below the rails of the track in boxings provided on the gate-supporting standards C C. The other arm of the bell-crank lever L is by means of a rod *l* connected to the connecting cross-piece *e* of the gate-operating rods E E. At its opposite end, adjacent to the gate immediately across the track, the shaft M carries a crank-arm *m*, connected to the operating-rods of said gate in precisely the same manner. The other two gates are connected to the other end i^2 of the lever I by exactly similar mechanism, and a series of wheel-engaging gate-operating devices and connections to said lever I are of course provided on the side of the crossing opposite to those above described for moving the gates by trains coming in the direction from such side; but as such mechanisms in all respects are similar to those described no further special description thereof is deemed to be necessary.

Beneath one of the ends of the lever I—that in the present construction designated *i′*—is a plate N, having on its upper edge two ratchet-like teeth or projections *n n′*, which are adapted successively to engage with and lock said lever when swung on its pivot in the direction of the arrow, Fig. 3, to the position shown in dotted lines through the instrumentality of the devices connected thereto and operated by the passing car-wheels. When engaged by the last tooth *n′*, it is released therefrom by means of a projection *o*, extending from the under side of a flat spring-plate O, arranged adjacent to the inner side of one of the track-rails, so as to be in position to be engaged and depressed by the flange of a passing car-wheel, carrying with it, of course, when moved, said projection *o*. The teeth *n n′*, as will be noted, stand in different horizontal planes, the latter being in the lower, and this necessitates the hereinbefore-mentioned vertical movement of the lever I in order that its end may be put in engagement with said teeth. Its release is therefore to be effected by rocking it, so as to lift it clear of said teeth, and this is done through the agency of the depression of the spring-plate O and the projection *o*, carried thereby, the latter by such depression being caused to bear upon said lever at a point on the side of its pivot opposite the tooth-engaged end, thereby rocking the same and lift-

ing its end clear of the locking-tooth. Upon its disengagement from the last tooth n' it is prevented on its return movement to its normal position from being caught on the other tooth n by a pivoted, weighted, or spring-actuated pawl or dog P, arranged on the side of the ratchet-plate N adjacent to the notch n. Said pawl has its upper face inclined at such an angle that the lever end on its return movement will engage with and be guided thereby up past the abrupt face of the tooth. Movement of the pawl under these circumstances is prevented by a pin q, which engages with it to limit its motion in one direction; but it is free to have such motion on its pivot in an opposite direction as will enable the lever end i^2 to swing it out of the way, so as to engage with the locking-tooth n.

Inasmuch as the gates must be kept down or closed during the passage by the crossing of the whole train, their opening or raising instantly on the releasing or unlocking of the lever I must be prevented. This I accomplish by providing a downwardly-projecting lug or tooth o' on one side of the projection o, which, as the latter is depressed, passes down beside the edge of lever I in position to engage the same before the under face of the projection o engages with the upper face of said lever to release its tooth-engaged end. Therefore as soon as said lever is so released it will be engaged by said tooth o' and prevented from swinging, said tooth, of course, engaging it on the side in the direction in which it tends to move by reason of the return of the gates from their lowered or closed position to their raised or opened position. This tooth o', it is to be observed, is so arranged that it will not immediately engage the edge of lever I when the projection o is depressed; but preferably it is located so that the lever, after being released from the tooth of the ratchet-plate N, will have a slight movement in a horizontal plane before being caught thereby, so that the tooth-engaging end of said lever may move to one side of said ratchet-tooth in order to obviate the possibility of said lever, after being disengaged, becoming re-engaged by said tooth.

To insure a downward movement of the tooth-engaging end i^2 of the lever I, the same may be weighted, or a flat spring i^3 may be provided having one end fixed at the pivot thereof and its other end bearing upon the upper side of said lever, while to cause its return to its normal position after being unlocked a spring R may be provided to supplement the weights b', attached to the gates, for it is mainly through the latter that the return movement is effected. Said spring is preferably a stout coiled one, with one end attached to the lever at an appropriate place and its other to an adjacent tie or sleeper. The lever-releasing plate O is of considerable length and has its ends curved downward to rest upon the ties d' d', one of these ends being firmly secured to its tie while the other is loosely confined between the two spikes or pins s s, so as to have some degree of longitudinal movement needful to enable it to yield under the weight of the car-wheels. The heads of the spikes overhang the upper face of the plate to hold it to its place on the tie. It is to be noted that the wire or rod H which extends from the crank-arm g^2 of the wheel-engaging gate-operating device F' farthest from the crossing is not connected directly to the crank-arm g^2 of the other such device, but to an end of a short section of chain h', whose other end is connected to said crank. The object of this will appear hereinafter; also, preferably, swiveled blocks g^3 are provided on the ends of said crank-arms, to which the wires or rods and chains are connected.

