No. 764,836. PATENTED JULY 12, 1904.

W. J. BELL.

ELECTROFLUID PRESSURE SWITCHING MECHANISM.

APPLICATION FILED AUG. 6, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

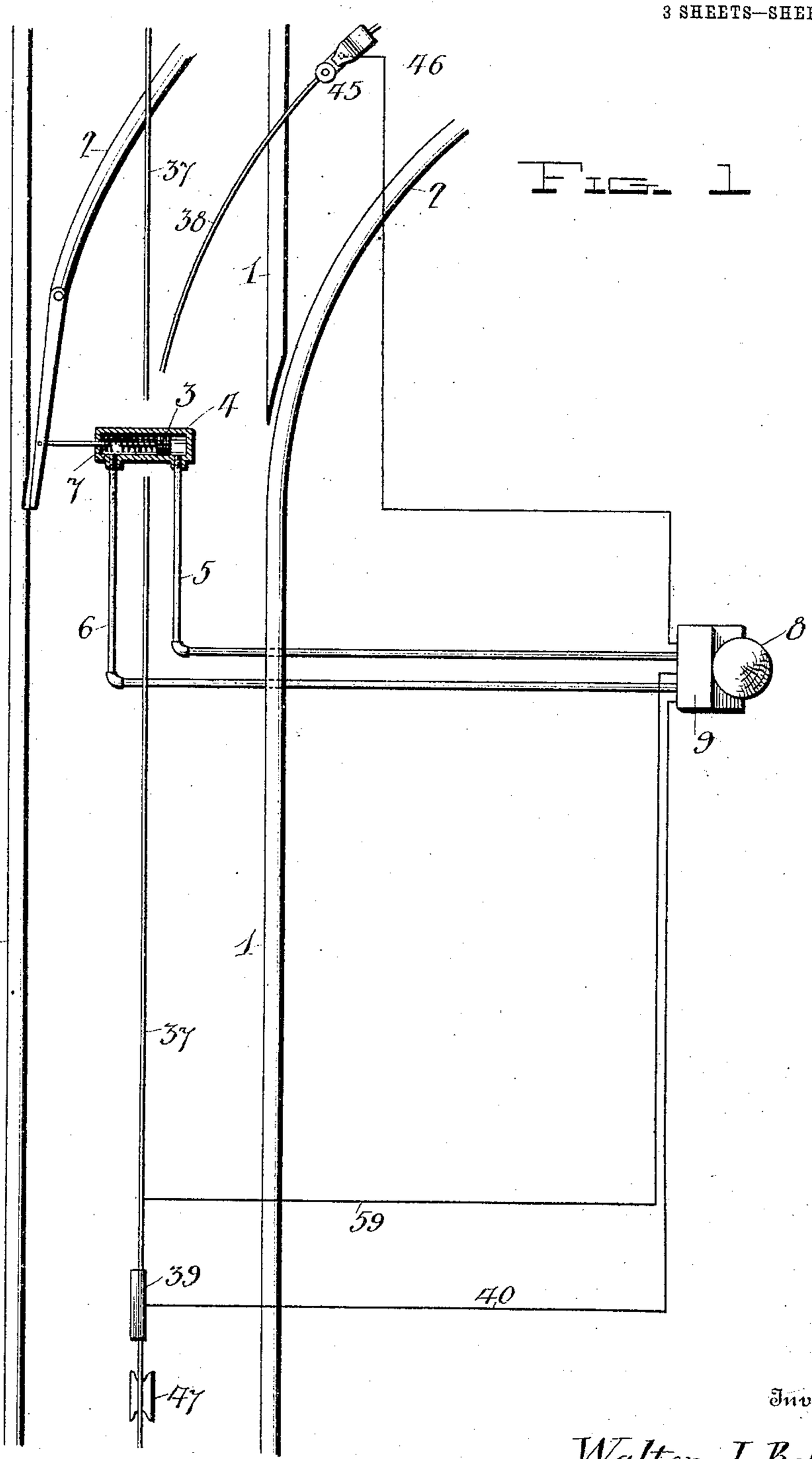

