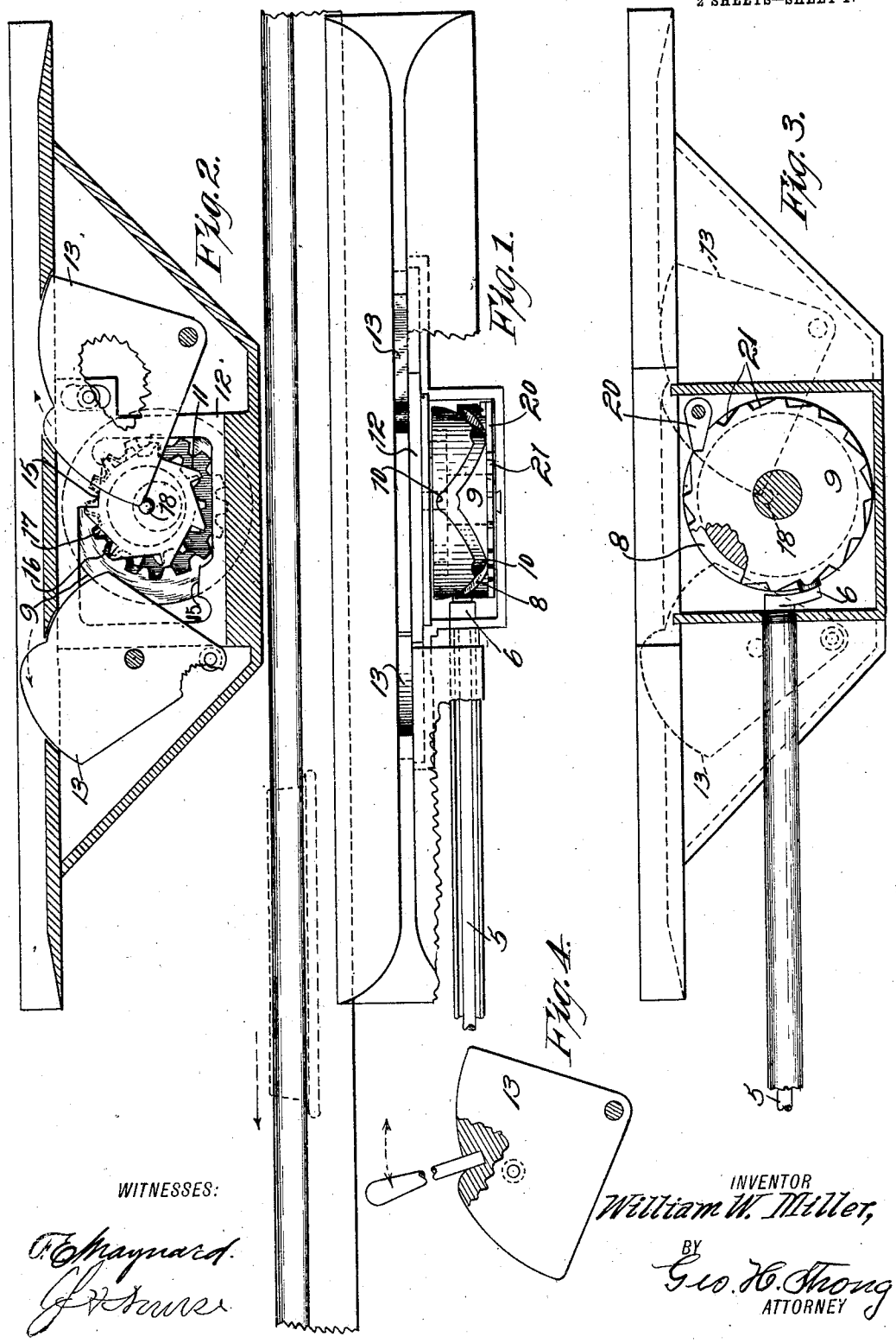
No. 836,393. PATENTED NOV. 20, 1906.

W. W. MILLER.

RAILWAY SWITCH.

