No. 774,373. PATENTED NOV. 8, 1904.

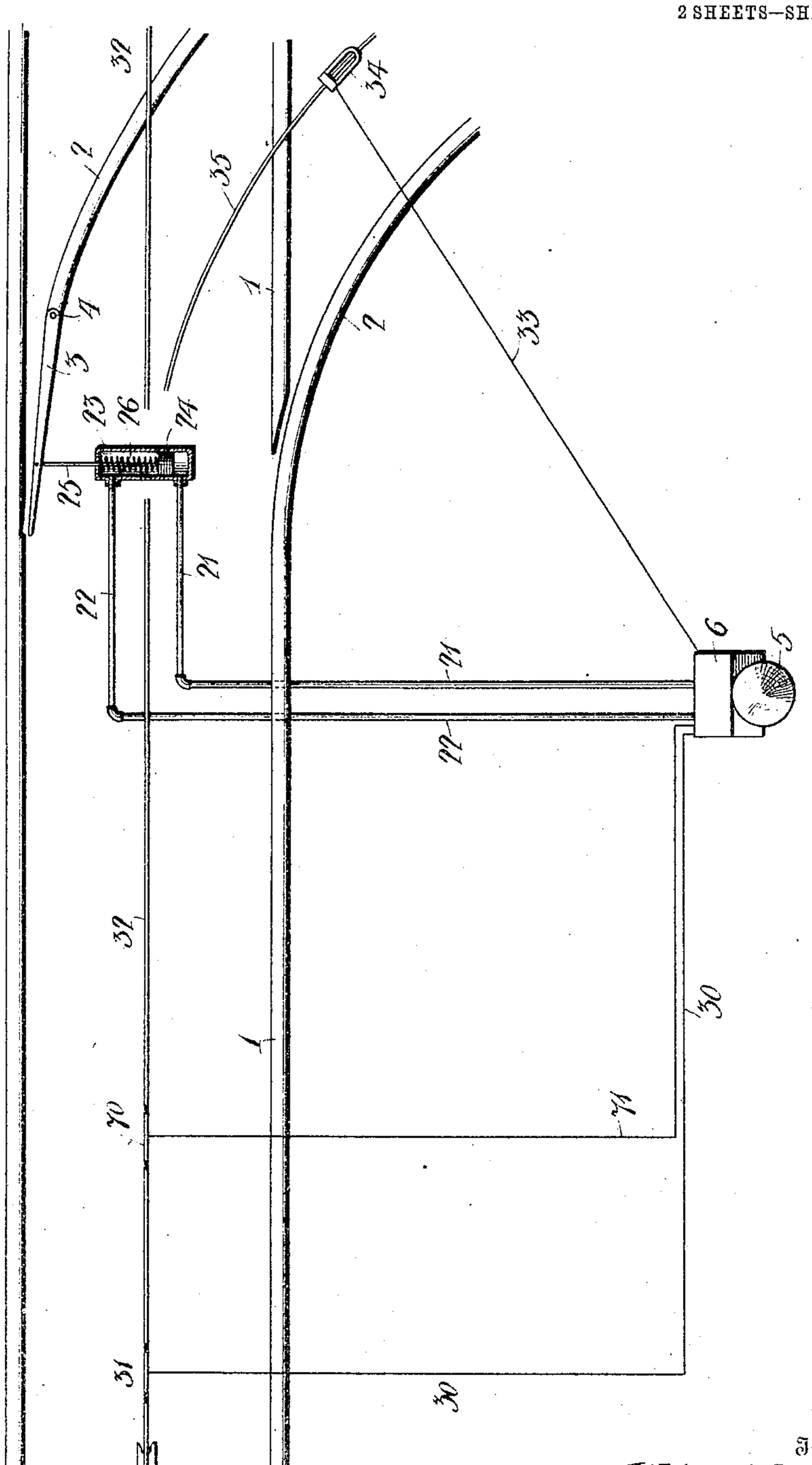
W. J. BELL.

STREET RAILWAY SWITCHING MECHANISM.

