(No Model.) 6 Sheets—Sheet 1.

G. A. REYNOLDS.

COMBINED SIGNAL AND GATE FOR RAILROAD CROSSINGS.

No. 305,331. Patented Sept. 16, 1884.

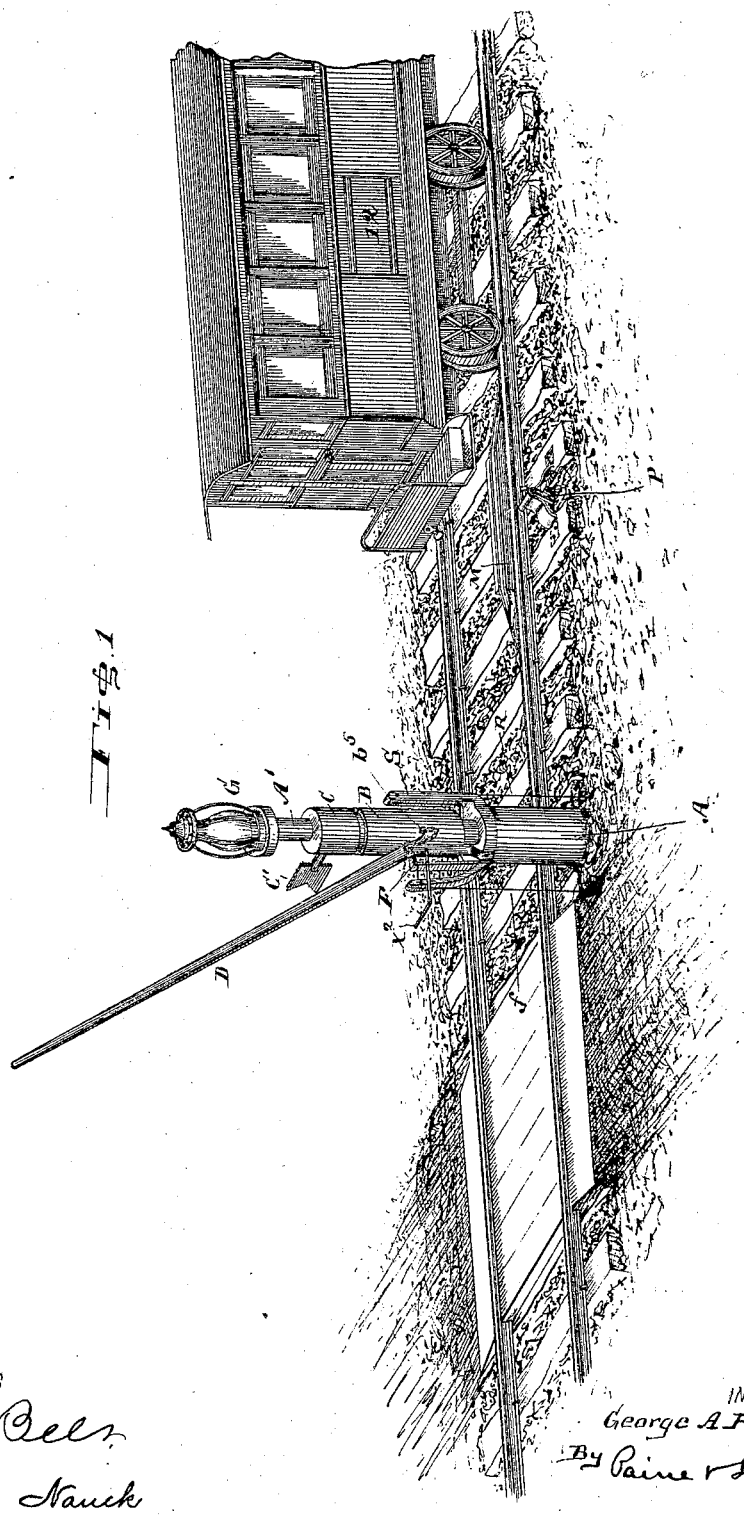

Fig. 1.

