(No Model.)

E. A. CHAPEL.

AUTOMATIC RAILWAY GATE.

No. 490,801. Patented Jan. 31, 1893.

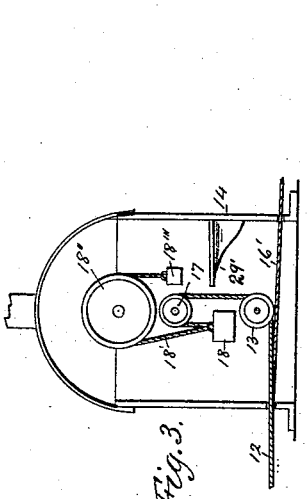

Fig. 3.

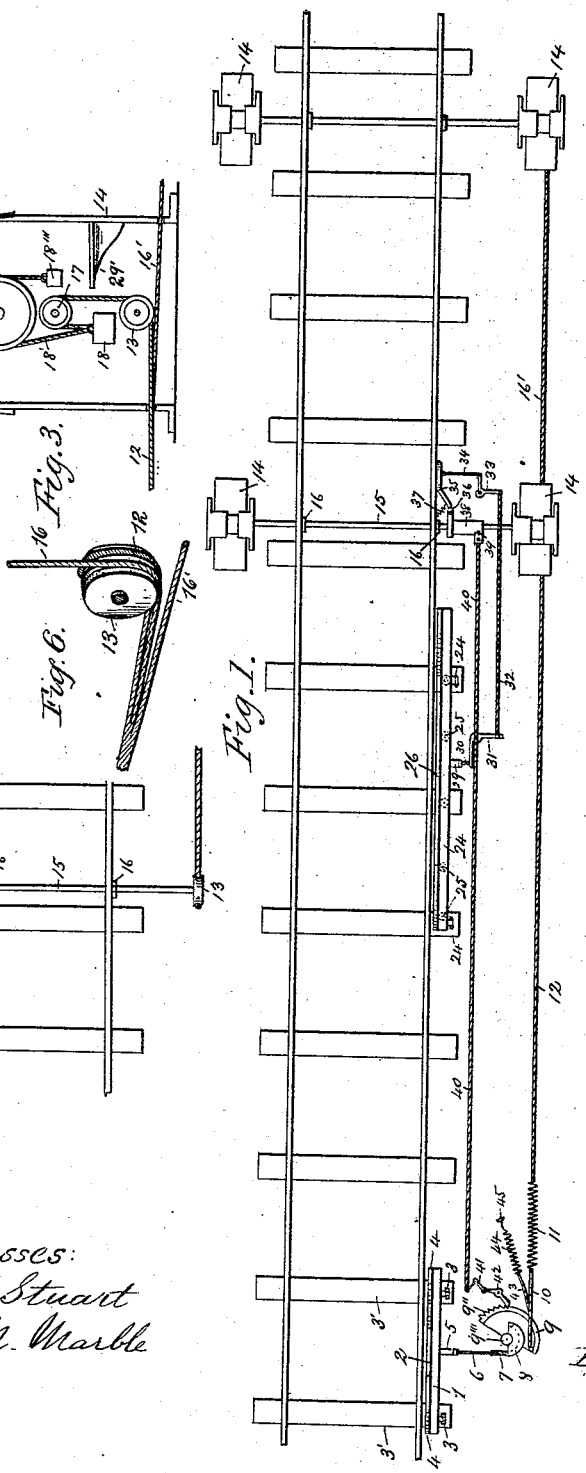

Fig. 1.

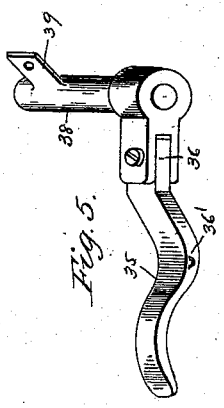

Fig. 5.

Fig. 6.