APPLICATION FILED MAY 21, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1



Witnesses

Inventor
Walter J. Bell

By Dudley & Co

his Attorneys

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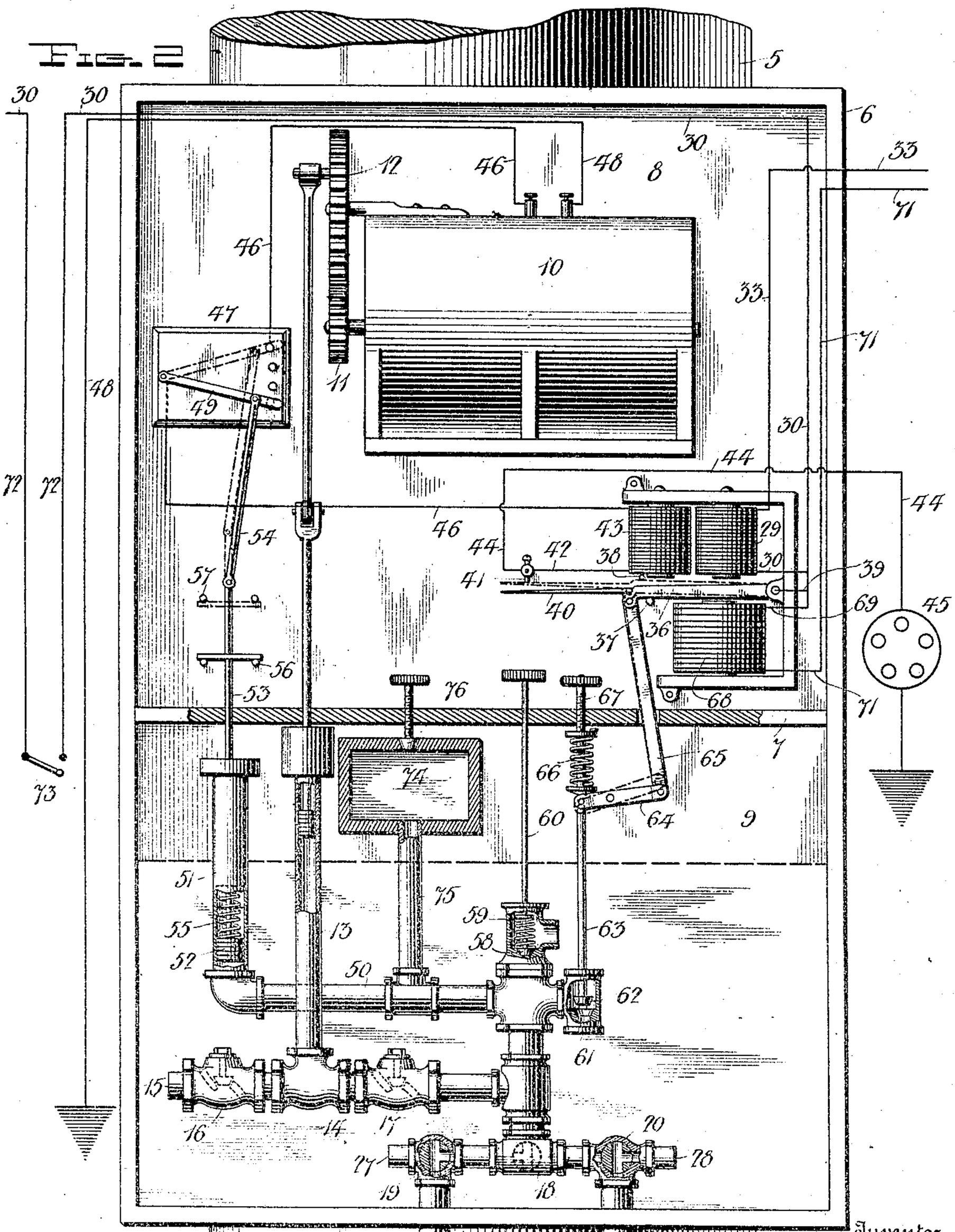
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2



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No. 774,373. Patented November 8, 1904.