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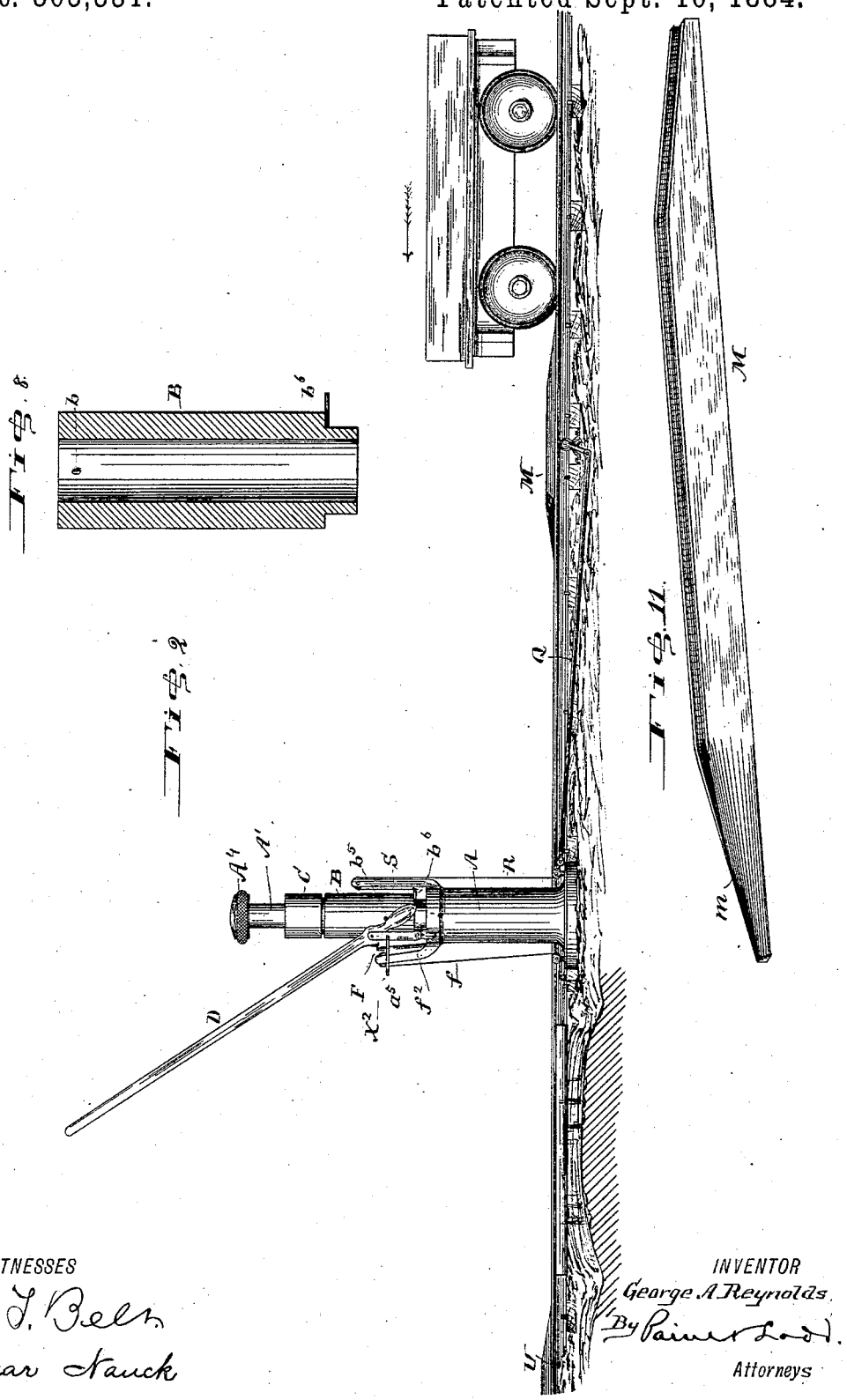