Fig. 1

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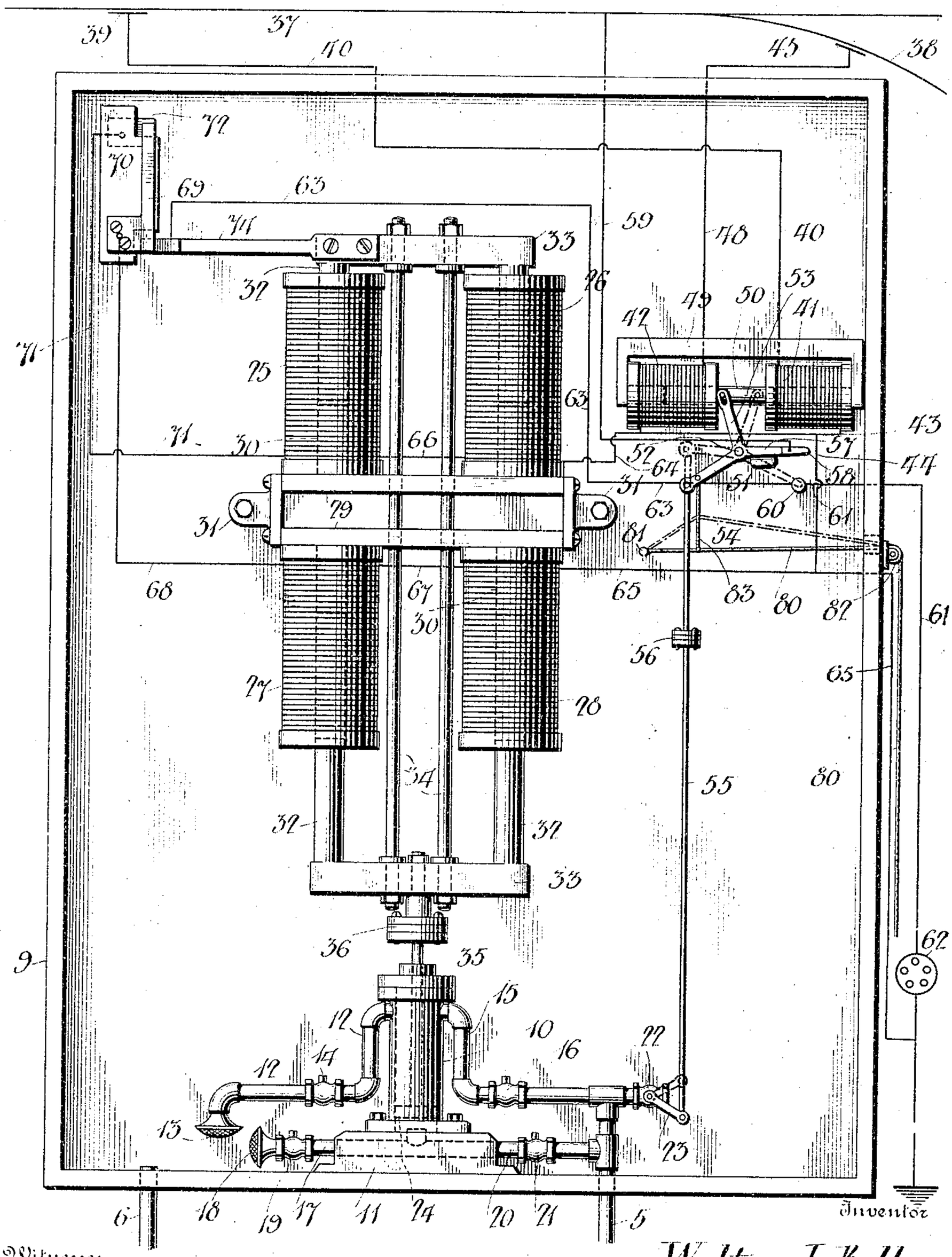
NO MODEL. 3 SHEETS—SHEET 2.

FIG. 2



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NO MODEL. 3 SHEETS—SHEET 3.