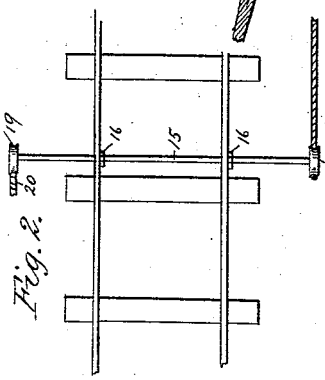

Fig. 2.

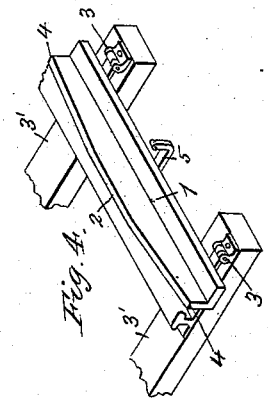

Fig. 4.

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EDWARD A. CHAPEL, OF MARENGO, ILLINOIS.

AUTOMATIC RAILWAY-GATE.

SPECIFICATION forming part of Letters Patent No. 490,801, dated January 31, 1893.

Application filed October 22, 1891. Serial No. 409,488. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. CHAPEL, a citizen of the United States, residing at Marengo, in the county of McHenry and State of Illinois, have invented certain new and useful Improvements in Automatic Railway-Gates; 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.

My invention relates, generally, to railway gates and particularly to improvements in that class thereof which are known as "automatic railway-gates," and is designed as an improvement upon the invention disclosed in Letters Patent issued to me August 25, 1891, No. 458,267, in which invention is provided novel and improved means for effectually closing and opening a roadway or crossing on each side of the track as a train approaches and departs and while it is at a considerable distance from the crossing and to keep the latter closed until the train has passed, so that vehicles will be excluded and also pedestrians warned of the proximity of the train and protected.

The object of my invention is to provide novel and improved means for automatically effecting the opening and closing of the gates as described in said Letters Patent. This object is accomplished by the mechanism illustrated in the accompanying drawings forming part of this specification, in which the same reference numerals indicate the same or corresponding parts and in which—

Figure 1 is a broken plan view of a section of railway track showing my invention applied thereto; Fig. 2, a broken section of a railway track showing the rock-shaft and pulleys secured at each end; Fig. 3, a side elevation of one of the gate housings, with the sides removed, showing the interior mechanism for lowering and raising the masts or gates; Fig. 4, a detail perspective view of the closing-plate, Fig. 5, a detail perspective view of the releasing plate and hollow cylindrical crank, and Fig. 6 is a detail perspective view of the pulley 13, showing the cables which pass around it.

My invention is illustrated in the drawings as applied to a single track railway, but it can be readily so constructed, by lengthening the rock-shafts, as to be applied to a double-track railway and worked with equal facility.

As will be seen by reference to the drawings, I have represented a grade crossing showing four gate posts or housings, but for the purpose of better illustration have shown one of the housings enlarged, in side elevation and with one of its sides removed in order to disclose the interior mechanism.

The closing plates 1, through the agency of which the gates are lowered to close the roadway, are placed at such distance as may be deemed necessary, on each side of the crossing. These closing plates are formed of angle iron, placed parallel to the track rail with one side horizontal and the other side vertical or nearly so and placed near to the outer side of the track rail, as shown. At or near the outer edge of the horizontal side, each setting plate is pivotally attached to suitable brackets 3, which are secured to the ties 3′. The central portion of the vertical side of the closing plate projects about three inches above the tread of the rail; the ends are gradually inclined or tapered off to a point even with or slightly below the tread of the rail. I have found that the closing plate should be about fourteen feet long, with a central level portion 2 about two feet long, and gradually tapered or inclined to the ends, as above stated. It will be seen that the closing plate is adapted to be depressed by the wheels of a locomotive or car passing over the track. The wheels, first striking the inclined or tapered ends, gradually depress the closing plate, which swings downwardly and inwardly around the line of pivots as its axis. In like manner, as the wheels leave the other inclined end of the setting plate, it is gradually drawn upward and outward by means to be hereinafter mentioned, and returns to normal. In order to prevent any rubbing of the side of the closing plate against the rail, there is a slight clearance left between the vertical side of the closing plate and the rail; and to still further prevent any danger of rubbing, the vertical side of the closing plate is formed not exactly at right angles to the horizontal side, but inclines outwardly somewhat from the perpendicular. The correct construction would be to make the vertical side a portion of the sur-