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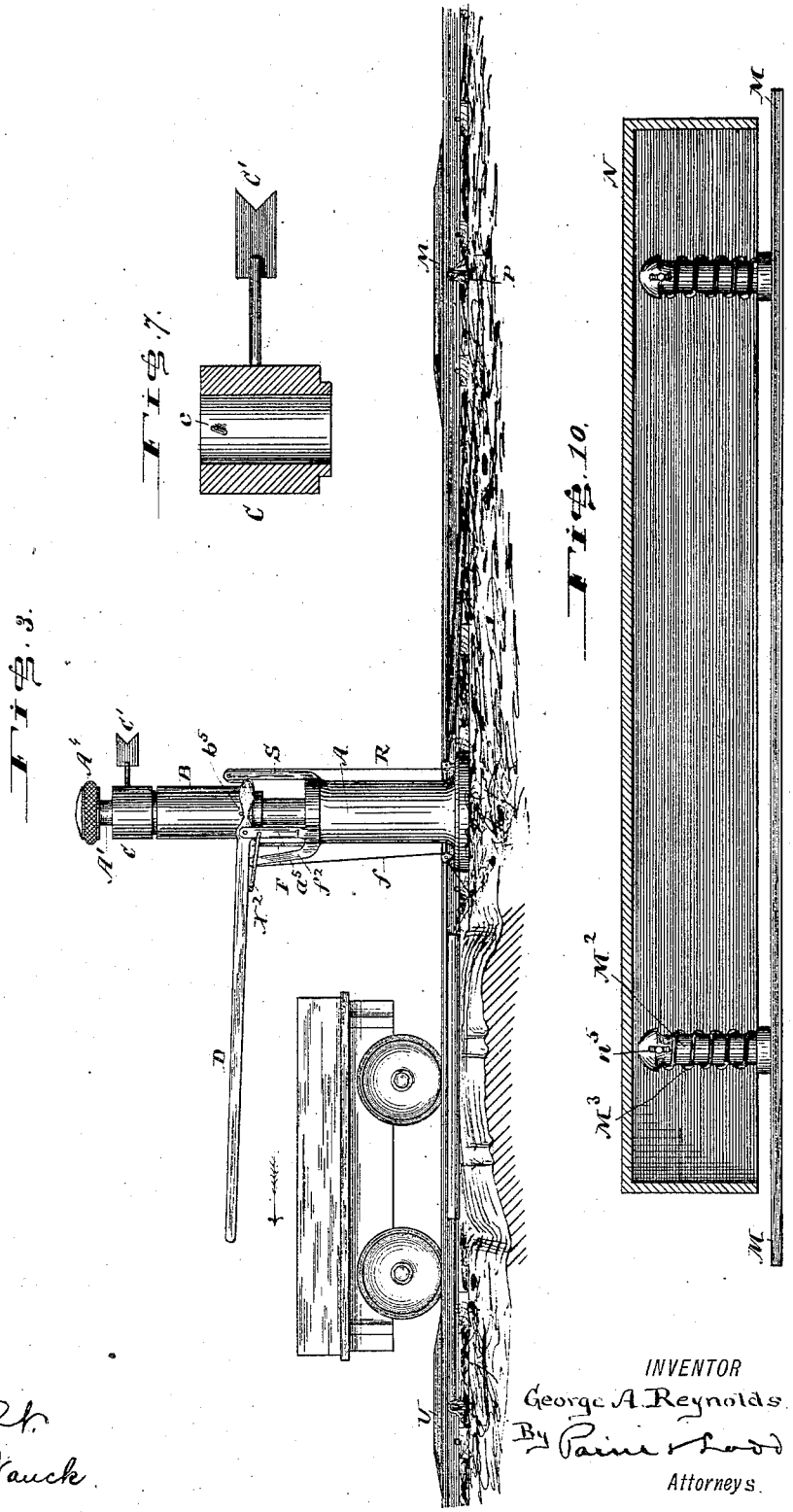

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COMBINED SIGNAL AND GATE FOR RAILROAD CROSSINGS.

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Fig. 4.

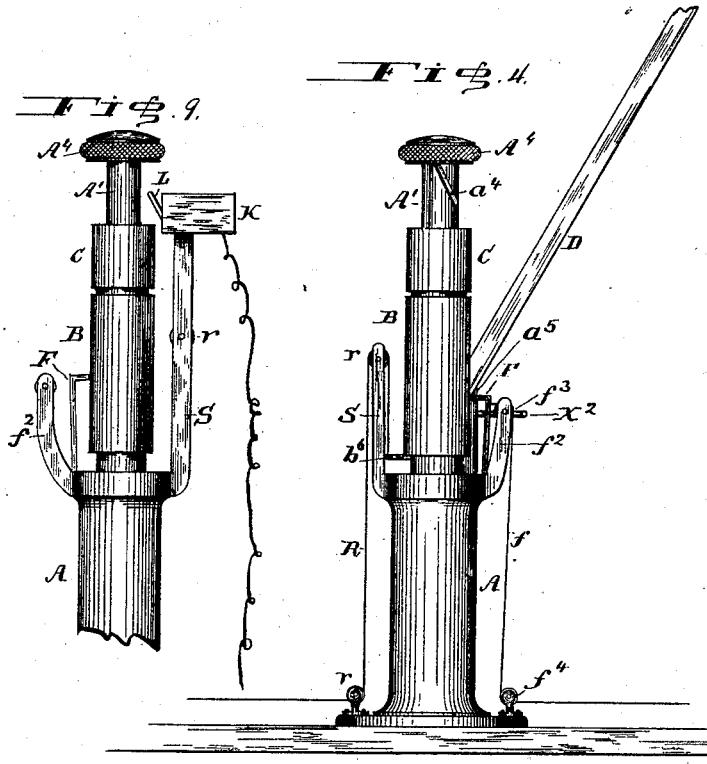


Fig. 9.

Fig. 5.

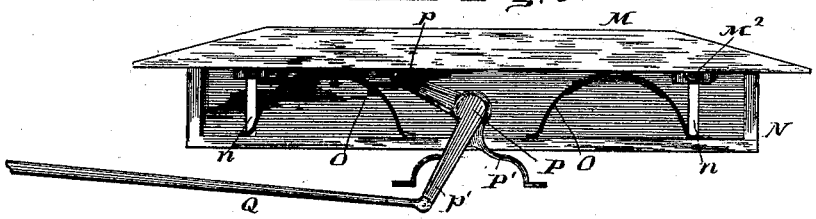
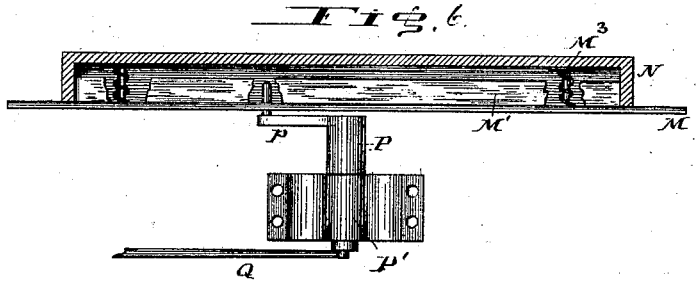


Fig. 6.



