No. 832,165. PATENTED OCT. 2, 1906.

W. W. SALMON.

RAILWAY SWITCH OPERATING AND CONTROLLING APPARATUS.

APPLICATION FILED JULY 15, 1901. RENEWED MAY 17, 1906.

4 SHEETS—SHEET 1.

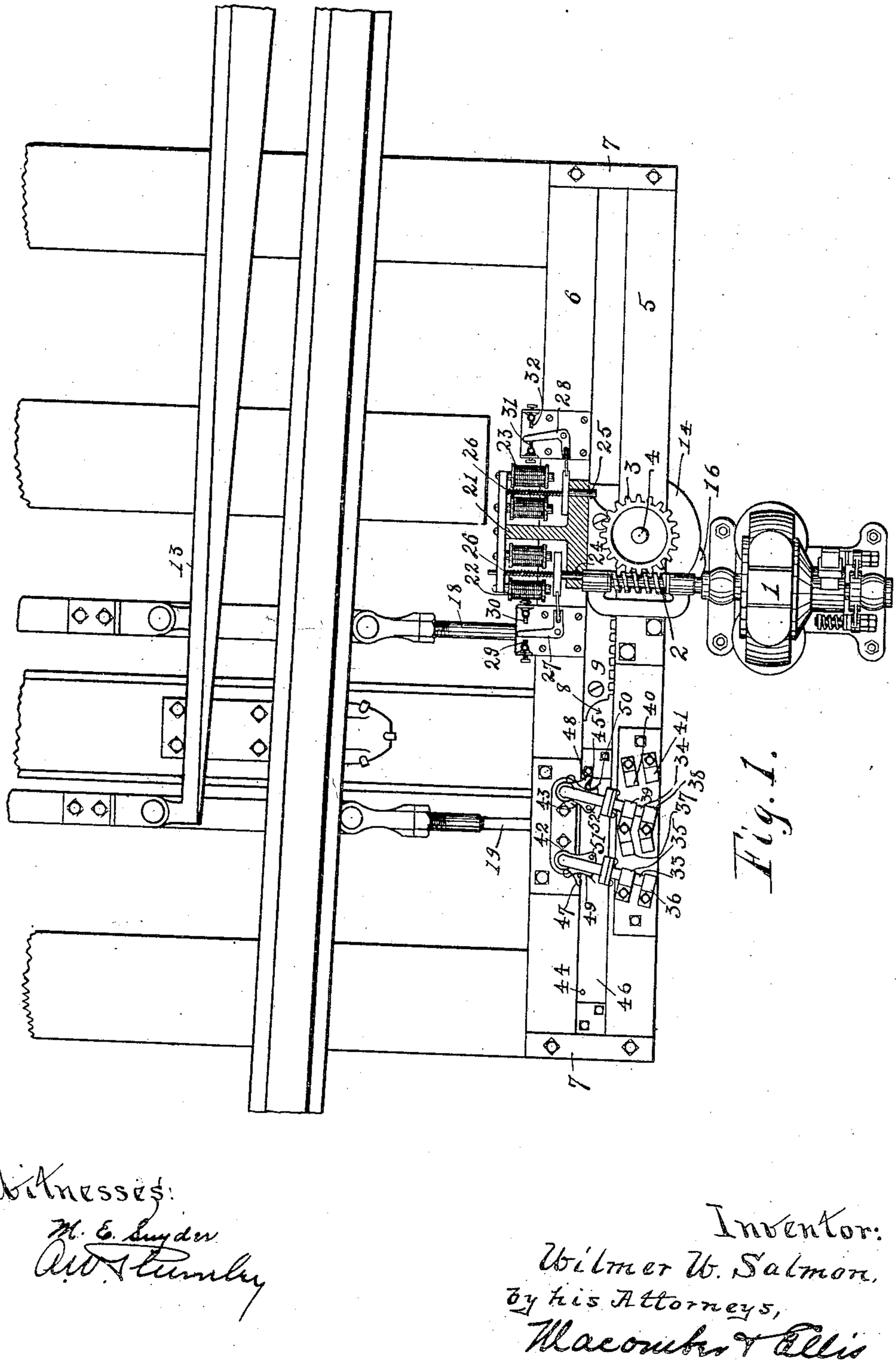

Fig. 1.