APPLICATION FILED SEPT. 4, 1906.

2 SHEETS—SHEET 1.



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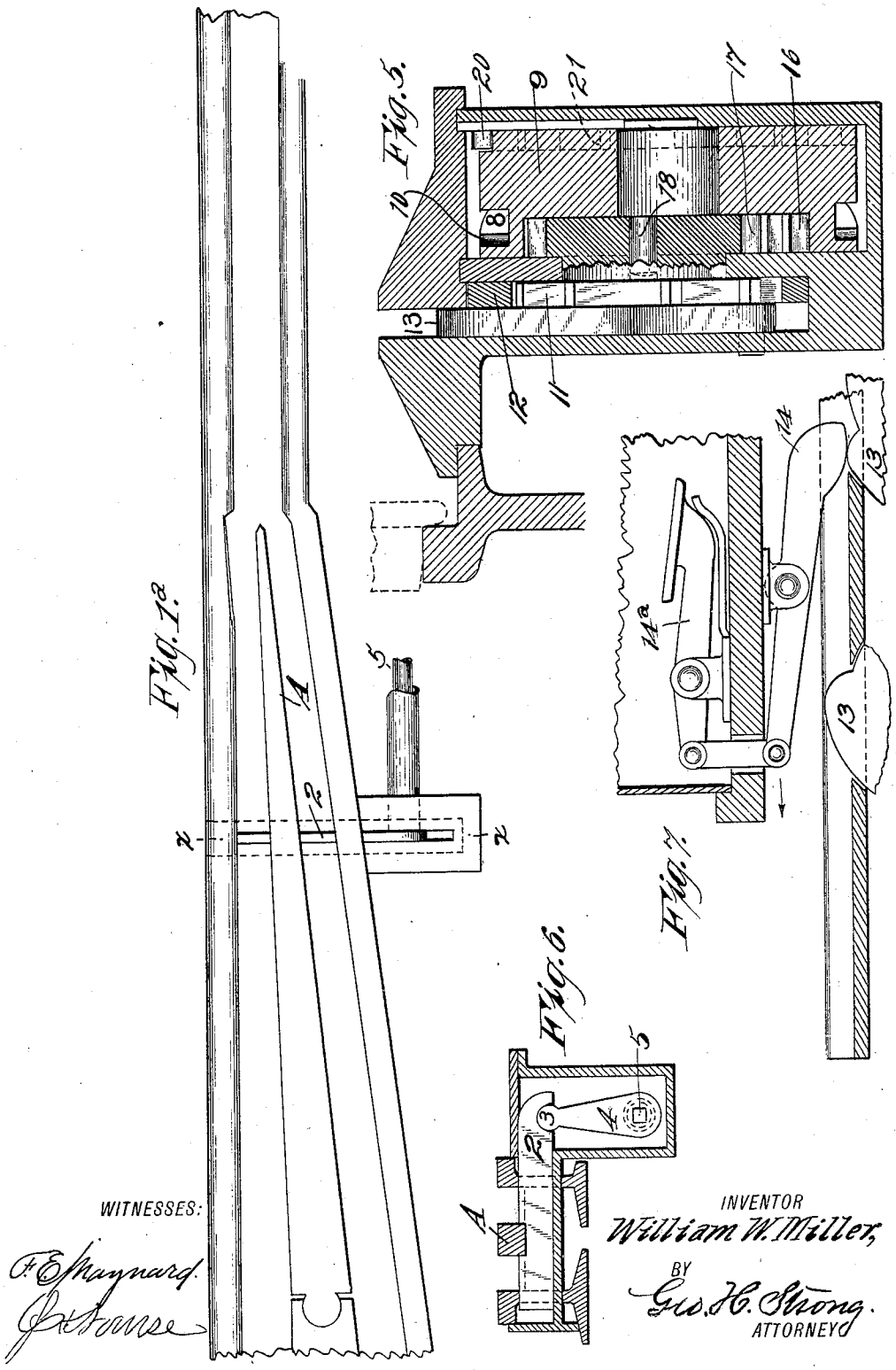

UNITED STATES PATENT OFFICE.