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COMBINED SIGNAL AND GATE FOR RAILROAD CROSSINGS.

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Fig. 12.

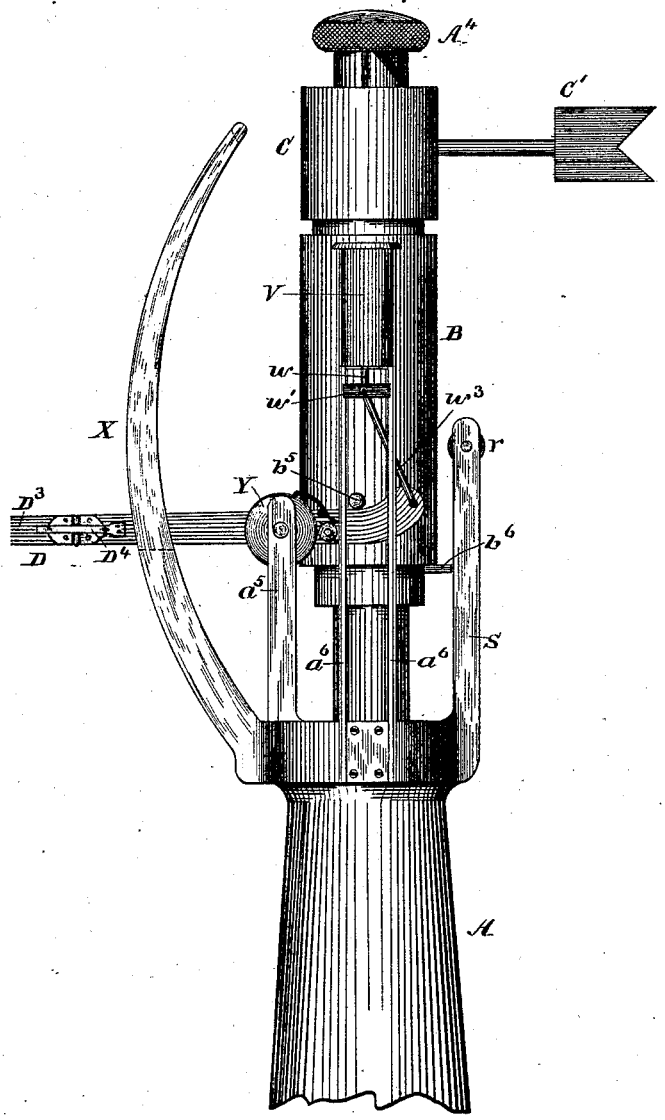
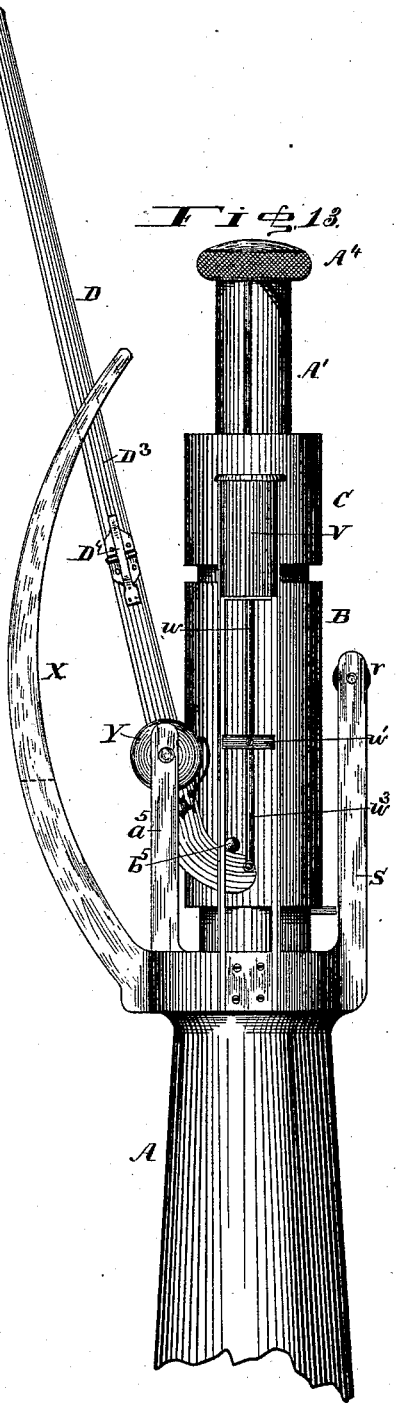


Fig. 13.