UNITED STATES PATENT OFFICE.

WALTER J. BELL, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO LEON F. MOSS, OF LOS ANGELES, CALIFORNIA.

STREET-RAILWAY SWITCHING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 774,373, dated November 8, 1904.

Application filed May 21, 1903. Serial No. 158,144. (No model.)

To all whom it may concern:

Be it known that I, WALTER J. BELL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Street-Railway Switching Mechanism; 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 present invention relates to railway-switches, and contemplates an improved construction of switching mechanism employing fluid-pressure-transmitting means between the source of power and the switch-operating appliance, also the provision of electrical means for controlling the operation of the parts from the moving car or train.

The invention in its preferred form of embodiment is fully set forth in the following description and illustrated in the accompanying drawings.

In the drawings, Figure 1 is a plan view of a section of a straight track and of a divergent track, a switch at the junction of said tracks, and switching operating mechanism embodying my invention. Fig. 2 is an elevation of the box or casing containing certain of the operating parts and shown supported on a pole or other upright.

Referring to the drawings by numerals, 1 1 denote the straight or main track rails, 2 2 are the divergent-track rails, and 3 is the switch-tongue, pivoted at 4.

Supported on a pole 5 adjacent to the switch is a casing or box 6, having a horizontal partition 7, dividing it into an upper compartment 8 and a lower compartment or reservoir 9 for fluid, preferably oil. In the compartment 8 is an electric motor 10, on the shaft of which is a relatively small gear-wheel 11, meshing with a relatively large gear-wheel 12, carrying a crank-pin. In the compartment 9 is a pump 13, the piston of which has rod-and-pitman connection with the crank-gear 12. Connected to the lower end of the pump and immersed in the oil is a supply-pipe 14, having an inlet end 15 and check-valves 16 17, which may be of the usual type. Connected to the opposite end of the supply-pipe is a manifold built up of T-couplings 18, 19, and 20 and connecting pipe-sections, and 21 22 are oil-pipes leading, respectively, from the couplings 19 and 20 to a cylinder 23, located at the switch. In the cylinder is a piston 24, connected to the switch-tongue 3 by a rod 25, and 26 is a spring coiled around the piston-rod and confined between the forward end of the cylinder and the piston to retract the latter and switch-tongue after movement to the normal position shown, in which position the straight or main track is open and the divergent track closed. The pipe 21 communicates with the cylinder at its rear end, and the pipe 22 connects the forward end of the cylinder with the tank, whereby to vent said forward end of air and any oil which may leak past the piston. The manifold is provided with open ends 27 28, and in each of the T-couplings 18, 19, and 20 is a three-way valve, the arrangement permitting the use of either of the pipes 21 22 as the pressure-pipe and the other the vent-pipe, dependent upon the right or left hand location of the switch-tongue. By this arrangement also the movement of the switch-point by fluid-pressure may be changed to normally open the divergent track and close the straight track, this being accomplished by the stated adjustment of the three-way valves and by shifting the spring 26 to the opposite end of the switch-tongue-moving piston 24.

In operation the motor is set in motion to actuate the pump and force the oil under pressure to the rear end of the cylinder 23, whereupon movement of the piston is communicated to the switch-tongue, and the latter assumes the position shown in dotted lines to open the divergent track.

The means for controlling the operation of the motor, and consequently of the switch, will now be described.

In the upper compartment 8 of the casing is an electromagnet 29, and 30 is a wire leading from the coils thereof to an insulated section 31 of the trolley-wire 32. A wire 33 leads from the magnet-coils to a circuit-

