No. 765,263. PATENTED JULY 19, 1904.

W. J. BELL.

ELECTRO FLUID PRESSURE SWITCHING MECHANISM.

APPLICATION FILED JULY 25, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

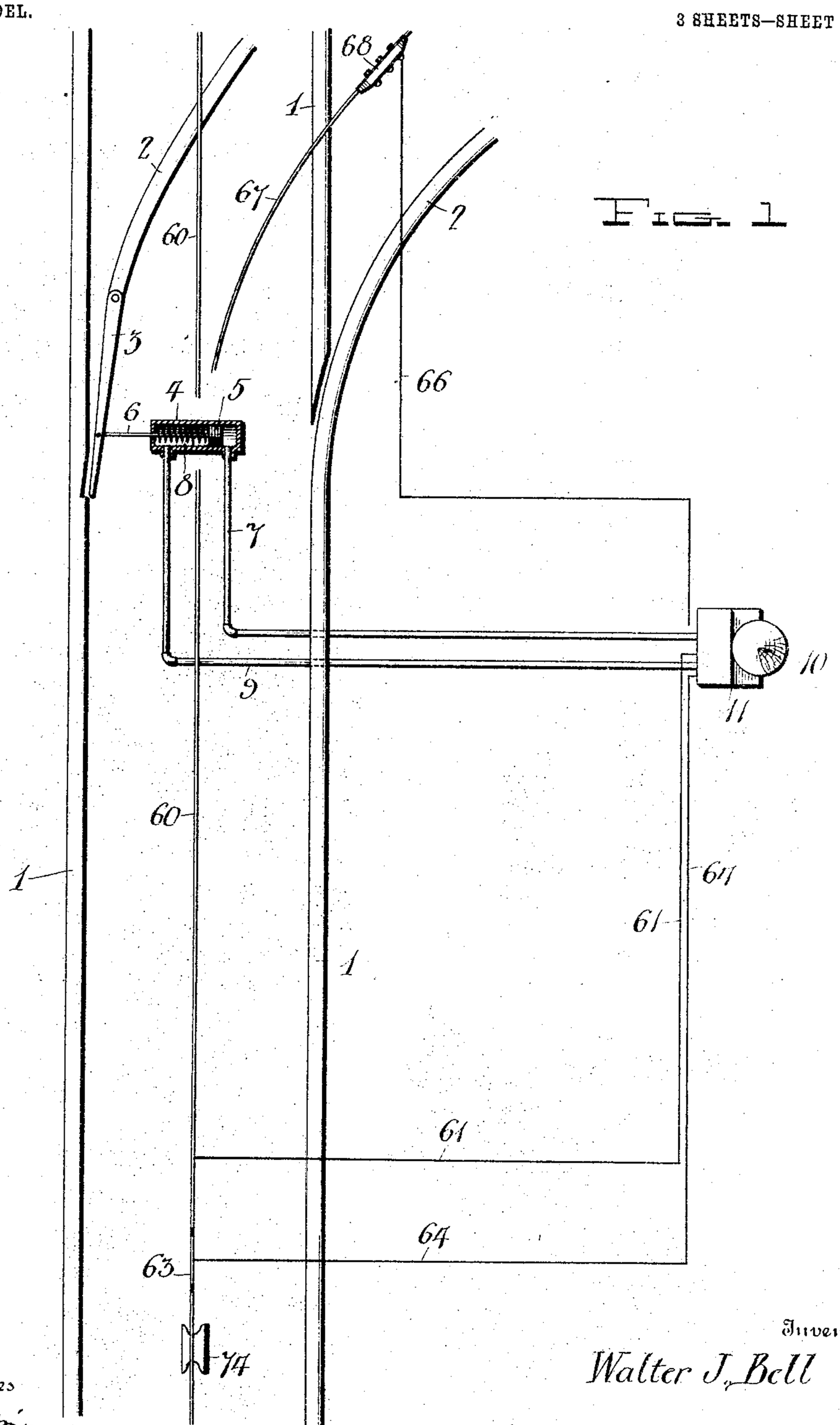

FIG. 1

Witnesses