FIG. 3

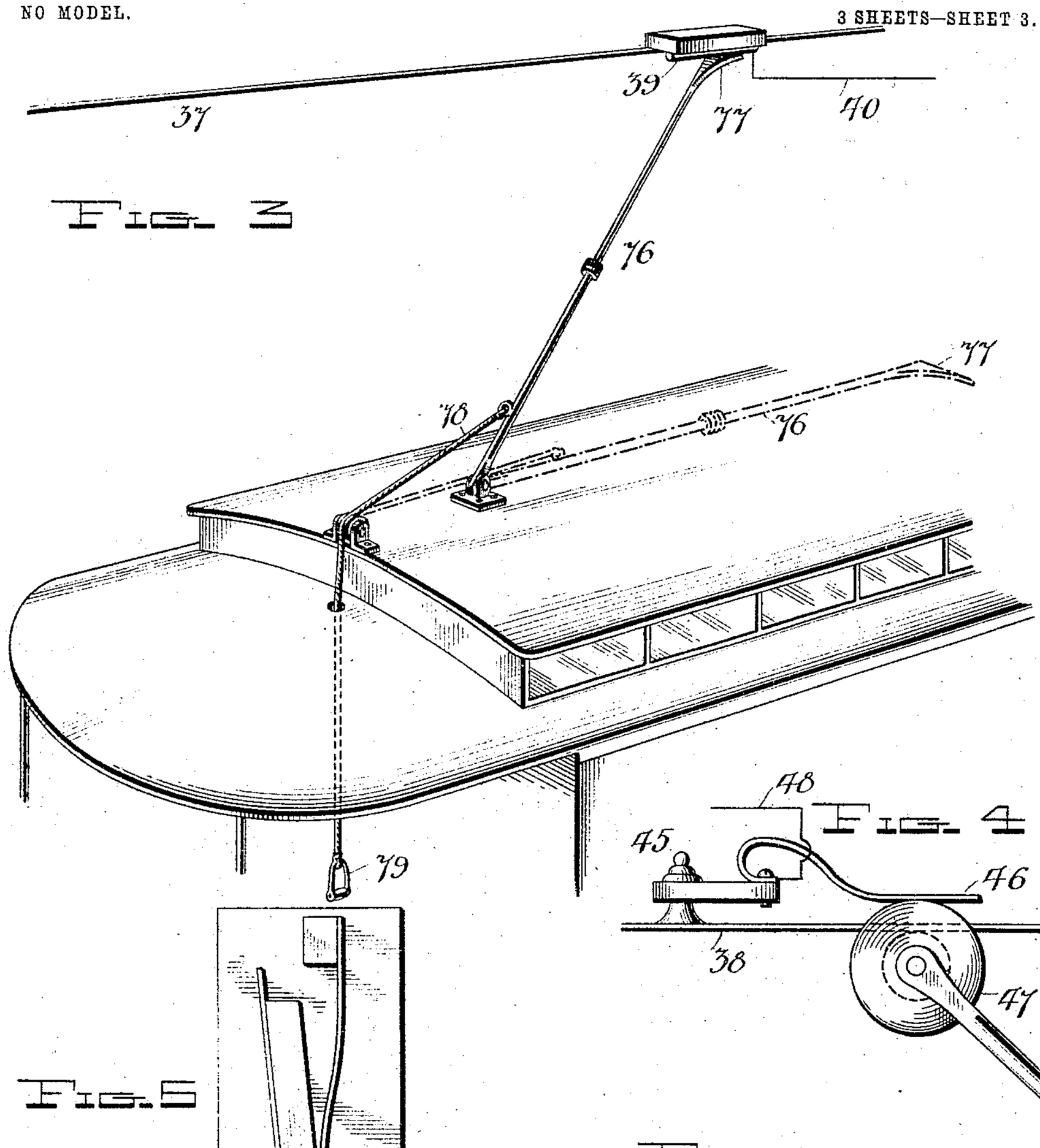


FIG. 4

FIG. 5

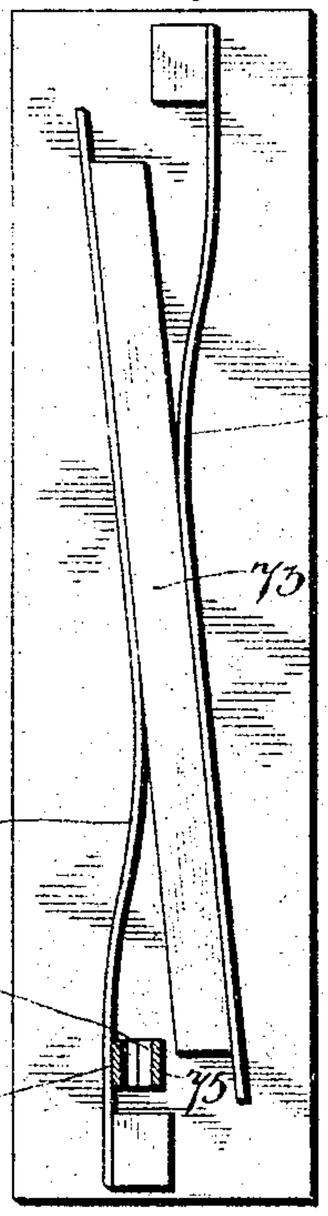
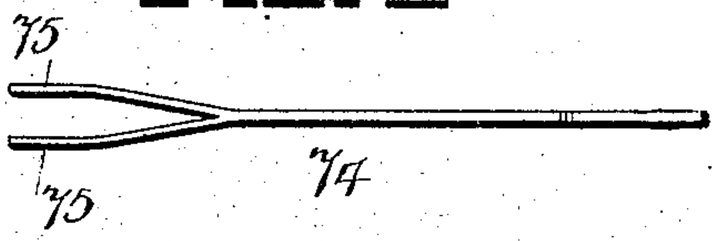


FIG. 6



Witnesses

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No. 764,836. Patented July 12, 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. 764,836, dated July 12, 1904.

Application filed August 6, 1903. Serial No. 168,463. (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, which relates to railway switching mechanisms, contemplates an improved fluid-pressure switching appliance and electric actuating means therefor, said means being set in motion by an operating-circuit established through the medium of a "starting-circuit," the operating-circuit not being dependent for its maintenance upon an electrically-charged magnet.

The invention is an improvement on the switching mechanisms forming the subjects-matter of my applications for patents filed May 21, 1903, and July 25, 1903, Serial Nos. 158,144 and 166,953, and differs from these prior constructions in the respect above pointed out and also in the use of a double-acting pump in lieu of the single-acting compressors of the former mechanisms.

The invention is set forth in detail in the following description, in connection with which reference is to be had to the accompanying drawings, illustrating the improvement in its preferred form of embodiment, it being understood that various changes may be made therein without exceeding the scope of the concluding claims.