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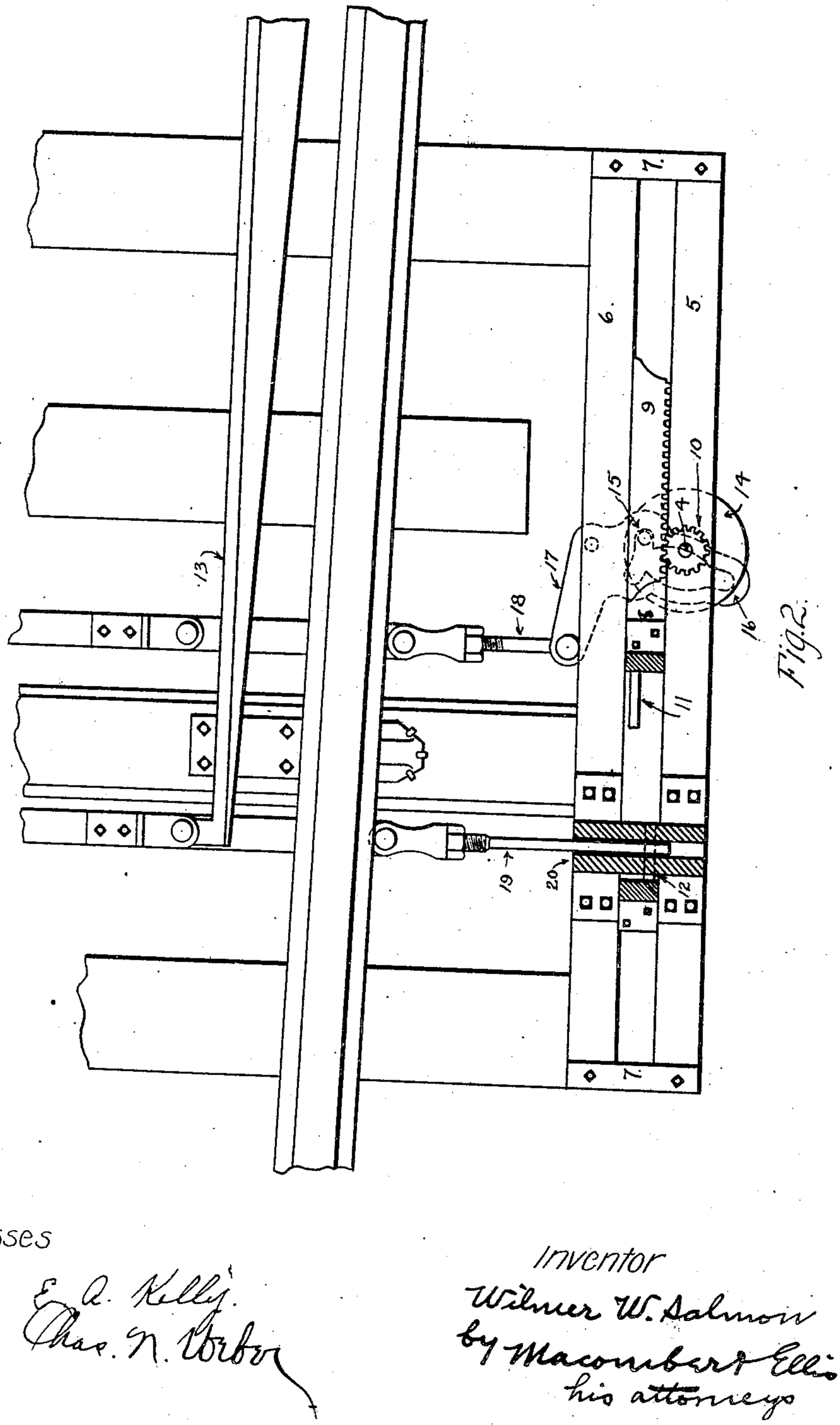

Fig. 2.

Witnesses

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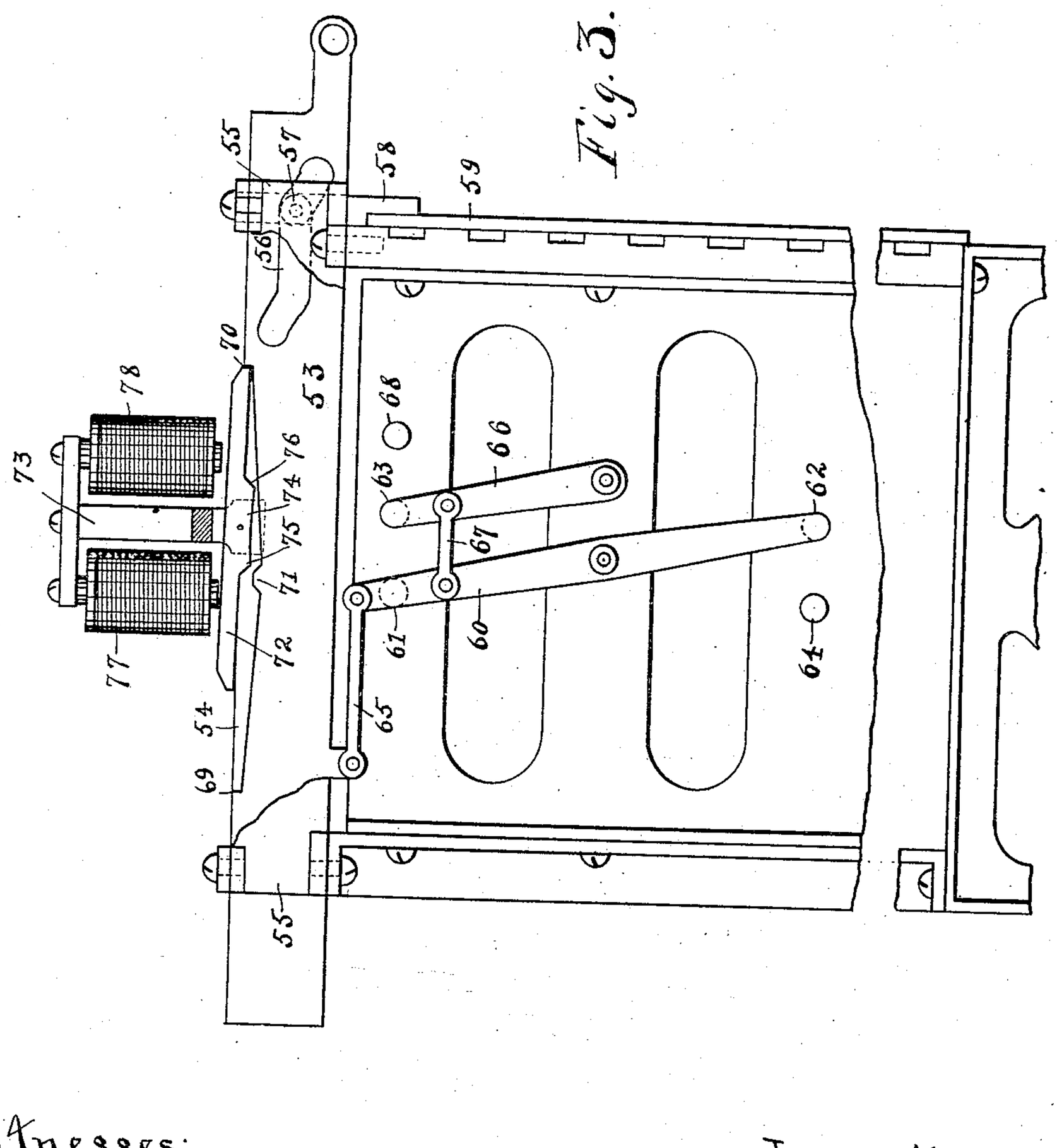
4 SHEETS—SHEET 3.