A suitable bell or gong T, aranged to be operated by the gate near or upon which it is placed, is usually provided, while a signal to affect the sight, composed of a large piece U, is pivoted at one end to each gate near the outer end thereof. This device is disposed in the space between the strips or bars forming the gate, and is almost concealed thereby when the gate is in a vertical position, but when the same is lowered automatically by reason of its gravity comes plainly into view. It may be made of such length as to touch the ground when the gate is lowered, and so serve as a support for the same.

The operation of my apparatus as shown and described is as follows: With the parts in the position seen in Fig. 1 a moving train on coming to the first gate-operating device F will by the engagement of the treads of its car-wheels with the levers f depress the same and through the crank g rock the shaft and swing the crank-arm g^2. This movement of the latter, through the above-described connections to the lever I, will turn the latter on its pivot until its tooth, engaging end i^2 falls into engagement with the tooth n on the ratchet-plate. Through the connections between said lever and the gates the latter will be lowered through approximately one-half of the limit of their motion to the point indicated by the dotted line 1, and there held. This position of the parts will continue until the train reaches the second gate-operating device, when, by the engagement therewith, the lowering of the gates to the dotted line 2 will be completed, and they locked by the completion of the movement of the lever I and its engagement with the tooth n'. When the train arrives at the crossing, and the flange of the first car-wheel engages the spring-plate O, the same will be depressed, and by the contact of the projection o with the lever I release or unlock the latter from the tooth n'; but by reason of the provision of the tooth o' on the projection o, just so long as there are any wheels engaging with and passing over said plate the gates cannot be raised, as movement of the lever I will be prevented, as hereinbefore set forth. As soon as the last car-

wheel passes off the plate O, the latter will rise, the lever will be released and the gates through the operation of the weights will return to and remain in their raised positions. Their movement when they reach a vertical position is stopped by the engagement with the standard of the rod, which passes from one weight b' to the other, and to which the levers E are attached. The crank-arm g^2 of the nearer gate-operating device F, as will be readily understood, must have twice the movement of the crank-arm of the other device, and the wheel-engaging levers must project twice the distance above the face of the rails, because of the connection between the said devices. Hence when the crank-arm of the device F′ farthest from the crossing moves from the position shown in full lines to the dotted line the crank-arm of the other device will move just one-half the distance from its position, as shown in full lines, to the dotted line, and when the wheel-engaging levers of the former device are pressed down flush with the rail the levers of the latter device will still be left above the face of the rail. This expedient enables one line of connection to the lever I to be used instead of having a line from each device. The section of chain h' or its equivalent before referred to is obviously needed in order that the second gate-operating device may in its turn readily operate, for were the entire connection between the cranks a continuous piece of rigid or stiff wire movement of the second operated crank would be difficult and result in cramping the wire, or some provision would be necessary to be made to allow for movement of the wire and the first gate-operating device. To prevent trains after having passed a crossing from operating the levers $f\,f$ of the gate-operating devices and so again lowering the gates, their free ends are, as has been described, curved outwardly, so that the inner sides and not the top edges will be engaged by a car-wheel and said levers moved laterally outward or spread apart, such movement being rendered possible by making them somewhat resilient or springy. In order that the car-wheels may pass out of contact with said levers before getting too close to the points of pivotal attachment to the rails, thereby subjecting them to great strain if not breaking them, the expedient before mentioned is resorted to of dropping their upper edges below the face of the rail by cutting them away or bending them or in whatever way it may be conveniently done. The cranks g on the shaft G are of such length as not to render possible the disengagement therefrom of the levers when "spread" apart or moved laterally, as above set forth. To limit the downward movement or lowering of a gate, which movement might continue after the operating mechanism has come to rest by reason of the weight or gravity of the gate, and to support the same when lowered, the rod l, connecting the levers or rods E E to the crank m of the shaft M, is made somewhat stiff or rigid and a loop or bar b^2, attached to the gate parts where they embrace the standard, so as to extend across from one part to the other, is provided, which is adapted to engage with said levers or rods E when the parts occupy the position shown in dotted lines in Fig. 7. It will be seen that by this construction, when the crank-shaft M has ceased to move, if any tendency exists on the part of the gate to continue downward, which will of course be accompanied by a tendency upward of the weighted part b', the loop or bar b^2 will engage with the levers E and, in conjunction with the rod l, hold the levers E (which merely rest upon the pivot c) down upon the pivot c, and so arrest such downward tendency of the gate. Otherwise, as the bars or levers E rest but loosely on the pivot c, nothing would prevent their being raised by the upward movement of the weighted end of the gate, turning as they would on their connection with the rod l. The levers or bars E are preferably made yielding or spring to some degree in order to avoid injuries from sudden jars or shocks.