In the drawings, Figure 1 is a plan view of a railway-switch and switching mechanism embodying my invention. Fig. 2 is an elevation of the fluid-pressure pump and electrical operating and controlling means therefor. Fig. 3 is a perspective view of the starting-circuit-making means. Fig. 4 is an elevation of the circuit-making means for interrupting the operating-circuit. Fig. 5 is a detail view of the pole-changer for the pump-actuating solenoid-magnets. Fig. 6 is a view of the contact-arm forming a part of the pole-changer.

Referring to the drawings by numerals, 1 1 denote the main track-rails and, 2 2 are the divergent track-rails. The switch-tongue is of the usual pivoted type, and as the means for moving said tongue I prefer to employ a piston 3, having rod connection with the tongue and slidably arranged in a cylinder 4, to which fluid under pressure, preferably oil, is supplied by a pipe 5. A pipe 6, leading from the cylinder, is employed to vent the latter of air and any oil-leakage. The piston and switch-tongue are retracted by a spring 7.

On a pole 8 at the switch is supported a casing 9, the lower end of which forms a tank for the oil and to which the pipes 5 and 6 connect, as shown more clearly in Fig. 2. In the oil-tank is a double-acting pump, the cylinder 10 of which is supported by a base 11. An intake-pipe 12, having a screened inlet 13 and a check-valve 14, leads into the upper end of the cylinder, and 15 is the outlet-pipe for the upper end of the cylinder, having a check-valve 16. An intake-pipe 17, having a screened inlet 18 and a check-valve 19, leads into the bottom of the pump-cylinder, and 20 is an outlet-pipe which may connect with the pipe 17 and which is equipped with a check-valve 21. The pipes 15 and 20 commonly connect with the pipe 5 through the medium of suitable couplings or joints, and 22 is a valve at a discharge-outlet of said pipes within the tank, said valve having a stem-arm 23.