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COMBINED SIGNAL AND GATE FOR RAILROAD CROSSINGS.

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Fig. 14.

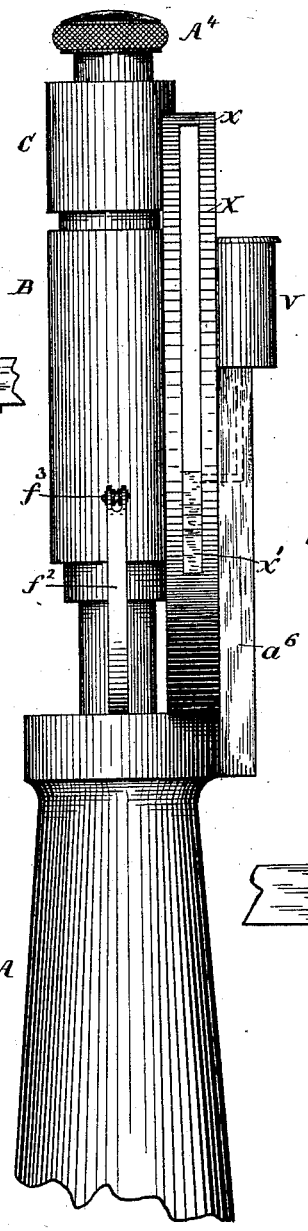


Fig. 17.

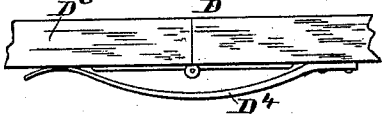


Fig. 18.

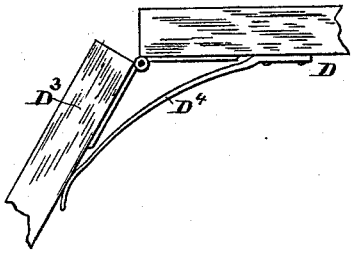


Fig. 15.

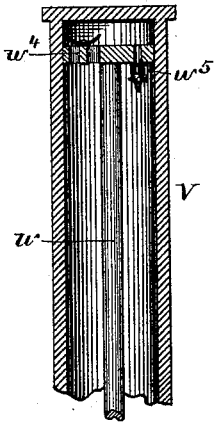
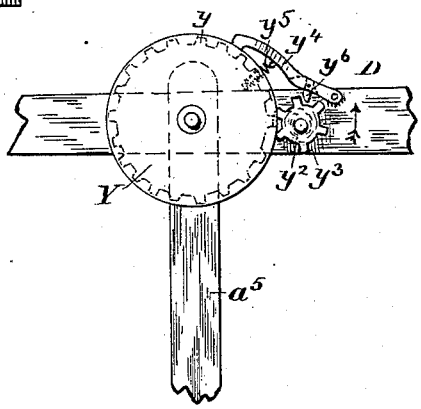


Fig. 16.



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UNITED STATES PATENT OFFICE.

GEORGE A. REYNOLDS, OF UTICA, NEW YORK.

COMBINED SIGNAL AND GATE FOR RAILROAD-CROSSINGS.

SPECIFICATION forming part of Letters Patent No. 305,331, dated September 16, 1884.

Application filed November 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. REYNOLDS, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in a Combined Signal and Gate for Railroad-Crossings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The present invention relates to improvements in combined railroad signals and crossing gates or bars which are operated by passing trains; and the object of my invention is to provide mechanism simple in construction, which is not liable to get out of order, and which is positive and effective in its operation. A swinging gate or bar, adapted to extend across a railroad-crossing when in a lowered position, is pivoted to a bracket on the supporting column or post, and is arranged in such relation to a vertically-movable weight that when the latter is raised to properly set the semaphoric signal the gate or bar will drop down into a horizontal position and close the approaches to the track. The weight is elevated by devices located adjacent to the track-rail and operated by the passing train, and is held in such position until the train has reached the crossing, when other devices are set into action by the train for causing the weight to descend and the sliding collar, with its semaphoric signal, to assume its normal position. The weight, on descending, comes in contact with the crossing gate or bar, and again raises it into a vertical or upright position alongside the post that supports said gate and the signaling devices. Other features of the invention are the devices acted upon directly by the wheels of an approaching or passing train for closing and opening the gate and operating the signals, these devices being properly housed or protected from snow and ice, and placed out of the way of wagons crossing the track. Means may also be provided for operating a gong or other audible signal by the direct movement of the gate-arm or guard-bar, and as a sudden closing of the gate is not generally desirable, I propose to effect a slow or gradual descent thereof by the employment of an air-cylinder the piston of which is connected with the gate-arm. It is also proposed to make the gate-arm of two members, jointed together in such a manner that the end of the gate can be swung outward from the track to allow persons or vehicles hemmed in when the gates are down to pass out without raising said gate, whereupon such swinging member is returned to its normal position by the action of a spring.