breaker 34 on the divergent trolley-wire 35, said circuit-breaker until operated by the trolley-wheel of a car traversing the divergent track being electrically charged. When the trolley-wheel occupies the trolley-wire section 31, a circuit is established through the circuit-breaker 34, wire 33, magnet 29, wire 30, and thence by the section 31 through the car to the ground. The magnet 29 being thereby energized attracts and elevates an armature 36 to close the motor-operating circuit, it being understood that the circuit established by engagement of the trolley-wheel with the insulated section 31 is of but short duration, whereas the operating-circuit is maintained for a length of time sufficient to effect the operation of the parts, as hereinafter explained. The armature 36 is pivoted at its inner end, and its outer end is movable between stop-pins 37 38. A wire 39 connects the armature with the wire 30. The armature carries at its outer end a contact-arm 40, and in the path of movement of said arm is an adjustable contact 41, connected by a wire 42 with the coils of a magnet 43, arranged, preferably, at the side of magnet 29. A wire 44 leads also from said contact 41 to ground, and in said wire is a group of lights 45, located to be within sight of the operator on the car. Leading from the coils of magnet 43 to the motor 10 is a wire 46, in which is arranged a rheostat 47. The motor is grounded through a wire 48. The arm 49 of the rheostat normally rests on the first notch of the resistance, there being no zero-point, and said arm is moved successively across the other notches by the fluid-pressure generated in the operation of the pump. Connected with a branch 50 of the supply-pipe 14 is a cylinder 51, containing a piston 52, the rod 53 of which is attached to the rheostat-arm 49 by a rod 54. Fluid-pressure being created by the operation of the pump, the piston 52 is moved against the action of a spring 55, and through the medium of the connecting-rod 54 the rheostat is adjusted to throw in the proper resistance, the range of movement of the arm being limited by stop-pins 56 57.

In the supply-pipe 14 is a pop-valve 58, normally held to its seat by a spring 59, the tension of which is adjusted through the medium of a hand-operated screw-rod 60. The function of the pop-valve is to relieve the fluid-pressure when the switch-tongue has reached its limit and also when movement of the switch-tongue is obstructed. The supply-pipe is provided also with an escape-opening 61, at which is a valve 62. The stem 63 of the valve 62 is pivoted to one end of a lever 64, and 65 is a rod connecting the opposite end of the lever with the armature 36. The valve 62 is normally elevated from its seat by the action of an expansible spring 66, attached to the stem 63, and a tension-regulating screw 67. By the employment of the escape-opening 61 free-hand switching may be accomplished when the automatic mechanism is idle without interference with the retractive movement of the switch-tongue, inasmuch as the free vent of the oil past the raised valve 62 prevents the oil being drawn through the pump check-valve. In the movement of the armature 36 toward the magnet 29 the valve 62 becomes seated, and, the escape-opening being closed, full pressure of the oil generated by the operated pump is exerted against the piston 24. The spring 66 operates to retract both the valve 62 and armature.

68 is a magnet located beneath the magnet 29, wound to magnetically antagonize the latter. The armature is arranged between the poles of said magnets and normally assumes the lowered position shown in full lines. A wire 69 leads from the coils of magnet 68 to the wire 30, and leading from said coils to an insulated section 70 of the trolley-wire 32 is a wire 71.

In operation the described temporary circuit is obtained by the contact between the trolley-wheel of the car and the trolley-wire section 31, and the magnet 29 is energized to elevate the armature and establish, through the contact 40 41, the operating-circuit and the circuit through the group of lights 45, whereby to indicate to the operator on the car the formation of the operating or switch-throwing circuit. The magnet 29 is wound with coarse wire to carry the full current, and the magnet 43 is wound with finer wire and will develop sufficient magnetism to maintain the armature in raised position when only a portion of the current is carried. The motor being set in motion through the formation of the operating-circuit, the oil is pumped from the tank through the pipe 21 to the piston 24, and the escape-valve 62 being seated by movement of the armature the full pressure of the oil is exerted against said piston to move the switch-tongue to open the divergent track. When the switch-tongue has reached its limit of movement, the excess of oil passes by the pop-valve back into the tank, the requisite fluid-pressure being thereby maintained against the piston to hold the switch-tongue in its thrown position. If the car is to take the straight track, the controller on the car, which has previously been moved to turn on the current, is not disturbed, and when contact between the trolley-wheel and the second trolley-wire section 70 is effected a circuit is established through the magnet 68, which, being more powerful than the magnet 29, retracts the armature, breaking the operating-circuit at 40 41 and stopping the motor. In the retractive movement of the armature the escape-valve 62 is raised, and the tension of the piston-spring 26 being greater than the reduced fluid-pressure the switch-tongue returns to normal position to open the straight track. If the car is to take