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2

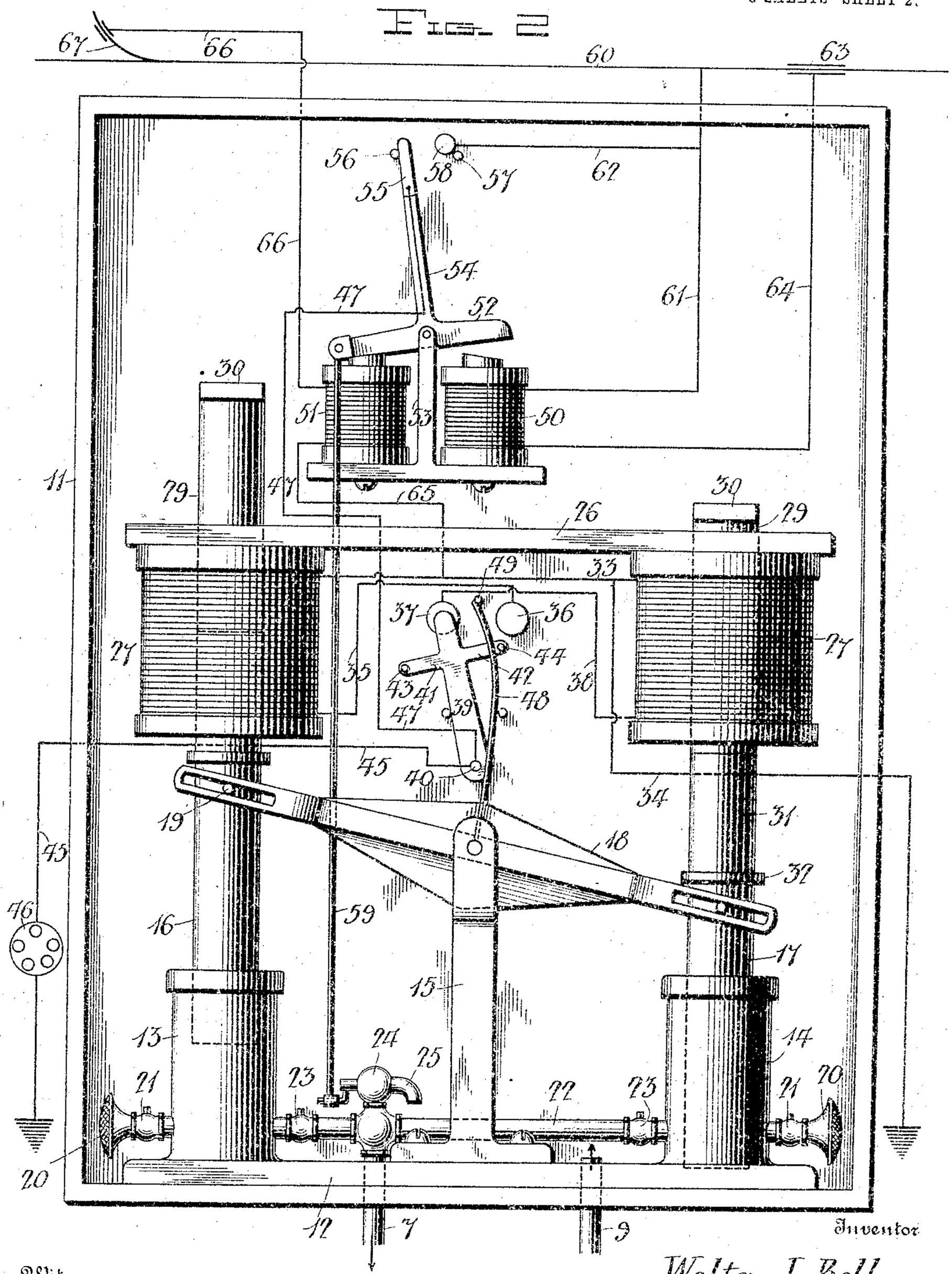

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Fig. 4

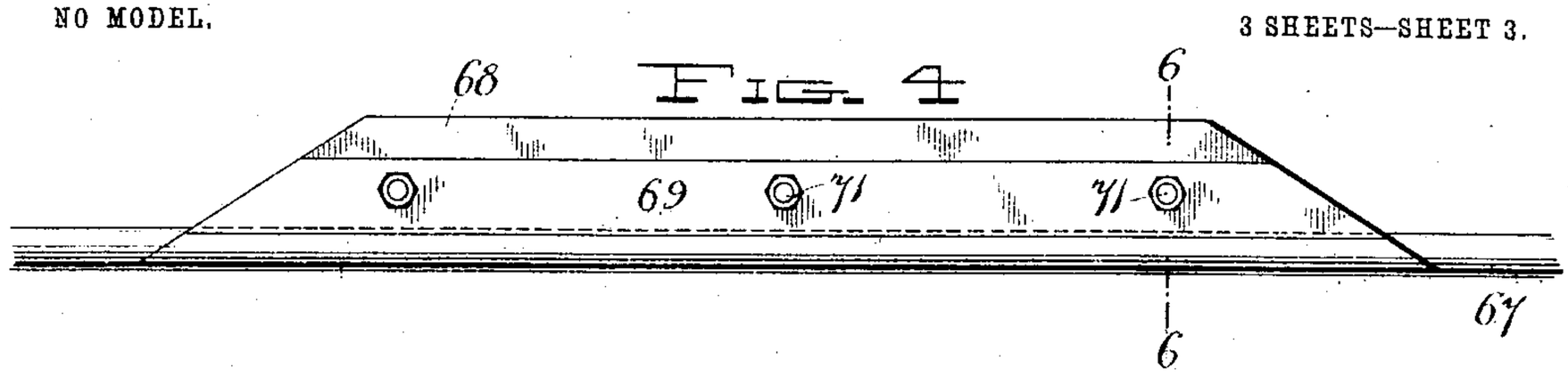


Fig. 5

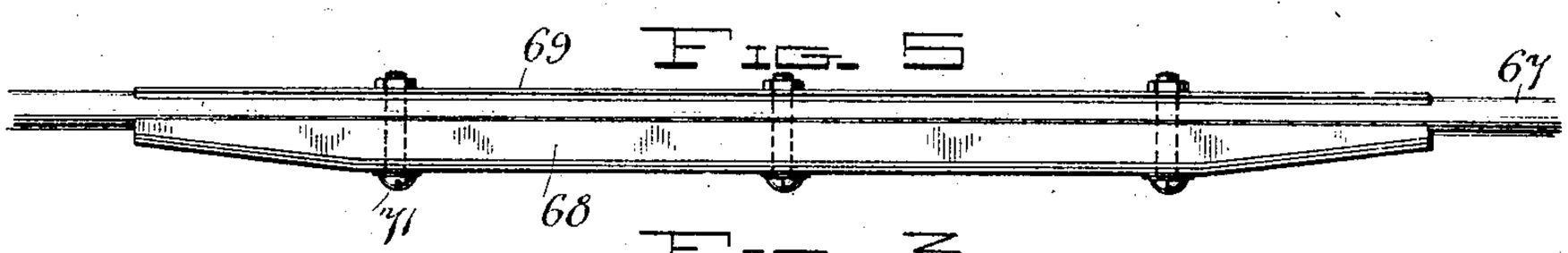