In the accompanying drawings, Figure 1 is a perspective view showing the signaling devices and gate in their normal positions, and illustrating a railroad-car about to pass upon the devices located adjacent to the track for setting the signal and closing the gate. Fig. 2 is a side elevation showing the various parts in their normal positions. Fig. 3 shows the signal set and the gate closed and a car about in position to operate the device for returning these parts to their normal positions. Fig. 4 is a detail view of the supporting-column, sliding weight, sliding and rotating collar, and swinging gate. Fig. 5 is a side elevation of the devices located adjacent to the track-rails for operating the gate and signaling devices by passing trains. Fig. 6 is a top view of these devices partly in section. Fig. 7 is a sectional view of the sliding and rotating collar with its semaphoric signal. Fig. 8 is a vertical sectional view of the sliding weight. Fig. 9 is a detail view showing the arrangement of an electric bell or audible signal in connection with the gate and visible signal. Fig. 10 is a horizontal section of another form of spring-pressed bar adapted to be acted upon by the car-wheels. Fig. 11 is a perspective view of one of the grooved and beveled rail-plates operated upon or depressed by a passing train. Fig. 12 is a modification showing means for effecting a slow or gradual closing of the gate-arm or guard-bar, the latter being so constructed that the end can swing outward from the track to allow egress therefrom without raising the gate. Fig. 13 is a similar view showing the gate-bar in a raised position. Fig. 14 is an end elevation of the devices illus-

trated in side elevation by Figs. 12 and 13. Fig. 15 is a detail sectional view of the air-cylinder, the piston whereof is connected with the gate-arm or guard-bar. Fig. 16 is a detail view of an alarm device or bell directly actuated by the movement of the gate-arm. Figs. 17 and 18 are detail views of the hinged gate-arm.

The letter A designates a column or post which is set by the side of a railroad-track adjoining a road crossing the same. The upper reduced portion, A′, of this column is encircled by a sliding weight, B, and by a sliding and rotating collar, C, which may be of a cylindrical or other suitable form. The bore or axial opening through the sliding weight contains a lug, *b*, which slides in a straight groove made in the column, and the bore in the collar has a lug, *c*, which moves in a spiral groove, a^4, also made in the column; hence it follows that an upward movement of the weight B, effected by the devices hereinafter set forth, will impart a vertical and a rotary movement to the collar C, and bring the indicator or semaphoric signal C′, carried by said collar, into the position shown in Fig. 3, or parallel to the track-rails. This change of position of the indicator shows that a train is approaching from the direction in which it is pointing.

An arm or bracket, a^5, rising from the main or lower portion of the column A, has pivoted thereto a gate bar or rail, D, such as is generally employed for guarding a railroad-crossing, or I may use the guard bar or gate shown in Figs. 12, 13, 17, and 18, which consists of an inner section pivoted to the bracket a^5, and an outer section, D^3, jointed to the inner section or connected thereto by a hinge, so that it can be swung outwardly from the track and permit the egress of persons or vehicles hemmed in between the closed gates. A spring, D^4, returns the section D^3 to its normal position after the pressure which has caused it to swing outward is removed.

Instead of the bar or guard-arm shown in the various figures, I may employ a gate-frame of any preferred construction, and make the same of one or more sections or panels, as deemed most expedient. The guard bar or gate, pivoted in the above-described manner, is designed to be lowered when the signaling devices are set to indicate the approach of a train. This lowering of the gate is effected by the removal of the weight B from the portion of the gate or bar located in rear of its fulcrum-point, for when the parts are in the normal positions indicated in Figs. 1 and 2 the weight B holds the gate or bar in an elevated or open position; but when it is raised, as is shown in Fig. 3, the preponderance of weight in front of the fulcrum causes the gate or bar to drop. The weight B is held in an elevated position until the proper time has arrived for its descent by means of a support, F, which is a projecting ledge or shoulder carried by a spring-plate secured to the column, that is projected beneath the weight when the latter is raised, and which is withdrawn by means of a jointed chain, cord, or rope, *f*, when it is desired to release the weight and raise the gate. As the weight descends on the column, a pin or projection, b^5, thereon strikes the gate or bar in rear of the fulcrum and raises it to an upright or nearly upright position, as is shown in Figs. 1, 2, and 4.