Fig. 3.



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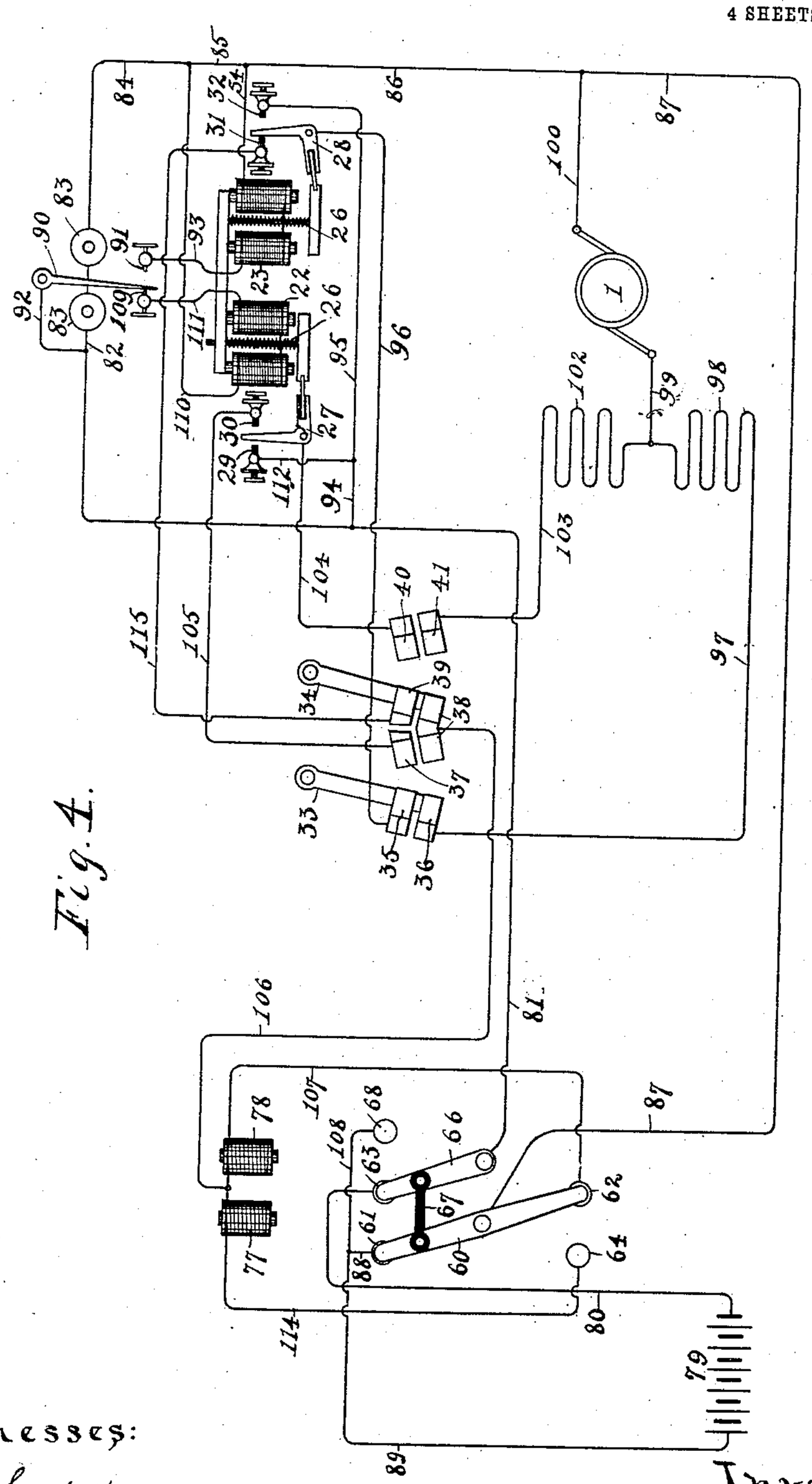

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILMER W. SALMON, OF BUFFALO, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GENERAL RAILWAY SIGNAL COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

RAILWAY-SWITCH OPERATING AND CONTROLLING APPARATUS.