WILLIAM W. MILLER, OF OAKLAND, CALIFORNIA.

RAILWAY-SWITCH.

No. 836,393. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed September 4, 1906. Serial No. 333,079.

To all whom it may concern:

Be it known that I, WILLIAM W. MILLER, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Railway-Switches, of which the following is a specification.

My invention relates to railway-switches and mechanism by which such switches may be operated, with means for locking the switch at any point and rendering it safe.

It also includes details of construction and combination of parts, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 and Fig. 1ª are plan views of the mechanism and switch. Fig. 2 is a side elevation of the cams and ratchet. Fig. 3 is a top view of drum and its associated parts. Fig. 4 shows an operating-cam and hand-lever. Fig. 5 is a vertical transverse section through the gearing. Fig. 6 is a section through the switch-point at line *x x*, Fig. 1ª. Fig. 7 illustrates an operating mechanism.

The point-rail A, which is to be thrown, is located as is usual in such switches, and it is moved by means of a connecting-rod 2, which unites the rail with the crank-pin 3, which crank-pin is carried upon a rocker-arm 4. This arm is fixed upon the end of a shaft 5 of considerable length, which shaft connects with the actuating mechanism. The shaft is preferably made of such length as to be elastic, so as to be capable of torsional movement, and in case any obstruction is placed or falls into the switch or any of the moving parts the torsion of the rod allows it to yield sufficiently to prevent the breakage of parts. The opposite end of this rod is connected with a rocker-arm 6, and the end of this arm carries an antifrictional pin or roller, which engages with the cam by which the mechanism is actuated. The cam is here shown in the form of a zigzag slot 8, formed around the periphery of a drum 9. This drum is mounted upon bearings within a casing or inclosure which is sunk below the level of the track and contiguous thereto. The drum and cam are revolved by mechanism to be hereinafter described, and the movements are such that the first movement of the drum acts to throw the switch-rail one-half of the full distance, the movement of the drum being such that the actuating-lever and its roller travel only one-half the length of one of the inclines of the cam-slot, and the second movement completes the travel and the throw of the switch-rail. At the meeting angles of each of these cam-slots is formed a depression or groove 10, into which the roller on the moving end of the lever drops at the end of the motion, and this forms a lock to hold the parts in position and prevent any accidental moving of the switch-rail.

In line with the drum is a ratchet-wheel 11, and this ratchet-wheel is actuated by a guided slidable shuttle 12. In the present case I have shown this shuttle as rectangular in form and having a central opening of such size that the ratchet-wheel is turnable within this opening. The shuttle is reciprocated longitudinally either by a hand-lever, which can be operated by a motorman or other person, or it may be mechanically actuated by means of oscillating cams 13, pivoted with relation to the shuttle and having connection therewith, so that an oscillation in one direction moves it in the opposite direction. There are here shown two of these cams, both having cams or upward projections in line with the slot or channel into which they project, and by means of a lug, plate, or other projection 14, carried by the car and disposed so as to travel in this channel, the first of the cams will be moved and will turn the ratchet, and with it the actuating-drum, as previously described. As the projection passes on it contacts with the other oscillating cam and in turning this cam so as to depress it will raise the first-named cam to its normal position, and the movement communicated by the action of the second cam will return the shuttle and complete the stroke of the switch-actuating lever. Thus the apparatus may be caused to operate directly from the moving train, or it may be operated by hand by means of a lever, as before described.