Fig. 3

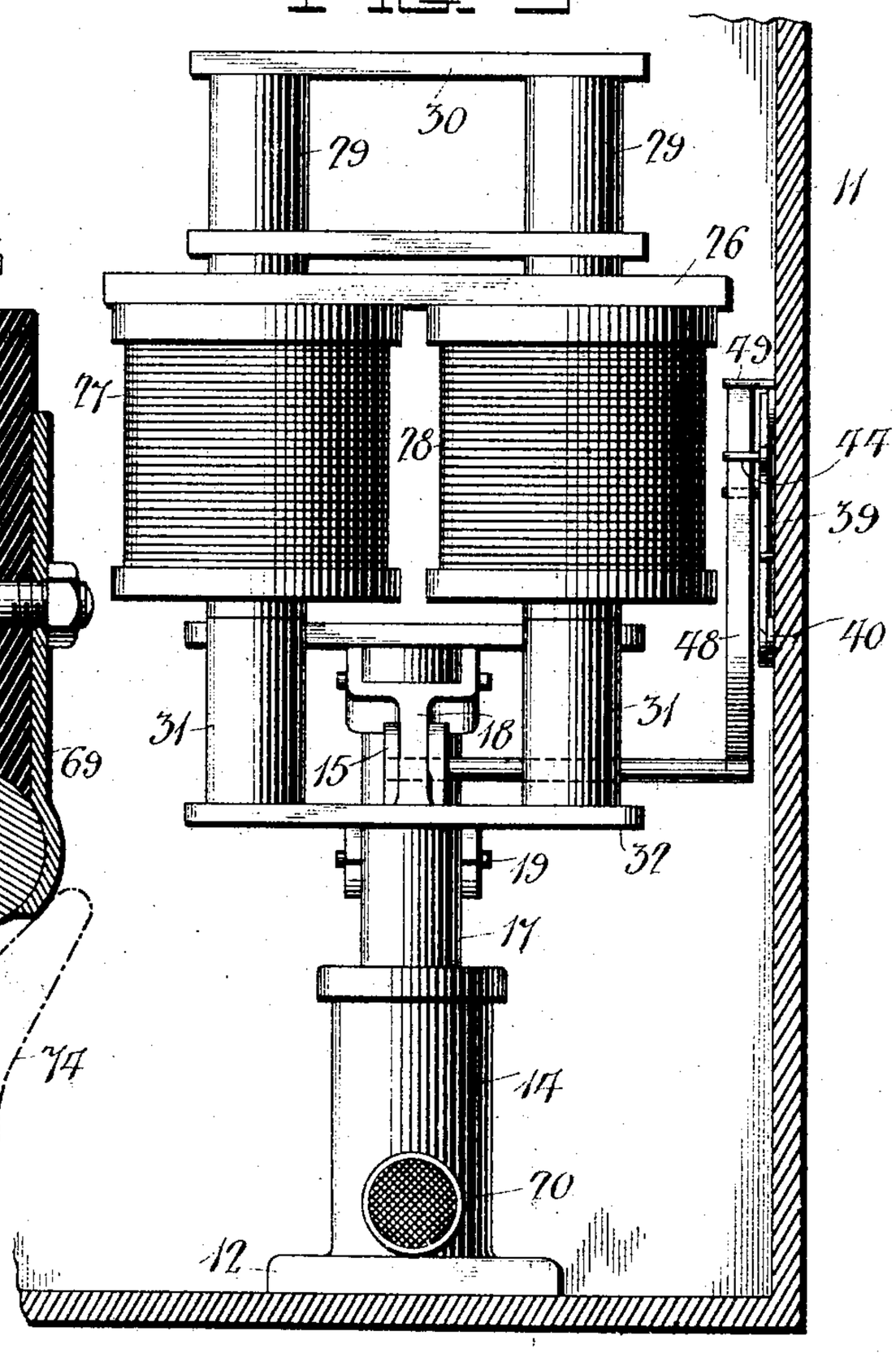
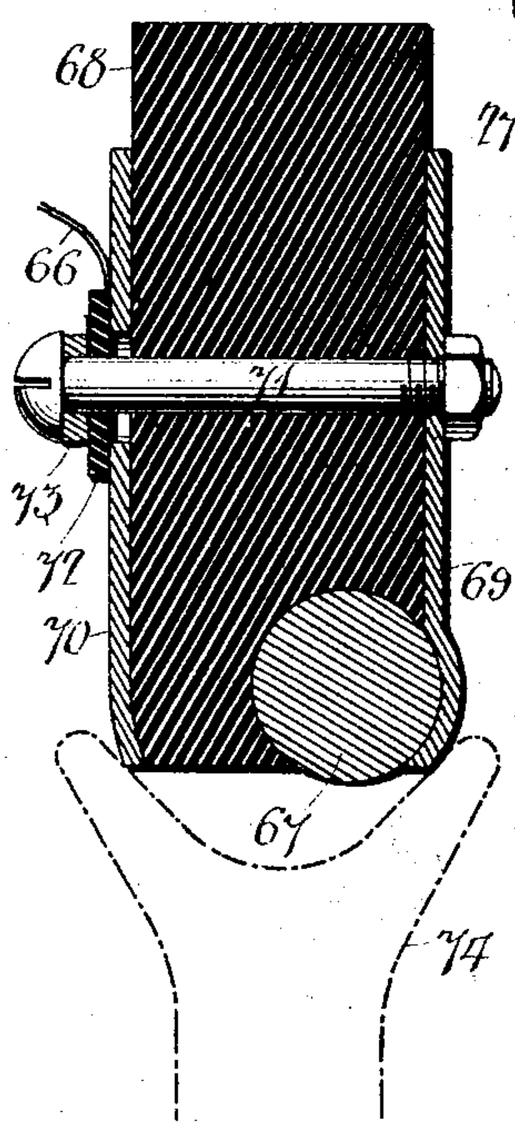


Fig. 6



Inventor

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Witnesses

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No. 765,263. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

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

ELECTRO FLUID-PRESSURE SWITCHING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 765,263, dated July 19, 1904.