the divergent track, the operator after traversing the section 31 throws off the current from the car by moving the controller and allows the car to coast by the section 70, thereby preventing the energizing of the magnet 68 and maintaining the operating-circuit. The operating-circuit is broken at the section 70 to reset the parts when the car takes the straight track, and to break said circuit after the car has been switched onto the divergent tracks I provide the circuit-breaker 34, previously described, which is engaged by the trolley-wheel and moved to effect the separation of contacts thereon in any suitable manner. When the break in the operating-circuit occurs, the parts return to normal position and are ready for the next car.

In the wire 33 is a loop 72, provided with a hand-switch 73, located at the side of the track within reach of the operator on the car. This hand-switch when opened serves to break the operating-circuit and allow retraction of the thrown switch-tongue, the hand-switch being moved by the operator of a straight-ahead car in the event of unintentional interference with the controller and the consequent shutting off of the current at the second section 70. This allows of the interruption of the operating-circuit without the necessity of operating the circuit-breaker 34 and does not compel a straight-ahead car to take the divergent track even though through error the car is allowed to coast by the second section 70. As a means for retarding the movement of the switch-tongue until after the car has passed the second section 70 I provide an air-chamber 74, which communicates with the oil-pipe 14 through the pipe 50, and a pipe 75, connecting the latter with air-chamber casing. The chamber is equipped with a hand-controlled valve 76, by which the volume of air is regulated. In operation the initial fluid-pressure is utilized to compress the air in the chamber. Consequently the movement of the switch-tongue is retarded until after the car has passed the second section 70. If the car is to take the straight track, therefore, no movement of the switch-tongue will occur, as the operating-circuit through which said tongue is moved is broken at the second section before sufficient fluid-pressure is obtained to move the piston 24.

Various modifications of the construction may be made without departing from the spirit of the invention, and no limitation is intended by the specific disclosure and illustration.

I claim as my invention—

1. In a switching mechanism, a switching element, liquid-pressure means for operating said element, a liquid pump or compressor, an actuator for the pump or compressor, and electrical means controlled from the car for starting and stopping the actuator.

2. In a switching mechanism, a switching element, fluid-pressure means for operating said element, a fluid pump or compressor, an electric motor for actuating the pump or compressor, and electrical means controlled from the car for starting and stopping said motor.

3. In a switching mechanism, a switching element, fluid-pressure means including a piston for operating said element, a fluid pump or compressor, an electric motor for actuating the pump or compressor, and electrical means controlled from the car for starting and stopping said motor.

4. In a switching mechanism, a switching element, fluid-pressure means including a piston for operating said element, and a regulable air-chamber connected with said fluid-pressure means and into which the fluid is admitted for retarding the movement of the element.

5. In a switching mechanism, a switching element, liquid-pressure means including a piston for operating said element, and a motor-operated compressor, and an air and liquid chamber connected with the liquid-pressure pipe and having a regulable valve controlling the volume of air therein.

6. In a switching mechanism, a switching element, fluid-pressure means including a pump or compressor for operating said element, an electric motor for operating the pump or compressor, and a rheostat in the motor-operating circuit, said rheostat being connected with the fluid-pressure means to be controlled thereby in the operation of the pump or compressor.

7. In a switching mechanism, a switching element, fluid-pressure means including a pump or compressor for operating said element, an electric motor for operating the pump or compressor, a rheostat in the motor-operating circuit, and a fluid-pressure-operated piston connected with the rheostat-arm.

8. In a switching mechanism, a switching element, fluid-pressure means including a motor-operated pump or compressor for moving said element, and a regulable pop-valve for relieving the fluid of pressure after movement of said element.