In order to prevent the turning of the apparatus and to form a supplemental lock for the switch in whatever position it may be placed, I have shown the ratchet 11 as having seven teeth, the relation of the short and long sides being such that the long sides, the lines of which are tangent to a circle described within the ratchet, will stand substantially in line with the line of travel of the shuttle and may be engaged by stops 15, which are carried by the shuttle and reciprocated therewith. One of these stops is located on the lower side of the shuttle-opening and the other on the upper side, so that when the shut-

tle is advanced by the movement of the first cam 13 the ratchet will be turned to such a point that the long side or back of the lowermost tooth will be engaged by the stop which locks it, and when by the reverse movement of the shuttle the ratchet is again turned the movement of the shuttle first disengages the lower lock and carries the upper lock into engagement with the back of an upper tooth of the ratchet, thus locking it. The number of teeth and the space between them are such that in the present case seven teeth of the ratchet allow for these locking devices without other mechanism. In order to transmit the movement of this ratchet to the cam-drum, I have shown an internal gear having V-shaped teeth, as shown at 16, and this gear is revoluble with the cam-drum 9. Interior to this gear is a spur-gear 17, made of smaller diameter than the interior of the internal gear, and this spur-gear is mounted upon a pivot-shaft 18, which is eccentric to the drum and the internal gear.

The difference in the diameter of the internal and external gear is such that the teeth of the latter engage with those of the internal gear upon one side only, and upon the opposite side it turns free from the internal-gear teeth. In the present case I have shown the internal gear as having sixteen teeth, or two teeth to each of the sides of the cam 8, and the external gear or pinion which engages therewith has fourteen teeth, or double the number of teeth of the ratchet. Thus the seven-toothed ratchet, with its fourteen-toothed gear, serves to turn the sixteen-toothed gear and the drum carried thereby and at the same time allows the sides of the teeth of the ratchet to be brought alternately into the locking positions previously described.

The device which is carried upon the car and which when depressed operates the shuttle-changing cams may be of any suitble or desired form. A very convenient device may be a foot-lever 14^a within reach of the operator, so that by depressing this lever an arm connected therewith will be correspondingly depressed into the slot or channel into which the shuttle-actuating cams project.

The drum 9 is provided with ratchet-teeth 21, engaged by pawl 20 to further lock the drum and prevent return movement thereof.

The rod or bar 2, which carries the switch-rail A, is preferably flat and is guided in slots made in the webs of the two rails on each side of the rail to be moved. The end of this bar extends into a closed housing, and the upper end of the rocker arm or shaft 4 engages with the end of the bar 2, as is clearly shown in Fig. 6. This construction prevents the clogging of the bar and moving parts by dirt or sand.

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

1. In a railway-switch, a switch-rail, a cam-carrying revoluble drum, reciprocating connections between the cam and the rail, means by which the drum is rotated, a reciprocating shuttle, and mechanism whereby the reciprocation of the shuttle actuates the drum-rotating means.

2. In a railway-switch, a switch-rail, a revoluble drum having a zigzag peripheral cam upon its surface, a pivoted arm with means engaging the cam, a shaft to which the arm is fixed, a lever carried by the shaft, and connections between the arm and the switch-rail.

3. In a railway-switch, a switch-rail, a revoluble drum having a zigzag peripheral cam upon its surface, an arm with means engaging the cam, an elastic or yielding shaft to which the arm is fixed, a lever carried by the opposite end of the shaft, and connections between the lever and the switch-rail.

4. In a railway-switch, a movable switch-rail, a revoluble drum having a zigzag cam upon its periphery, connections between the cam and the rail, a reciprocable shuttle, a ratchet-wheel having connection with the drum, and devices whereby the reciprocation of the shuttle is transmitted to rotate the ratchet.

5. In a railway-switch, a switch-rail, a revoluble cam-carrying drum, mechanism actuated by the revolution of the drum to transmit motion to move the rail, a ratchet-wheel loosely connected with the drum, an open guided slidable shuttle inclosing the ratchet, projections carried by the shuttle and adapted to engage the teeth of the shuttle, and means by which the shuttle may be reciprocated.

6. In a railway-switch, a switch-rail, a revoluble cam-carrying drum, intermediate mechanism through which the movement of the cam is transmitted to move the rail, a ratchet-wheel loosely connected with the drum, a guided slidable shuttle and means by which it may be reciprocated, projections carried by the shuttle to engage the teeth of the ratchet and a locking means to prevent the turning of the ratchet at either end of the throw of the shuttle.