face of a cylinder, the axis of which would be the line of pivots. But since the cylindrical surface would be difficult and expensive to construct, and since the portion of the side of the closing plate which it would be necessary to make cylindrical is slight compared to the diameter of the cylinder, being only a little more than that which normally projects above the top of the rail, it is found sufficient to make the vertical side of the closing plate coincide with the plane which would cut off this portion of the cylindrical surface. Therefore the vertical side is not perpendicular to the horizontal side, but inclines outwardly somewhat. This inclination, however, is not so great as to cause the edge of the closing plate to be so far out that it will not be touched by wheels passing over the track.

At or near the center of the lower edge of the closing-plate 1 is rigidly secured a short arm 5, bent upwardly at right angles and connected or pivoted at its upper end by a hinge joint to the inner end of a short connecting rod 6, which is placed at right angles to the rail and which is connected at its outer end to one end of a short chain 7, said chain having its other end secured to and passing around a grooved pulley 8 rigidly secured in a horizontal position to a larger horizontal pulley 9, suitably mounted on a stud 9‴, also provided with a peripheral groove, on the flange of which is formed a suitable number of ratchet teeth 9″ adapted to be engaged by the releasing latch or pawl, as more fully hereinafter described. Near the edge of the pulley 9 is rigidly secured one end of a chain 10, which leads forward or in a direction away from or opposite to that of chain 7 on pulley 8. The other end of chain 10 is attached to one end of a strong spiral spring 11, which while acting to absorb the shock incident to the somewhat sudden and violent depression of the plate by the passing train, also serves to hold taut the cable 12, one end of which is attached to said spiral spring and the other end to the grooved pulley 13 within the hollow gate-post or housing 14, said pulley 13 being rigidly attached to one end of a rock-shaft 15, which enters said housing and is placed at right angles to and passes beneath the rails of the track and is loosely journaled in boxes or bearings 16 secured to the bottom of the rails. To the cable 12 is attached a bifurcated cable 16′, one part or end of said cable passing around the pulley 13, and upwardly and over a pulley 17 in the upper part of the housing and thence downwardly and its end attached to a heavy weight 18. The other part or end of said cable 16′ passes through the housing 14 to and into the housing at the opposite side of the road or street and thence over similar pulleys arranged within said housing, and is attached to a weight therein in the manner above described. Also attached to the heavy weight 18 is one end of a cable 18′, which passes upwardly and is secured to the large grooved pulley 18″ at a suitable point between its ends and to the other end thereof is attached the light weight 18‴. To the shaft of said pulley 18″ is attached the mast or gate which is operated as fully described in said Patent No. 458,267.

To the end of the rock-shaft 15 which passes beneath the rails of the track or tracks to the opposite housing is rigidly secured a grooved pulley 19, to which is attached one end of a cable 20, which passes upwardly and over pulleys in said housing as heretofore described.

The retaining-plate 24 which is made of angle iron is placed at the outer side of the outer rail and adjacent to it and is pivotally held in place by means of brackets 24′ placed at suitable distances apart and rigidly secured to the rail ties, said retaining-plate being arranged a sufficient distance from the side of the rail, so that the pressure of car wheels passing thereon will permit the same to rock downwardly and inwardly in the arc of a circle. The form and construction of the retaining plate are similar to that of the closing plate, the only difference being in their proportions. It is elevated at its center above the tread of the rail about two inches, and is made of a length sufficient to extend from truck to truck of the longest car, being thus adapted to be depressed during the passage of an entire train over the same. It has been ascertained from experience that a retaining plate of this construction should be about fifty feet in length, with a central level portion, 26, about forty-five feet in length, and with inclined or tapered end portions, as heretofore described. Beneath the lower edges of said retaining plate are arranged a suitable number of strong springs, 25, of any desired construction, but preferably spiral, which serve to hold the upper edge of said plate normally elevated above the top surface of the rail, and which will yield sufficiently to permit of its depression under the weight of a passing car or train.