No. 832,165. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed July 15, 1901. Renewed May 17, 1906. Serial No. 317,343.

To all whom it may concern:

Be it known that I, WILMER W. SALMON, a citizen of the United States, residing at the city of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Railway-Switch Operating and Controlling Apparatus, of which the following is a full, clear, and exact description.

My invention relates to railway-switch operating and controlling apparatus, and more particularly the employment of electric energy and electromagnetic influence to produce such operation and control.

The object of my invention is to provide means whereby the movement of the switch-rail may be reversed at any point of movement and restored to its initial position, and also to provide means whereby the actuating-current is automatically cut off from the motor when a complete movement of the switch has been made in either direction, and to provide means whereby the residual energy of the motor, due to momentum, may be utilized to produce an indication-current which will give the necessary back indication and operate through magnetic influence to release the controlling-levers of other functions which remain locked until the movement of the particular switch in question is complete and the switch locked.

To this end my invention consists in the employment of a series wound motor having two independent field-windings, mechanism connecting the motor with the rail-switch, locking-bars actuated by said mechanism which lock the rail-switch, an electric switch actuated by said locking mechanism to cut off the actuating-current from said motor and to close the circuit for the indication-circuit, interlocking mechanism, controlling mechanism, polarized electromagnetic mechanism governing the direction of current in the motor-armature, and the several circuits hereinafter fully described essential to the operation of said several mechanisms.

Referring to the drawings herewith, consisting of four sheets, in which like characters of reference indicate like parts, Figure 1 is a plan view of a rail-switch, switch-operating motor, and mechanism. Fig. 2 is a similar view of the switch and mechanism, in which the overlying mechanism and motor are removed to clearly show the mchanism for driving the switch-rail and the locking bars and bolts. Fig. 3 is a side elevation, partly in section, showing the controlling mechanism placed in the tower. Fig. 4 is a diagram of circuits.

Referring to Figs. 1 and 2, 1 is a series wound motor, having two independent field-windings. 2 is a worm on the armature-shaft. 3 is a worm-gear on the vertical shaft 4. The shaft 4 is journaled to bar 5 and is rotated in either direction by the motor through said worm and gear. The bar 5 and the bar 6 are bolted to extended ties and are positioned by plates 7 to provide the necessary space for the locking-bar 8 to slide freely between them. The locking-bar 8 has a rack 9 secured to it, which meshes with a pinion 10 (see Fig. 2) on the shaft 4. Bracketed to the bar 8 are bolts 11 and 12, hereinafter more fully described. The switch-rail 13 is moved, by means of a disk 14 and pin 15 in rotation with the shaft 4, in the following way: Pivoted to the bar 6 is a cam 16, which has a lever-arm 17, which is pivoted at its outer end to an adjustable rod 18, connected to the switch-rail 13. The cam 16 has a slot engaging the pin 15 of such shape that during the initial movement of the disk—say one-third of the entire movement—in either direction from its starting-point the pin 15 travels in an arc portion of the slot concentric with the shaft 4, so that it does not move the switch-rail. During the middle third of the movement of the disk 14 the pin engages the outer end of the slot, swings the cam in its pivot, and the arm 17 moves the rod 18 in one direction or the other, according to the direction of movement of the motor 1, opening or closing the switch 13. During the final third of the movement of the disk 14 the pin 15 travels free in the opposite path concentric with said shaft 4 and imparts no further movement to the cam. A lock-rod 19 is rigidly connected to the switch-rail 13 and reciprocates in a locking-frame 20, which is mounted upon the bars 5 and 6. The locking-frame 20 has holes which permit of the free passage of the bolts 11 and 12, and the holes which they enter in the locking-frame 20 are so positioned as to be respectively in