9. In a switching mechanism, a switching element, a fluid pump or compressor, a piston for moving said element, pipes between the compressor and piston, and means permitting the use of said pipes alternately as the fluid-pressure conducting and venting mediums.

10. In a switching mechanism, a switching element, a fluid pump or compressor, a piston for moving said element, a manifold connected with the pump or compressor and having a three-way valve, fluid-pipes leading from said manifold to said piston, and a three-way valve in each of said pipes.

11. In a switching mechanism, a switching element, an electric-motor-operated fluid-pressure means for moving said element, a fluid-outlet in the fluid-pressure means, a spring-

retracted valve at said outlet, and an armature movable to establish the motor-operating circuit and connected with the valve to effect the seating of the latter.

12. In a switching mechanism, a switching element, means for operating said element including a pump and an electric motor, means controlled from the car for establishing a temporary electrical circuit, and means operated by said circuit for establishing the motor-operating circuit.

13. In a switching mechanism, a switching element, fluid-pressure means for operating said element including a pump or compressor, an electric motor for said pump or compressor, means controlled from the car for establishing a temporary electrical circuit, and means operated by said circuit for establishing the motor-operating circuit.

14. In a switching mechanism, a switching element, fluid-pressure means for operating said element including a pump and an electric actuator therefor, means controlled from the car for establishing a temporary electrical circuit, and means operated by said circuit for supplying current to said actuator.

15. In a switching mechanism, switch-operating fluid-pressure means including a pump and an electric motor, temporary electrical-circuit-forming means including a magnet and a trolley-wire section, an armature arranged to be attracted by said magnet, and a motor-operating circuit including a contact in the path of a contact on the armature.

16. In a switching mechanism, switch-operating fluid-pressure means including a pump and an electric motor, temporary electrical-circuit-forming means including a magnet and a trolley-wire section, an armature arranged to be attracted by said magnet, and a motor-operating circuit including a magnet and a contact in the path of a contact on the armature, and a visual signal in said operating-circuit.

17. In a switching mechanism, switch-operating fluid-pressure means including a pump and an electric motor, temporary electrical-circuit-forming means including a magnet and a trolley-wire section, an armature arranged to be attracted by said magnet, and a motor-operating circuit including a magnet, a rheostat and a contact in the path of a contact on the armature.

18. In a switching mechanism, switch-operating means including an electric motor, temporary electrical-circuit-forming means including a magnet and a trolley-wire section, an armature at said magnet, a motor-operating circuit established by movement of said armature, and automatic and hand-operated circuit-breakers in said operating-circuit.

19. In a switching mechanism, switch-operating means including an electric motor, temporary electrical-circuit-forming means including a magnet and a trolley-wire section, an armature at said magnet, a motor-operating circuit established by movement of said armature, and a relatively stronger magnet connected with a second trolley-wire section and adapted to retract the armature and break the operating-circuit.

20. In a switching mechanism, the combination with a switching element and mechanism for moving said element including a fluid-compressor and an electric actuator, electric means including a magnet for closing the operating-circuit of said actuator and electric means including a magnet for interrupting said operating-circuit.

21. In a switching mechanism, the combination with a switching element and mechanism for moving said element including a fluid-compressor and an electric actuator, a pivoted armature, a magnet at the armature connected with an insulated section at the trolley-wire for moving said armature to close the operating-circuit of said actuator, and a second magnet at the armature connected with a second insulated section at the trolley-wire for retracting said armature to interrupt said operating-circuit.

22. A switch-controlling apparatus provided with an energizing-circuit, a switch and signal controlling circuit closed by the energizing-circuit, a breaking-circuit for said controlling-circuit and means operated by the passage of the car for closing said energizing, switch and signal circuits.

23. A switch and signal controlling apparatus provided with an energizing-circuit, a switch-controlling circuit and signal-controlling circuit closed by the energizing-circuit and means for automatically making and breaking each of said circuits by the passage of the car.

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

WALTER J. BELL.

Witnesses:

E. C. ROBINSON,

E. A. WATERMAN.