At or near the center of the plate, 24, and to its lower edge, is rigidly secured a short arm 29, which is bent upward and is pivotally connected at its upper end to the inner end of a short, horizontal arm or rod 30, which in turn, is connected at its outer end to the inner arm of a horizontally arranged bell-crank lever 31, and to the outer arm of said bell-crank lever 31 is attached one end of a cable 32, which is placed above the ground, and parallel with the track rail, and is connected at its opposite end to the outer arm of the horizontally-arranged bell-crank lever 33, the inner arm of which projects in a direction opposite to that of lever 31, said inner arm being connected by means of a short cable 34, to the releasing arm or plate 35, which is bent downwardly and inwardly then upwardly, toward its free end, and is connected at its other end by means of a hinge-joint 36, to the inner end of a hollow, cylindrical crank 38, which is loosely mounted upon the rock-shaft 15 so as to permit said crank 38 to turn freely upon the rock-

shaft when the releasing arm or plate is in operation. The free end of arm 35 is normally in position to be depressed by a passing train. Midway between said hinge-joint 36 and the angle 36′ of the arm or plate 35, is secured one end of a spiral spring 37 the other end of which is secured to the rail. The tendency of said spring is to draw or hold said releasing arm or plate to its normal position. At the outer end of said hollow cylindrical crank 38 is rigidly fixed a vertically arranged arm 39, to which is secured one end of the releasing cable 40, which is parallel with the track-rails and is connected at its opposite end to the inner arm of the horizontally-arranged bell-crank lever 41, the outer arm of which is connected by means of a pivot or hinge-joint to the latch or pawl 42, the end of said latch or pawl engaging the ratchet teeth 9″ of the pulley 9. At a suitable point on the periphery of the pulley 9 is secured one end of a chain 43, to the other end of which is attached a spiral spring 44 which is secured to a staple or bolt 45 fastened in one of the cross ties, for the purpose of holding said pulley in its normal position.

The operation of my invention is as follows—When a train approaches and passes over the closing plate 1, said closing-plate is depressed or rocked downwardly and inwardly about its pivots in the arc of a circle which causes the upwardly-turned arm 5, to pull the connecting rod 6, which, in turn, causes the pulleys 8 and 9 to make a partial revolution, the latch or pawl 42 engaging the ratchet teeth 9″ and holding said pulleys in the position to which they have been turned. This operation draws the chain 10, spring 11 and cable 12, which, in consequence of the latter being attached to the pulley 13, on the end of the rock-shaft 15 causes said pulley to revolve, carrying with it the rock-shaft 15 and causing a similar revolution of the pulley 20 in the housing at the opposite end of the rock-shaft, thus causing the large weights 18 to be drawn upwardly and removing their weight off the masts or gates and permitting said masts or gates to be swung from their vertical positions by the light weight 18″. After the masts have been started and partly lowered, the light weights are not permitted to continue their descent, as they would cause the masts to descend too suddenly, and therefore the housings are provided with the shells 29′ as shown and described in said Patent No. 458,267, which arrest the descent of said small or lighter weights soon after the masts have been turned from their vertical positions. The weights are held up by means of the latch or pawl 42 engaging the ratchet teeth on the flange of the pulley 9. As the train moves forward the wheels of the locomotive or car as the case may be, run upon and depress the retaining plate 24 in the arc of a circle, which causes the arm 29 to move inwardly, or toward the track-rail. This pulls the connecting rod 30, moves the bell-crank lever 31 in the arc of a circle, and draws the cable 32, which moves the horizontal bell-crank lever 33 also in the arc of a circle thus pulling the short cable 34 and causing the releasing arm 35 to move away from the track-rail, thus preventing the wheels of a moving train from coming in contact therewith. After the train has entirely passed over the retaining-plate 24 the latter assumes its normal position very quickly, by means of the heavy springs situated beneath its lower edge, releasing the tension on the cables 32 and 34 and thus permitting the spiral spring 37 to cause the releasing arm 35 to assume its normal position against the track-rail. The last wheels of the train then pass over the releasing arm 35, depressing the same, the result thereof being that the hollow cylindrical crank 38 is rocked, which draws the cable 40 forward, or toward it, thus causing the bell-crank lever 41 to release the latch or pawl 42 from engagement with the ratchet teeth on the pulley 9, and the masts are drawn up again into a vertical position by the weights 18 which are left free to descend because the spiral spring 44 draws the pulley 9 again to its normal position, and releases the tension on the cable 12. The return of the pulley 9 to its normal position acting through the agency of the pulley 8, chain 7, rod 6 and arm 5, raises the closing plate and returns it likewise to its normal place.