axial line with the hole in the locking-rod 19 when the switch 13 has reached its final position, either open or closed. The bolts are further positioned longitudinally, so that they are withdrawn from the locking-rod 19 in the initial one-third movement and enter the same only upon the final third movement. Secured to the bar 6 is a bracket 21, which supports magnets 22 and 23. The armatures of these magnets carry bolts 24 and 25, and springs 26 tend to force the armatures away from the magnets and to force the bolts 24 and 25 through holes in the bracket 21 and past the ends of the plate which forms the rack 9. Thus when the bar 8 is in one or the other extreme position the bolt 24 or 25 will engage over the end of the plate 9, and thus lock the lock-bolts 11 and 12, respectively. These magnets 22 and 23 and their armatures also serve to operate circuit-closers by means of bell-crank levers 27 and 28, the lower arms of which are connected to but insulated from the magnet-armatures and the upper arms of which swing in and out of contact with contact-points 29 30 and 31 32, respectively, and thus operate as circuit-closers to perform functions hereinafter described. 33 and 34 are electric switch-arms, which are calculated to bridge the contacts 35 36 37 38 and 39 38 40 41, respectively. These arms 33 and 34 are pivoted over cams 42 and 43 by pivots secured to a plate bolted to a bar 6. Upwardly-projecting pins 44 and 45 are secured to a plate 46, which is secured to the brackets carrying the bolts 11 and 12. The movement of the plate 46 will therefore be coincident with the locking-bar 8. Lugs 47 and 48 are formed on the sides of the cams 42 and 43 in such a manner that when either cam is in the position shown by the cam 42 pin 44 or 45 will readily pass by the lug and strike the side of the cam, and when either cam is in position shown by cam 43 the lug 47 or 48 will engage over the pin 44 or 45. Springs 49 and 50 are rigidly attached to the cams 42 and 43 and have their free ends so placed that they tend to bear against the sides of the switch-arms 33 and 34. Pins 51 and 52, secured to the cams 42 and 43, act against the sides of the switch-arms 33 opposite to the sides in contact with said springs and the pins 44 and 45. When the pin 44 is carried to the right, it will compress the spring 49 against the switch-arm 33 and by contact of the pin 44 with the switch-arm 33 said arm will be released from contact with the contact-plates 35 and 36. Thus freed, the spring 49 will give a quick throw to the switch-arm 33, and the pin 44 will carry it to final contact with plates 37 and 38. Such movement of the plate 46 will also cause the pin 45 to engage the lug 48 and cause the pin 52 to carry the switch-arm 34 out of contact with contact-plates 39 and 38 and into contact with plates 40 and 41. The construction just described will at once be recognized as a modified form of the ordinary electric snap-switch.

Referring now to Fig. 3, I will describe my controlling mechanism to the extent that the same enters into my invention and sufficient for an understanding of the same. A bar 53 is mounted to slide longitudinally upon the frame between guides 54 and 55. A longitudinal slot 56 is cut in the bar 53 and engages a roller 57, which is pivoted to a jaw 58, attached to the tappet-bar 59. The construction of the tappet-bar and the interlocking mechanism is too well known to require detailed description. The slot 56 adjacent to its ends is inclined upwardly and downwardly in parallel planes to give the roller 57 vertical movement during the initial and final movement of the bar 53 and a condition of rest during the middle movement of the bar 53 in the well-known manner, and it will be understood that any required number of bars 53 and tappet-bars 59 may be arranged side by side in the usual manner, and since the interrelation of several bars and tappet-bars so mounted is well known I shall not further describe the same. An electric switch-arm 60 is pivoted beneath the bar 53 and swings to bridge the contact-points 61 62 or 63 64. The arm 60 is pivoted to a pitman 65, which in turn is pivoted to a lug on the bar 53. A second switch-arm 66, having insulated link connections 67 with the bar 60, is calculated to bridge its pivot, which constitutes one contact, with the contacts 63 or 68. When the bar 53 is moved until it is stopped by the latch 72, engaging in the notch 70, the switch-arm 60 makes contact with the contacts 61 and 62, and the switch-arm 66 makes contact with 63. When the bar 53 is moved until it is stopped by the latch 72, engaging in the notch 69, the switch-arm 60 makes contact with the contacts 63 and 64, and the switch-arm 66 makes contact with contact 68. The final movement of the bar 53 throws both switch-arms 60 and 66 out of all electrical connections. The upper edge of the bar 53 is cut away centrally, so as to form the shoulders 69 and 70. A lug 71, centrally located in said cut, projects upwardly from the bar 53. A latch 72 is pivoted to the bracket 73, which is secured to the frame of the machine in such manner that its ends may engage the shoulders 69 and 70, and upon its under side the latch 72 has a downwardly-projecting lug 74 with shoulders 75 and 76. The face of the lug 74 is so positioned that the movement of the lug 71 will throw the latch 72 into engagement with the shoulder 69 or 70, according to the direction of movement, so that the bar 53, free to make its initial movement, throws the latch by this mechanical device during its middle movement to prevent it from making its final movement until said latch is moved by the

influence of the magnets, about to be described, when energized by the back indication-current. It will be noted that the shoulders 75 and 76 of the lug 74 are so located that when the lug 71 has reached the position for a magnetic release of the latch 72 the lug 71 is out from under the lug 74. 77 and 78 are magnets supported by the bracket 73 in such position that when the magnet 77 is energized it will lift the end of the latch 72 engaging with the shoulder 69, and when the magnet 78 is energized it will lift the end of the latch 72, engaging with the shoulder 70.