To secure a slow descent or closing of the gate, so as to give persons and vehicles on the track time to cross, I provide the devices illustrated in Figs. 12 to 14, inclusive. An air-cylinder, V, is secured to suitable arms or a frame, a^6, rising from the bottom section of the column, and this cylinder contains a piston, the rod of which, *w*, is connected with a cross-head, *w′*, that slides in the frame a^6. A link or pitman, w^3, is pivoted to the cross-head *w′* and to the rear or inner end of the gate arm or bar D, as is clearly shown in Figs. 12 and 13. The piston has ports w^4, which are closed by a valve when said piston is ascending in the cylinder. The lowering of the gate causes the piston to ascend, and thus compresses the air between the cylinder-head and piston, which is allowed to escape slowly through a nozzle or tube, w^5, having a cock which can be opened more or less so as to regulate the descent of the gate. When the weight B is descending to raise or open the gate, the piston is descending in the cylinder and no resistance is offered to its movement, as the valve or valves are allowed to open in an upward direction.

In the construction shown in Figs. 12 to 14, inclusive, the gate-bar moves in a curved guide-arm, X, carried by the main column, which arm is slotted and has top and bottom stop-surfaces, *x x′*, for limiting the movement of said gate-bar. In the other views, Figs. 1 to 4, a supporting-arm, X^2, is shown, which supports the gate-bar when in its lowered position.

In Figs. 2 and 4 the reduced portion A′ of the column is represented as being surmounted by a cap or nut, A^4, for limiting the upward movement of the sliding and rotating collar C. Instead of said cap, I may locate a lantern or other night-signal, G, upon the top of the column, as is clearly shown in Fig. 1.

It is also proposed to combine audible signaling devices, or an alarm with the visible or semaphoric signal, said audible signal being preferably in the form of an electric bell, K, as is shown in Fig. 9. The circuit closing and breaking device L is arranged on the outside of the bell-box, and is placed in juxtaposition to the sliding and rotating collar C, so that the latter, when ascending, will engage with the device L, thus closing the electrical circuit and sounding the bell or alarm. The electrical conductors or wires may pass down into a battery buried in the ground deep enough so as not to be affected by frost. The box containing the electric-bell devices is mounted on an arm extending from the column A.

Instead of an electric bell, I may employ the

gong or audible signaling device Y, (shown in Figs. 12, 13, and 16,) which is actuated by the gate-arm and mechanical devices combined therewith. The gong is mounted on the standard a^5, supporting the gate, and has a toothed rim, y, (shown in Fig. 16,) which engages with a pinion or spur-disk, y^2, carried by the gate-arm, said pinion being free to rotate on a fixed axis, y^3, projecting from the gate-arm and arranged beneath a hammer, y^4, pivoted to the gate-arm, that strikes the gong.

The operation of the audible signal is as follows: It will be seen that the gong is stationary, being attached to the standard, and that the pinion or spur-disk and the hammer, being attached to the gate-arm, are carried with it in an arc of a circle around the gong when the gate-arm is raised and lowered. The movement of the gate-arm thus causes the rotation of the pinion in the direction indicated by the arrow, Fig. 16, when the gate-arm is descending, and in the reverse direction when it is being raised. When the pinion is rotated in the direction indicated by the arrow, its teeth strike successively against the lug or arm y^6 of the hammer and raise it, and the spring y^5 throws the hammer down and makes a stroke on the gong each time the arm passes a tooth. To prevent the gong from sounding when the gate is being raised—that is, when the is pinion rotated in a direction opposite to that indicated by the arrow—the lug or arm y^6 is hinged so that it can swing out of the way of the pinion-teeth when struck by them, and not lift the hammer, but it can swing in one direction only—toward the right. It cannot swing toward the left, and consequently when the gate is falling the pinion-teeth successively raise the hammer.