It will be understood that in practice such parts of the mechanism as can be housed or inclosed will be so protected. Such housing, for the sake of clearness in illustration, however, has been omitted.

While I have shown my apparatus as applied to a line of single track, it will of course be understood that it can be as readily applied to lines of road where double tracks are used, and that where but one set of gates are needed, as at narrow crossings, the other opposite set can be dispensed with.

When desired, the gates may be closed by a succession of more than two movements simply by increasing the number of the wheel-engaging devices and providing additional locking-teeth on the ratchet-plate N. Such changes as these involve no departure from my invention.

What I claim is—

1. In a railroad-gate, in combination with gates on opposite sides of a crossing, a lever pivoted on a vertical axis at a point between said gates, connections between them and the lever, a series of wheel-engaging gate-operating devices, connections between the latter and said lever, and suitable means to lock the gates through the medium of the lever at the point at which they may be left by the movement of each one of said series of operating devices, substantially as and for the purpose specified.

2. In an automatic railroad-gate, in combination with a gate and mechanism for operating the same, a pivoted locking and releasing lever, movable both horizontally and vertically, connected to said mechanism, and suitable locking and releasing devices to co-operate with said lever, substantially as specified.

3. In an automatic railroad-gate, in combination, pivoted gates on opposite sides of a crossing, a pivoted lever oscillating in horizontal and vertical planes, locking and releasing devices to co-operate with said lever at its opposite ends, and the gate-moving mechanism connected to said lever, substantially as shown.

4. In an automatically-operated device to bar railroad-crossings, the pivoted gates on opposite sides of the track, the connections between the same for moving them simultaneously, the pivoted locking and releasing lever, the ratchet-teeth for engaging the latter, the depressible plate for releasing the same, the connections between said lever and the gates, and the wheel-engaged gate-operating devices connected with said lever, substantially as set forth.

5. In combination, the gate or gates, the pivoted lever connected therewith, devices for operating said lever, the ratchet-teeth for successively locking the same, a device for unlocking it from the last of said teeth, and the dog or pawl to prevent re-engagement with said teeth on its being unlocked, substantially as described.

6. In combination, the gate or gates, the pivoted lever connected therewith, devices for operating said lever, the locking device for the same, and the releasing device consisting of a depressible plate having a portion to engage said lever on being depressed, substantially as shown.

7. In combination, the gate or gates, the pivoted lever connected therewith, devices for operating said lever, the locking device for the same, and the releasing device consisting of a depressible plate, a projection or lug on its under side, and a tooth on the lug, substantially as shown.

8. In combination, the pivoted gate or gates, the pivoted lever connected therewith, capable of horizontal and vertical movement, the ratchet-teeth for successively locking the same, a depressible plate carrying a lug provided with a tooth for releasing said lever from the last ratchet-tooth, and the pivoted pawl having an inclined face to prevent re-engagement with the teeth, substantially as shown.

9. In combination with the gates, their operating mechanism, and the oscillatory locking-lever forming a part of such mechanism, a depressible releasing-plate to engage said lever, made springy and having one end fixed and the other free, substantially as specified.

10. In combination with a gate having a weighted end, a lever rocking upon the gate-pivot independently of the gate and having one end connected to said weighted end of the gate, and the operating devices connected to said lever, substantially as shown.

11. In combination with a pivoted gate carrying a weight, a standard for the gate, arranged so as to have a space between its sides and the sides of the gate, a U-shaped lever whose arms pass through such spaces and are attached to or adjacent to the weight, being fulcrumed on the gate-pivot, and the operating devices connected to said lever, substantially as specified.

12. In combination with a pivoted gate carrying a weight, a lever fulcrumed on the gate-pivot and having one end attached to or adjacent to said weight, the stop device on the gate for engaging said lever, the operating-shaft, the crank thereon, and the rod between the latter and said lever, substantially as shown.

13. In combination, the pivoted gates on opposite sides of the track, the shaft carrying at one end a crank-arm which is connected to one of said gates and at its other end a bell-crank connected to the other gate, a pivoted lever located at a point between the gates, connections between it and the bell-crank, and connections between said lever and operating devices, substantially as shown.

14. In a railroad-gate, in combination with gates on opposite sides of a crossing, a lever pivoted on a vertical axis between said gates, connections between them and the lever, a series of wheel-engaged devices consisting each of sets of levers adapted to be depressed by trains moving in one direction and spread laterally by trains moving in a reverse direction, the connections between said levers and the lever on a vertical axis, and suitable means to lock the latter lever at each depressing operation of a wheel-engaged device, substantially as shown.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

JOSEPH BOLT.

Witnesses:
J. W. MOYER,
JOHN H. WILLIAMS.