Having thus described the several mechanical parts of my invention, I will now refer especially to the diagram of Fig. 4 and indicate the several circuits and method of operation. Suppose the bar 53 to have been moved from its extreme right-hand position into the position shown in Fig. 3, where it is stopped by the latch 72, engaging the shoulder 70. This movement has put the electric switch-arm 60 into connection with the contacts 61 and 62 and the switch-arm 66 into connection with the contact 63. This closes a circuit of the battery 79, so that the current flows through wire 80, contact 63, switch-arm 66, wires 81 and 82, polarized relay 83, wires 84 85 86 87, switch-arm 60, contact 61, wires 88 and 89, back to battery 79. This energizes the polarized relay in such direction as to throw its lever 90 against the stop 91, thereby closing another circuit of the battery 79, so that the current flows from the battery through wires 80, contact 63, switch-arm 66, wires 81 92, lever 90, stop 91, wire 93, magnet 23, wires 54 86 87, switch-arm 60, contact 61, wires 88 and 89, back to battery 79. This energizes the magnet 23, causing it to withdraw the bolt carried by its armature from the rack 9 on the locking-bar 8 and to put the electric switch-arm 28 into electrical connection with the stop 32, thereby closing another circuit of the battery 79, so that the current flows through wire 80, contact 63, switch-arm 66, wires 81 94 95, stop 32, switch-arm 28, wire 96, contact 35, switch-arm 33, contact 36, wire 97, field-coil 98, wire 99, armature 1, wires 100 and 87, switch-arm 60, contact 61, wires 88 and 89, back to the battery 79. This energizes the motor 1, causing it through the intermediate gearing to move the locking-bar 8 and the switch-rail. The first small part of the movement of the bar 8 withdraws the switch-arm 34 from the contacts 38 and 39 and puts it into connection with the contacts 40 and 41. When the movement of the lock-bar 8 is nearly complete, the rack 9 passes the bolt carried by the armature of magnet 22, allowing the armature to fall back under the influence of its spring, thus putting the switch-arm 27 into contact with the stop 30 at approximately the same time the bar 8 through intermediate mechanism withdraws the switch-arm 33 from the contacts 35 and 36 and puts it into connection with the contacts 38 and 37. This breaks the circuit for the driving-current between the contacts 35 and 36 and establishes a circuit including the motor 1 and the magnet 78, so that the current generated by the continued rotation of the armature 1, due to momentum, generates a current which flows from the armature 1 through wires 99, field-coils 102, wire 103, contact 41, switch-arm 34, contact 40, wire 104, switch-arm 27, stop 30, wire 105, contact 37, switch-arm 33, contact 38, wire 106, magnet 78, wire 107, contact 62, switch-arm 60, wires 87 and 100, back to the armature 1. This current stops the rotation of the armature 1 and energizes the magnet 78, causing it to lift the latch 72 out of engagement with the shoulder 70, thus permitting the bar 53 to be pushed back into its final position, thereby releasing certain locking on the tappet-bar 59 and carrying the switch-arms 60 and 66 away from the contacts 61, 62, and 63, respectively. To put the track-switch back again to its original position, the bar 53 is pulled to the right until stopped by the latch 72, engaging with the shoulder 69. This movement puts the switch-arm 60 into connection with contacts 63 and 64, and the switch-arm 66 into contact with 68. In moving into this position the switch-arm 60 passes over the contacts 61 and 62, and the switch-arm 66 passes over the contact 63; but as these connections established a circuit of the battery to effect the previous movement, which circuit is broken between the contacts 35 and 36, nothing is done by it. The switch-arms in the new position mentioned above close a circuit of the battery 79, so that the current flows through the wire 80, contact 63, switch-arm 60, wires 87 86 85 84, polarized relay 83, wires 82 81, switch-arms 66, contact 68, wires 108 and 89, back to the battery 79. This magnetizes the polarized relay in such direction as to throw the lever 90 against the stop 109. This closes another circuit of the battery 79, so that the current flows through wire 80, contact 63, switch-arm 60, wires 87 86 85 110, magnet 22, wire 111, stop 109, lever 90, wires 92 81, switch-arm 66, contact 68, wires 108 and 89, back to the battery 79. This energizes the magnet 22, causing it to withdraw the bolt from the rack 9 and to place the electric switch-arm 27 in connection with the stop 29, thereby closing another circuit of the battery 79, so that the current flows through wire 80, contact 63, switch-arm 60, wires 87 100, armature 1, wire 99, field-coils 102, wire 103, contact 41, switch-arm 34, contact 40, wire 104, switch-arm 27, stop 29, wires 112 94 81, switch-arm 66, contact 68, wires 108 and 89, back to the battery 79. This current causes the armature to rotate in a direction opposite to that it had in the movement previously described and the track-switch 13 and locking-bar 8 to move in