The devices for setting the semaphoric signal, closing the gate, and putting into operation the electric bell or audible signal by the approach of a train may be described as follows, viz: In juxtaposition to one of the track-rails on the side of the crossing from which the train is approaching I locate a vertically-movable bar or plate, M, which fits closely against the rail, and has a groove in its top edge, in which run the flanges of the car-wheels of a train running in the right direction, so as to depress said bar or plate and hold it depressed until the wheels of the last car have passed over the same. One end, m, of this plate M is beveled or made without a groove, as is shown in Fig. 11, so that a train first approaching this end of the plate will push it aside or move it laterally and cause it to clear the flanges of the wheels, so as not to act upon the signaling devices. A case or box, N, made of about the same length as the bar or plate M, has an open side adjoining the outer face of the plate M, the inner face of the latter closely hugging the rail, as already stated. A horizontal flange or web, M′, of the plate M slides up and down in the box N, and below the flange M′, and secured thereto there are projecting stems M^2, which may slide up and down in vertical slots n, made in the case N, as is seen in Fig. 5; or said stems can extend from the plate M, and have slotted inner ends that fit on vertical pins n^5, rising from the bottom of the case N, as shown in Fig. 10. In either instance the stems are encircled by spiral springs M^3, the object whereof is to hold the plate M pressed against the rail, and permit the necessary lateral or horizontal movement thereof, to allow the plate to accommodate itself to car-wheels having different sized or shaped flanges, and to be pushed aside when the signals are not to be operated, as above explained. The plate M rests on curved or semi-elliptic springs O, which are generally secured at their middle portions to the aforesaid plate, the free ends of the springs resting upon the bottom of the box or case N. A rock-shaft, P, journaled in bearings P′ alongside the box N, has a crank-arm, p, which engages with or projects under the horizontal web M′ of the plate M. From the opposite crank-arm, p', of this rock-shaft P a rod, Q, runs through a suitable underground pipe or conductor, and terminates in proximity to the column A. A cord or chain, R, extending from said rod Q, is conducted over suitable pulleys, r, at the base of the column, and on an arm, S, extending therefrom at its point of junction with the upper reduced portion, A′. This cord or chain R is connected with a lug or lip, b^6, extending from the bottom of the weight B. It will be manifest that a downward movement of the plate M by the passage thereupon of the flange of a car-wheel will cause a rotary movement of the rock-shaft P through the medium of the crank-arm p, and in consequence thereof the rod Q and cord or chain R raises the weight B until the same has reached the limit of its upward movement and is caught by the spring-plate F, which passes under it and holds it in a raised position. The plate M is of such a length, or is so proportioned in relation to the spaces or intervals generally existing between car-wheels, that when the front wheels of a truck are passing from the plate the next succeeding or rear wheels have already commenced to pass upon the plate. In this manner I avoid all undue or repeated vibrations of the plate, it being understood that the plate is only once depressed during the passage of an entire train. It is also my intention to use a spring-plate sufficiently long to allow the two driving-wheels of a locomotive to rest on the same.

The means for resetting the signal and gate or returning the same to their normal positions are substantially the same as the above-described devices for setting the signal and closing the gate. The cord f, connected with the spring plate or catch F, that retains the weight B in an elevated position, is conducted over a pulley, f^3, on an arm, f^2, of the column, and over a second pulley, f^4, at the base of the latter. From thence the cord passes to

an underground incased rod, which leads to a rock-shaft that is arranged in co-operative relation to a spring-supported bar or plate, U, located at the side of the crossing from whence the train is departing. It will be obvious that this second bar or plate, U, employed for returning the signal and gate to their normal positions, is located near the crossing, so that when the engine reaches the latter, and the protection of the gates is no longer needed, said gate is opened or raised.

I have in the above description referred to a single gate and shown only one gate in the drawings, but desire it to be understood that two or more gates may be simultaneously operated by the devices above set forth for opening and closing one gate, it being only necessary to combine with the sliding weight a system of ropes or chains and pulleys leading to another gate or gates suitably weighted or counterbalanced, so that when the weight that acts directly upon the first gate descends to raise the same, the other gate or gates are also raised or opened.

An air-cushion cylinder similar to the one described above may also be attached to the post and weight to secure a gradual falling of the weight after it has been released, in order that the gate and operating mechanism may not be injured by the fall of the heavy weight.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a signal for railroad-crossings, the combination of a vertically-movable and revolving collar carrying an indicator or semaphoric signal, with a supporting column or post encircled by said collar, and means, substantially as described, for raising and lowering the collar with its signal by the approach and departure of passing trains, substantially as herein set forth.

2. In a signal for railroad-crossings, the combination of the vertically-sliding and revolving collar having a semaphoric signal or indicator, with a supporting column or post, a vertically-sliding weight, and means, substantially as described, for raising the weight and indicator-collar and again returning them them to their normal positions, substantially as herein set forth.

3. The combination of a swinging gate or bar, a supporting post or column, a vertically-sliding weight encircling the post, and a device for holding the latter in an elevated position, with means, substantially as described, for raising the weight by an approaching train and releasing the weight-retaining device by a departing train, substantially as and for the the purpose set forth.

4. The combination of an audible or electric bell signal and a vertically-movable collar having a semaphoric signal, and means, substantially as described, for automatically sounding the bell by the movement of said collar, with a supporting column or post, substantially as herein set forth.

5. In a railroad-signal, the combination of a protecting-case, a vertically and laterally movable spring-pressed plate, a rock-shaft, and connecting devices, together with signaling mechanism, substantially as described, which is actuated by said devices, and a railroad-track, substantially as herein set forth.

6. In a railroad-signal, the combination of the spring plate or catch, the system of cords and pulleys, the vertically-movable weight, and the vertically sliding and revolving indicator-collar, with a supporting column or post, and means, substantially as described, for automatically operating said devices by passing trains, as and for the purpose set forth.

7. In a railroad-signal, the combination, with a swinging gate, of a pinion and hammer carried by said gate, and a gong or bell having a toothed rim mounted on a base or column, substantially as herein set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. REYNOLDS.

Witnesses:
WM. B. SUTTON,
EDWARD S. KINGSTON.