Application filed July 25, 1903. Serial No. 166,953. (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 Electro Fluid-Pressure 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.

This invention relates to automatic railroad-switches, and contemplates the production of an electro fluid-pressure switching mechanism constructed to be durable and to be thoroughly reliable in operation.

The invention is an improvement on the construction of switching mechanism forming the subject-matter of my application for patent filed May 21, 1903, Serial No. 158,144, one feature of the improved construction being a solenoid-magnet for actuating the compressor, whereas in my application Serial No. 158,144 the compressor is actuated by an electric motor.

The details of construction, the mode of operation, and the resultant advantages are fully set forth in the following description, in connection with which reference is to be had to the accompanying drawings, illustrating the switching mechanism in its preferred form of embodiment, although it is to be understood that various modifications are permissible by reason of the scope of the concluding claims.

In the drawings, Figure 1 is a plan view showing straight and divergent railroad-tracks and a switch mechanism embodying my invention. Fig. 2 is an enlarged view in elevation of the fluid-compressor and the electrical actuator and controlling means. Fig. 3 is an end elevation of the compressor and actuator. Fig. 4 and 5 are enlarged views of the circuit-breaker. Fig. 6 is a further enlarged sectional view on line 6 6 of Fig. 4.

Referring to the drawings by numerals, 1 1 denote the rails of the straight track, and 2 2 are the divergent track-rails.

3 designates a pivoted switch-tongue, which in its normal position opens the straight track, although obviously the parts may be arranged to normally open the divergent track. Adjacent to the tongue is a cylinder 4, in which is a piston 5, connected by a rod 6 with the tongue. The piston is moved by compressed fluid—as, for example, oil—which is supplied by a pipe 7, leading into the cylinder at the rear of the piston. The piston and tongue are retracted after movement by a coiled spring 8, interposed between the piston and the forward cylinder end.

9 is a pipe leading from the cylinder in front of the piston to vent said cylinder end of air and any oil which may leak past the piston.

Fixed to a post 10, erected at one side of the track, is a box or casing 11, which contains the controlling and actuating parts. In the lower portion of the casing, which is filled with oil, is a base 12, on which are two vertical pump-cylinders 13 14 and a standard 15 intermediate of the cylinders. The pistons 16 17 of the pumps are connected by a beam 18, centrally pivoted on the standard, the ends of the beam being bifurcated to receive the piston-rods and slotted to loosely receive pins 19 on said rods. At each cylinder is a screened intake-pipe 20, containing a check-valve 21, and 22 is a discharge-pipe connecting the two cylinders with the pipe 7, which supplies the oil under pressure to the piston-cylinder 4. The pipe 22 contains two check-valves 23, one for each cylinder, and also a normally unseated valve 24, which allows the cylinder 4 and pipe 7 to discharge the oil therein by an outlet 25 back into the casing 11 to permit retraction of the tongue and piston, as will be hereinafter more fully explained. The vent-pipe 9 leads from the cylinder 4 to the bottom of the casing 11, as shown in Figs. 1 and 2.

Supported from a partition 26 in the casing are two pairs of solenoid-magnets 27 28, the cores 29 29 of each pair being connected together by a yoke 30.

31 31 designate non-magnetic extensions of the cores, which extensions are connected to-

gether by a non-magnetic yoke 32. The yokes 32 32 are attached centrally to the pump piston-rods 16 17.