Having thus fully described the construction and arrangement or combination of the several parts of my invention, their operation and advantages, what I claim as new is—

1. In an automatic railway gate, the combination, with a gate and gate operating mechanism, of a closing plate for closing said gate, a releasing arm for releasing the gate and permitting it to open, and a retaining plate for preventing said arm from permitting said gate to open until after the passage of the train over said retaining plate, substantially as described.

2. In an automatic railway gate, the combination, with a gate and gate operating mechanism, of a closing plate adapted to be depressed by the wheels of a passing train, means connecting said closing plate and gate operating mechanism for causing the gate to be closed by the depression of the closing plate, a ratchet and pawl or other locking device for locking the gate operating mechanism, a releasing arm adapted to be depressed by the wheels of the train for releasing said locking device, and a retaining plate likewise adapted to be depressed by the wheels of the train for preventing said releasing arm from releasing the locking device until after the passage of the train over said retaining plate, substantially as described.

3. In an automatic railway gate, the combination, with a gate and gate operating mechanism, of a closing plate adapted to be depressed by the wheels of a passing train, means for causing the gate to be closed by the

depression of the closing plate, and a ratchet and pawl or other locking device for locking the gate operating mechanism, of a releasing arm pivotally supported and adapted to be depressed about its pivot by the wheels of the train, but capable of being so moved as not to be acted upon by said wheels, means connecting said releasing arm and said locking device whereby said locking device is released by the depression of the releasing arm, a yieldingly supported retaining plate adapted to be depressed by the wheels of the train and to remain depressed during the passage of the train, ropes and bellcranks for connecting said releasing arm and retaining plate whereby said releasing arm is moved beyond the reach of the wheels of the train by the depression of the retaining plate, and a spring for restoring the releasing arm to position after the rise of the retaining plate, thereby permitting it to be acted upon by the last wheels of the train, substantially as described.

4. In an automatic railway gate, the combination, with a retaining plate adapted to be depressed by the wheels of a passing train and to remain depressed during the passage of the train, and provided with springs or other suitable device for raising said retaining plate after the passage of the train, of a releasing arm adapted to be depressed by the wheels of the train, suitable mechanism released by the depression of the releasing arm for causing the gate to open, and suitable mechanism operated by the depression of the retaining plate for preventing said releasing arm from so releasing the gate operating mechanism, thereby retaining the gate closed until after the passage of the entire train, substantially as described.

5. In an automatic railway gate, the combination, with a retaining plate adapted to be depressed by the wheels of a passing train and to remain depressed during the passage of the train and provided with springs or other suitable means for raising said retaining plate after the passage of the train, of a releasing arm pivotally supported and adapted to be depressed by the wheels of the train, but capable of some lateral movement, a cable and bellcranks or other suitable means for causing the releasing arm to be moved laterally by the depression of the retaining plate, thereby preventing said releasing arm from being acted upon by the wheels of the train while the retaining plate is depressed, a spring for restoring said releasing arm to its normal position after the retaining plate rises, thereby permitting the releasing arm to be depressed by the last wheels of the train, and suitable mechanism released by the depression of the releasing arm for causing the gate to open, substantially as described.