7. In a railway-switch, a switch-rail, a cam-carrying revoluble drum, intermediate mechanism whereby the movements of the cam are transmitted to move the switch-rail, a ratchet-wheel loosely connected with the drum, a slidably-guided shuttle, lugs carried by the shuttle adapted to engage the ratchet-teeth alternately above and below when the shuttle is reciprocated, and stops movable with the shuttle and engaging the ratchet-teeth to lock the ratchet after each reciprocation.

8. In a railway-switch, a switch-rail, a

cam-carrying revoluble drum, intermediate mechanism whereby the movements of the cam are transmitted to move the switch-rail, a ratchet-wheel loosely connected with the drum, a slidably-guided shuttle, lugs carried by the shuttle adapted to engage the ratchet-teeth alternately above and below when the shuttle is reciprocated, pivoted cams, means connecting said cams with the shuttle, and means whereby the cams may be alternately depressed to move the shuttle in opposite directions.

9. In a railway-switch, a switch-rail, a cam-carrying revoluble drum, intermediate mechanism whereby the movements of the cam are transmitted to move the switch-rail, an internal gear carried by the drum, a ratchet-wheel journaled eccentric to and in line with the drum, a pinion carried by the ratchet-shaft and engaging the teeth of the internal gear at one side only whereby motion is transmitted from the ratchet to the drum, a guided reciprocating open shuttle inclosing the ratchet having lugs above and below whereby the teeth are engaged and the ratchet and drum advanced at each reciprocation of the shuttle.

10. In a railway-switch, a switch-rail, a cam-carrying revoluble drum, intermediate mechanism whereby the movements of the cam are transmitted to move the switch-rail, said mechanism including a lever-arm having a roller to engage the slotted cam, said cam having concaved depressions at the junction of each incline into which the roller is received, and by which the arm carrying the roller is locked against accidental movement.

11. In a railway-switch, a switch-rail, a cam-carrying revoluble drum, an elastic shaft capable of torsional twisting movement journaled between the switch-rail and the drum, a lever-arm fixed to one end of said shaft, and connections between said lever and the switch-rail, a lever fixed to the opposite end of the shaft and a roller or traveler carried by the end of the lever and engaging the cam-slot.

12. In a railway-switch, a switch-rail, a cam-carrying revoluble drum, intermediate mechanism whereby the movements of the cam are transmitted to move the switch-rail, a ratchet-wheel and connections whereby the rotation of the ratchet is transmitted to move the drum, an open slidably-guided shuttle inclosing a ratchet having lugs to alternately engage the upper and lower teeth of the ratchet when the shuttle is reciprocated, pivoted cams engaging opposite ends of the shuttle and so disposed that one of the cams is raised when the other is depressed and an arm or plate carried by the car and capable of being depressed so as to contact with the cam when the car passes.

13. In a railway-switch, a switch-rail, a revoluble cam-carrying drum, intermediate connections through which the movement of the cam is transmitted to move the rail, mechanism by which the cam-drum is revolved, a ratchet turnable with the drum, and a pawl engaging the ratchet to prevent return movement of the drum.

14. In a railway-switch, a switch-rail, a revoluble cam-drum, intermediate connections through which the rotary movement of the cam is transmitted to move the switch-rail, a reciprocating shuttle and actuating devices, a ratchet turned and locked by the shuttle movements, gears transmitting said movements intermittently to the cam-drum, and a second pawl-and-ratchet mechanism to additionally lock the drum.

15. In a railway-switch, a switch-rail, main rails having slotted webs, a bar slidable through said slots, and fixed to the switch-rail, a rocker-arm engaging the bar, a shaft to which the rocker-arm is fixed, a cam, means for intermittently advancing it, and oscillating connections between the cam and the rocker-shaft.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM W. MILLER.

Witnesses:
S. H. NOURSE,
EMMA L. MILLER.