the opposite direction. At the beginning of this movement the switch-arm 33 is withdrawn from the contact 38 and 37 and put into connection with the contacts 35 and 36. During all but the final part of the movement the switch-arm 28 is held away from the contact or stop 31 by the bolt carried in the armature of the magnet 23, which operates it, resting against the back of the rack 9. This bolt is of such length that when it is resting against the back of the rack 9 the switch-arm 28 is held in a position between the stops 31 and 32, so that it does not make contact with either. The same construction is applied to the switch-arm 27, and it is shown in this neutral position in the drawings. Near the end of the movement now being described the rack 9 passes the bolt on the armature of magnet 23 and under the influence of its spring the armature is forced away from the magnet, which in this movement is not energized, and the switch-arm 28 is put into connection with the stop 31 at approximately the same time the switch-arm 34 is withdrawn from the contact 40 and 41 and put into connection with the contacts 38 and 39. This breaks the driving-current through the motor between the contacts 40 and 41 and establishes a circuit including the motor and the magnet 77, so that the current generated by the rotation of the armature flows from the armature through the wires 100 87, switch-arm 60, contact 64, wire 114, magnet 77, wire 106, contact 38, switch-arm 34, contact 39, wire 115, stop 31, switch-arm 28, wire 96, contact 35, switch-arm 33, contact 36, wire 97, field-coils 98, wire 99, back to armature 1. This current energizes the magnet 77, causing it to lift the latch 72 out of the path of the shoulder 69. The switch-arms 33 and 34 are reversed long enough before the end of the movement of the locking-bar 8 to give time for the development of the indication-current and for this current to stop the rotation of the armature without shock.

From the preceding description it will be seen that the switch-arms 33 and 34 make connection with the contacts 35 36 and 40 41, respectively, throughout nearly the whole of the movement of the locking-bar 8, and the arrangement and proportion of parts are such that they do remain in these positions throughout the entire time, and, more, that the lock-bolts 11 and 12 are being withdrawn from the lock-rod 19, so that during this time they are symmetrically situated with respect to forming circuits through the field-coils 98 and 102. It will also be seen that the direction of currents through the polarized relay and the motor-armature depends on the position of the controlling-switch 60 66 in the tower, that the circuits through magnets 22 and 23 depend on the position of the relay-lever 90, and the magnet 22 controls the circuit through the field-coil 102 and the magnet 23 that through the field-coil 98. The connections to the terminals of these field-coils are made so that opposite currents sent through the armature by the change in position of the controlling-switch produce opposite rotations of the armature.

After starting a switch movement and before the complete movement has been effected it is sometimes desirable to throw the track-switch back into its original position again. Especially is this desirable if there is an obstruction between the rail which prevents a complete movement. To describe how this is effected, suppose the controlling-switch 60 66 to be put into the position shown in Fig. 4 to effect the first movement described above. This throws the polarized relay-lever 90 against the contact 91, as above described, energizes the magnet 23, and causes current to flow through the field-coils 98 and through the armature 1 from left to right on the diagram. The initial movement of the lock-bar 8 puts the switch-arm 34 into connection with the contacts 40 and 41. If now the controlling-switch be put into the position to effect the second movement previously described, the current is sent through the polarized relay in the opposite direction, the lever is thrown against the stop 109, the magnet 22 is energized instead of 23, and current flows through the field-coil 102 and the armature 1 from right to left. This causes the armature to rotate in the opposite direction, and the track-switch and locking-bolts are put back into their original position, the operations being the same as those described for the second movements mentioned above.

I do not limit myself to this particular construction illustrated. For instance, I may use a train of spur-gearing instead of the worm-gearing shown, or I may use a screw on the armature-shaft running in a nut on the locking-bar 8 by means of the mechanism employed on the well-known mechanical switch-and-lock movement. I may also dispense with the polarized relay 83 by equipping the magnets 22 and 23 with polarized armatures and placing these two magnets in series in the circuit in which the polarized relay 83 is shown. I would arrange the polarization of the armatures so that a current in one direction would cause only one of the magnets—say 22—to attract its armature and a current in the opposite direction would cause the magnet 23 to attract its armature.

Having thus described my invention and its method of operation, what I claim, and desire to secure by Letters Patent, is the following combinations, substantially as and for the purposes set forth:

1. The combination with a switch mechanism of a motor having two independent

field-windings, a polarized relay, and locks, controlled by said polarized relay, for locking said switch mechanism.

2. The combination with a switch mechanism of a motor having two independent field-windings; a polarized relay, and magnets which are controlled by said polarized relay for governing the current through the field-windings of said motor.

3. In combination with a rail-switch and a source of electric energy, a series-wound motor having two independent field-windings, mechanism connecting said motor and said switch, controlling mechanism, an electric switch, a polarized magnet governed by said switch for mediately establishing a circuit including one or the other of the fields of said motor and said source of energy, electromagnetic means governed by said polarized magnet and governing the circuits of said fields for immediately closing one or the other of the fields of said motor with the source of energy, electromagnetic means for governing said controller, a circuit, and an electric switch in said circuit for closing said motor in circuit with said electromagnetic mechanism governing said controller, whereby the action of said motor, due to momentum, energizes said electromagnetic mechanism governing said controller, substantially as and for the purposes set forth.

4. In combination with a railway-switch and a source of electric energy, a series-wound motor having two independent field-windings, mechanism connecting said motor with said switch, a controller, an electric switch, a polarized magnet governed by said switch for mediately establishing a circuit including one or the other of the fields of said motor with said source of energy, electromagnetic means governed by said polarized magnet and governing the circuits of said fields for immediately closing one or the other of the fields of said motor with said source of energy, a circuit, an electric switch in said circuit, and electromagnetic means for governing said controller comprising indication-circuits and indication-magnets included in each of said indication-circuits, said magnets capable of being closed respectively with the windings of said motor, whereby said motor, acting as a generator, may energize one or the other of said magnets, according to the direction of its rotation, substantially as and for the purposes set forth.