6. In an automatic railway gate, the combination, with a gate and gate operating mechanism, of a closing plate adapted to be depressed by the wheels of a passing train, two pulleys rigidly secured together and revolubly mounted on a vertical shaft, means connecting one of the said pulleys with the closing plate, means for connecting the gate operating mechanism with the other of the pulleys, thereby causing the gate to be closed by the depression of the closing plate, a spring for restoring the said pulleys and closing plate to their normal position, thereby permitting the gate to open, ratchet teeth on one of the said pulleys and a pawl engaging therewith, and releasing mechanism operated by the last wheels of the train for disengaging said pawl, thereby permitting the gate to open, substantially as described.

7. In an automatic railway gate, the combination, with a gate and gate operating mechanism, of a closing plate adapted to be depressed by the wheels of a passing train, two pulleys rigidly secured together and revolubly mounted on a vertical shaft, means connecting one of said pulleys and the closing plate, means connecting the other pulley with the gate operating mechanism, thereby causing the gate to be closed by the depression of the closing plate, a spring for restoring said pulleys and closing plate to their normal positions, thereby permitting the gate to open, ratchet teeth on one of the said pulleys and a pawl engaging therewith, a releasing arm adapted to be depressed by the wheels of the train and means for causing said pawl to be disengaged by the depression of the releasing arm, and a retaining plate yieldingly supported and adapted to be depressed by the wheels of the train and to remain depressed during the passage of the train, for preventing said releasing arm from disengaging said pawl so long as said retaining plate is depressed, thereby retaining said gate closed until after the passage of the train over said retaining plate, substantially as described.

8. In an automatic railway gate, the combination, with a closing plate formed of angle iron placed with one side adjacent to the rail and having pivotal supports in a line parallel to the line of rails adapted to permit said closing plate to swing downwardly and inwardly about its pivots, of two pulleys rigidly secured together and revolubly mounted on a vertical shaft, means for connecting said closing plate and one of said pulleys, a cable connecting the other of said pulleys and the gate operating mechanism, and a spring arranged to hold the pulleys in their normal positions, substantially as described.

9. In an automatic railway gate, the combination, with a pivoted closing plate having its axis parallel to the line of rails, horizontally arranged pulleys, means for connecting said closing plate and said pulleys, a cable connecting said pulleys and the gate tilting mechanism, a spring for holding said pulleys in their normal positions, means for holding said pulleys in their adjusted positions, and means adapted to be operated by the rear wheels of the last car of the train for releasing said pulleys from their adjusted positions.

10. In an automatic railway gate, the combination, with a pivoted closing plate having its axis parallel to the line of rails, of horizontally arranged pulleys, one of which is formed with ratchet teeth, means for connecting said pulleys and closing plate, a pawl or latch engaging said teeth, a spring for holding said pulleys in their normal positions, a transverse shaft, a cable connecting said shaft and pulleys, a crank mounted on said shaft, a bent arm pivoted to said crank, and a cable connecting said crank and said pawl whereby when said arm is depressed said pawl will be disengaged from said ratchet teeth, substantially as described.

11. In an automatic railway gate, the combination with a pivoted closing plate having its axis parallel to the line of rails, of horizontally arranged pulleys, one of which is formed with ratchet teeth, a pawl engaging said teeth, a spring for holding said pulleys in their normal positions, means for connecting said pulleys and said closing plate, a transverse shaft, a crank mounted thereon, a bent arm or plate connected loosely to said crank, a cable connecting said crank and pawl, a retaining plate adapted to be depressed, and means for connecting said bent arm or plate and said retaining plate, substantially as described.

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

EDWARD A. CHAPEL.

Witnesses:

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