The coils of the solenoid-magnets 27 28 are connected by a wire 33, which is grounded through a wire 34. A wire 35 leads from the coils of magnets 27 28 to a contact 36, and 37 is a similar contact connected by a wire 38 with the coils of the other magnets 27 and 28. The contacts 36 37 are located in the path of the free end of a switch-lever 39, pivoted at 40 and having at each side a laterally-extending arm, said arms 41 42 carrying pins 43 44. Leading from the switch-lever 31 to ground is a wire 45, in which is a group of lights 46. Leading also from said lever 31 is a wire 47, to which further reference will presently be made. A spring-arm 48 extends centrally from the beam 18 and normally engages at its free end a pin 49 between the contacts 36 37. The function of this spring-arm, which follows the movements of the beam, is to snap the switch-lever alternately to the right and left to alternately energize the solenoid-magnets and effect thereby the reciprocation of the pump-pistons, it being understood that the magnets operate in the downward stroke of said pistons. With the parts in the position shown in Fig. 2 the spring-arm 48 has but a slight engagement with the pin 49, and in the further downward movement of the piston 17 said spring-arm disengages from the pin 49 and forcibly strikes the pin 44 on the switch-arm 42, moving the switch into engagement with the contact 36, thereby shifting the current from the magnet 28 to magnet 27.

In the upper portion of the casing are two electromagnets 50 51, at which is a rocking armature 52, centrally pivoted on a post 53. The armature carries an arm 54, the outer insulated end 55 of which is movable between stop-pins 56 57, and a contact 58 is arranged in the path of said end 55. The armature is mechanically connected with the valve 24 by a rod 59, and its insulated end 55 is electrically connected with the switch-lever 39 by the wire 47, above referred to. The coils of magnet 50 are connected with the trolley-wire 60 by a constantly-charged feed-wire 61, and connecting said latter wire and the contact 58 is a wire 62. The magnet 50 is wound with wire sufficiently coarse to carry the proper current to propel the car. Leading from the coils of magnet 50 to an insulated section 63 in the trolley-wire is a wire 64, normally in open circuit. The magnet 51 is preferably wound with wire of a relative fineness, which precludes the carrying of a sufficient current to run the car. A wire 65 leads from the coils of this magnet to the wire 33, and said coils are connected by a wire 66 with a circuit-maker in the diverging trolley-wire 67, constructed, preferably, as follows: A block 68 of insulating material is clamped to the wire 67 by plates 69 70 and screws 71 71. The wire occupies a recess in one lower edge of the block, and the lower edge of the plate 69 is bent to conform to and engages directly with the wire 67 and is therefore constantly charged. The openings in the plate 70 are of sufficient size to freely receive the screws 71 without contact therewith, and the plates 70 71 are insulated from each other by a mica or other disk 72, which separates the plate 70 and screw-heads. Preferably a washer 73 is interposed between the screw-heads and disks 72. It will be understood that by reason of the comparatively light current passing over this section or breaker but little insulation is required to rupture the arc that may possibly be drawn. The wire 66 is connected with the plate 70, and a circuit between said plate and the trolley-wire 67 is established by engagement of the trolley-wheel 74 with the plate 70 and the constantly-charged plate 69.

Normally, as above stated, the switch-tongue is positioned to open the straight track and close the divergent track. The controller of a "straight-ahead" car is moved by the operator to shut off the current before the trolley-wheel reaches the insulated section 63, and the car is allowed to coast by said section without disturbing the switch-tongue. If the car is to take the divergent track, the current is left on, and when the trolley-wheel enters the insulated section a circuit is closed through the magnet 50 and the armature is rocked to bring the arm end 55 into engagement with the contact 58. The circuit through the magnet 50, which may be called the "starting-circuit," is of but brief duration, as the insulated section is relatively short in length; but the formation of this circuit is sufficient to effect, through the contacts 55 and 58, the closing of the operating-circuit, which is maintained until interrupted by the circuit-breaker, as will presently be explained. When the contact is made at 55 58, current flows from the trolley-wire 60 through wires 61 62, contacts 58 55, wire 47, and switch 39. Here the current flows through the wire 45 and lights to ground and also through the switch-lever 39, contact 37, wire 38, solenoid-magnet 28, and thence by the wires 33 34 to ground. The magnet 28 being energized, the piston 17 is moved downwardly to force oil from the casing through the pipes 22 and 7 to the piston-cylinder 4 and effect the throwing of the switch to open the divergent track, the valve 24 in the pipe 22 being previously seated by the movement of the armature 52 through the connecting-rod 59. The pump-pistons 17 16 are alternately rapidly moved to cause a continuous flow of oil and maintain the proper pressure against the piston 5 through the medium of the snap-switch 39 and connections previously described. When the trolley-wheel of the car which has entered the divergent track contacts with the circuit-maker, current is sent from the trolley-wire 67 through plate 69,