5. The combination with a rail-switch, a motor, a source of electric energy, and mechanism connecting said motor with said switch, of a locking mechanism consisting of a locking-bar mechanically actuated by the mechanism driven by said motor, and locking-bolts for locking said bar, a polarized magnet and magnets governed by said polarized magnet for unlocking said bolts, and a controller and circuits including said polarized magnets with the source of energy and circuits including said magnets for unlocking said bolts locking said locking-bar with said source of energy, substantially as and for the purposes set forth.

6. The combination of a rail-switch, a series-wound motor having two independent field-windings, operating-circuits, indicating-circuits, and a source of electric energy, of a controller, a pole-changing mechanism for mediately closing one of said motor-fields with said source of energy, magnets governing said controller, mechanical means for moving and locking said rail-switch through the action of said motor, and means for locking and releasing the mechanism locking said switch, consisting of magnets governed by said pole-changing mechanism and armatures carrying bolts to lock said rail-switch-locking mechanism, mechanical means for driving said bolts to lock, and electric switches actuated by the movement of said armatures which immediately close one or the other of the fields of said motor and said source of energy when said bolts are entirely withdrawn from lock, and a snap-switch which breaks one or the other of said operating-circuits and closes said motor through one of said indication-circuits in circuit with one of said magnets governing said controller when said bolts are driven into lock mechanically, substantially as and for the purposes set forth.

7. In combination with a rail-switch, a motor having two independent field-windings, and a source of energy, of mechanical means for moving said switch and locking the same on completion of the movement of the rail-switch, a controller, an electric switch, a polarized magnet governed by said switch for mediately establishing a circuit including one or the other of said fields with said source of energy, electromagnets governing said controller, mechanism for locking said locking mechanism and for closing said motor in circuit with said source of energy when said last-mentioned mechanism is withdrawn from lock and for closing said motor in circuit with said magnets governing said controller when said locking mechanism is in lock, comprising said polarized magnet, magnets and armatures carrying bolts for locking said track-switch lock, mechanical means for moving said bolts and said armatures to lock and away from said magnets, and a circuit including one or the other of said magnets to withdraw one of said bolts from lock, and electric switches actuated by the movement of said armatures which put one or the other of said motor-fields in circuit with said source of energy when its respective bolt is out of lock, and which puts said motor in circuit with one of said magnets governing said controller when said bolt is in lock, substantially as and for the purposes set forth.

8. The combination with a railway-switch,

a motor having two independent field-windings, and a source of electric energy, of a controlling mechanism and an electric switch actuated thereby for mediately closing the field-windings respectively in circuit with a source of energy, an electric switch actuated by a polarized magnet governing said circuit, an electric snap-switch, a track-switch, mechanism for driving said switch and mechanism for locking the same, an electric switch actuated thereby for closing said field-windings in circuit with said source of energy, mechanical means for holding said controller against final movement until the railway-switch is locked and electromagnetic means for permitting such final movement, means for locking said switch-locking mechanism and releasing the same at the proper intervals consisting of bolts mechanically driven into lock, electromagnets governed in the order of their action by said polarized magnet for withdrawing the same, and electric switches moved by said bolts to close the circuit including the motor and the source of energy when a bolt has been withdrawn from lock and to close said motor in circuit with the magnets governing said controller when the switch-rail movement is complete and locked, substantially as and for the purposes set forth.

9. In combination with a series-wound motor having two independent field-windings, a track-switch, a controller, a source of energy and controlling and operating and indication circuits, an electric switch, a polarized magnet, a circuit capable of being closed through said controller, and an electric switch to establish a second circuit including said switch, the tongue of said polarized magnet and one of two other magnets, according to the position of the tongue of said polarized magnet, a lock for locking said track-switch, magnets last mentioned to unlock the lock of said track-switch comprising two coils, two armatures and two bolts, and two electric switches actuated by said armatures for said unlocking and for establishing the switch-operating circuit through one or the other of the windings on said motor to move said rail-switch, substantially as and for the purposes set forth.

10. In combination with a series-wound motor having two independent field-windings, a track-switch, a controller, a source of energy and controlling and operating and indication circuits, an electric switch, a polarized magnet, a circuit capable of being closed through said controller, and an electric switch to establish a second circuit including said switch, the tongue of said polarized magnet and one of two other magnets, according to the position of the tongue of said polarized magnet, a lock for locking said track-switch, magnets last mentioned to unlock the lock of said track-switch comprising two coils, two armatures and two bolts, and two electric switches actuated by said armatures for said unlocking and for establishing the switch-operating circuit through one or the other of the windings on said motor to move said rail-switch, and indication-circuits and magnets included in said circuits, and a snap-switch included in said operating-circuit to break the same at the end of the switch movement and closing the indication-circuit, substantially as and for the purposes set forth.

In witness whereof I have hereunto subscribed my name, in the presence of two witnesses, this 28th day of June, 1901.

WILMER W. SALMON.

Witnesses:
D. B. TUTTLE,
M. E. SNYDER.