trolley-wheel 74, plate 70, and wire 66 to the magnet 51, and thence through the coils thereof and wires 65, 33, and 40 to ground. The magnet 51 being energized, the armature is retracted to normal position to break the operating-circuit and unseat the valve 24, which allows the oil to discharge from the pipes 7 and 22 by the opening 25 back into the casing. The pressure on the piston 5 being removed, the spring 8 acts to retract the switch-tongue to normal position.

It will be observed that by reason of the peculiar form of circuit-breaker, which includes for its operation the trolley-wheel, the act of interrupting the operating-circuit is effected automatically and this regardless of whether the car-controller is on or off.

The lights 46 are provided to signal to the operator on the car the position of the switch-tongue, the lights being on when the tongue is set to open the divergent track.

I claim as my invention—

1. In a switching mechanism, the combination of a switching element, fluid-pressure means including a compressor for moving said element, a solenoid-magnet for actuating said compressor, electrical means controlled from a moving car and including an armature for establishing a starting-circuit to close the solenoid-operating circuit, and a circuit-breaker operating in the further movement of the car to interrupt the operating-circuit.

2. In a switching mechanism, the combination of a switching element, fluid-pressure means including a compressor for moving said element, a solenoid-magnet connected in an operating-circuit for actuating said compressor, electrical means including a magnet, an armature and a trolley-wire section for establishing a starting-circuit to close said operating-circuit, and a circuit-breaker connected with a magnet at said armature and operating in the movement of the car to move said armature and interrupt the operating-circuit.

3. In a switching mechanism, the combination of a switching element, a plurality of compressors creating fluid-pressure to move said element, solenoid-magnets, electrical connections for said magnets, and an automatic switch operating to energize said magnets alternately to effect the alternate operation of the compressors.

4. In a switching mechanism, the combination of a switching element, a pair of connected compressors creating fluid-pressure to move said element, a solenoid-magnet at each compressor, electrical connections for said magnets, and an electrical switch shiftable in the movements of the compressor-pistons to alternately energize said magnets and effect the alternate operation of the compressors.

5. In a switching mechanism, the combination of a switching element, a pair of compressors, a pivoted beam connecting the compressor-pistons, a solenoid-magnet at each compressor having its core connected to the piston-rod, electrical connections for said magnets, a pivoted switch, contacts in the connections one for each magnet and arranged in the path of the switch, and a spring-arm carried by said beam and adapted to snap the switch alternately against said contacts to effect the alternate operation of said pistons.

6. In a switching mechanism, the combination of a switching element, a pair of compressors, a pivoted beam connecting the compressor-pistons, an electrically-connected solenoid-magnet for moving each piston, electrical contacts one for each magnet, a pivoted switch carrying pins, and a spring-arm carried by the beam and engaging a fixed pin and adapted in the movement of the beam to disengage from the fixed pin and alternately engage the pins on the switch to rock the latter and effect the alternate energization of the magnets and the alternate operation of the pistons.

7. In a switching mechanism, the combination of a switching element, fluid-pressure means including a solenoid-magnet-operated compressor, a magnet connected with the trolley-wire and an insulated section on said wire, a fixed contact in the trolley-wire connections, a pivoted armature arranged to be moved by said magnet and carrying an insulated contact movable in the path of the fixed contact said insulated contact being connected with the solenoid, a second magnet at said armature, and contacts on the trolley-wire one of which is connected with the second magnet, said contacts being engaged by the trolley-wheel to complete the circuit through said second magnet to retract the armature.

8. In a switching mechanism, a trolley-wire, an insulation-block having a recess receiving said wire, a clamping-plate at one side of the block and contacting with the wire, a clamping-plate at the other side of the block and insulated from the first-named plate, screws connecting the block and plates, and a conducting-wire leading from the second-named plate.

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

WALTER J. BELL.

Witnesses:

H. B. ROSSITER,

E. A. WATERMAN.