The pump-piston 24 is reciprocated through the medium of two pairs of solenoid-magnets 25 26 and 27 28, each pair being connected by a yoke 29 and cores 30 30, the latter extending approximately one-third of the distance through the magnetic field. The yokes 29 29 have end connection with supporting-brackets 31 31, of non-magnetic material. Each pair of magnets is provided with yoked armatures 32 32, the yokes 33 33 being united by rods 34 34, preferably of brass, and the lower yoke being connected with the piston-rod 35, but insulated therefrom by an interposed block 36 of insulating material to prevent grounding of the armatures.

37 is the main trolley or feed wire, and 38 is the trolley-wire for the divergent track. Adjacent to and parallel with the main wire

37 at a point in advance of the switch is a contact 39, and 40 is a wire leading therefrom to a solenoid-magnet 41 in the casing 9, said magnet being connected to a companion magnet 42 by a wire 43. Leading from the wire 43 is a wire 44. On the divergent trolley-wire is a circuit-maker 45, consisting of a block of insulating material, on which is fixed one end of a spring contact-arm 46, having its free end in the path of the trolley-wheel 47, whereby a circuit is closed when said wheel contacts with the arm, as shown in Fig. 4. A wire 48 leads from the magnet 42 to said arm 46. The cores of magnets 41 42 are connected by a yoke 49, the cores each extending into its respective magnet a distance equal, approximately, to one-third of the length of the field.

50 is the armature, which moves forwardly and rearwardly, dependent upon which of the magnets is energized.

51 is a lever pivoted at 52 and having three arms, one of which, 53, has pin-and-slot connection with the armature 50. Another arm, 54, of the lever is connected with the valve-arm 23 by a rod 55, in which is an insulating-joint 56. 57 is the third arm of the lever, having at its extremity an insulated contact 58, connected with the trolley-wire 37 by a constantly-charged wire 59. A contact 60, located in the path of movement of the contact 58, is connected by a wire 61 with the ground, and in said wire 61 is a group of lights 62. A wire 63 leads from the contact 60 to a contact-arm forming a part of the pole-changer, presently to be described. A wire 64 connects the wire 43 with magnet 26, and magnet 28 is connected to the ground by a wire 65, to which is connected the wire 44.

66 and 67 are respectively wires connecting the pairs of magnets 25 26 and 27 28. Leading from the magnet 27 is a wire 68, which is connected with one spring contact-arm 69 of the pole-changer 70, and 71 is a wire connecting magnet 25 with another spring contact-arm 72 of said changer.

73 is an insulating-bar set between the contacts 69 72 at an angle, as shown in Fig. 5.

Secured to and extending from the upper yoke 33 is an arm 74, carrying at its outer end two spring contact-arms 75 75, insulated from the arm 74, and to which is connected the wire 63.

Mounted on the car-roof adjacent to the trolley-pole is a hinged insulated pole 76, having at its upper end a contact 77, which is adapted to bridge the trolley-wire and contact 39 when the pole is elevated to the position shown in full lines in Fig. 3, which is accomplished by the car operator through the medium of the cable 78 and handle 79. The pole is retracted by its weight, the retracted position being shown in dotted lines in Fig. 3.

80, Fig. 2, is a cable, one end of which is attached at 81 and the other end of which is within reach of the car operator. The cable is intermediately passed around a sheave 82, and a cable 83 connects the cable 80 with the arm 54 of lever 51.

In practice the operator of a car to be switched elevates the pole 76, and a circuit being closed between the trolley-wire and contacts 77 and 39 current flows by the wire 40 to and through the magnet 41 and from thence to ground by the wires 43, 44, and 65. The magnet 41 being energized, the armature 50 is moved to the right to rock the three-arm lever 51 and effect the seating of the valve 22 by the rod 55 to close the outlet of the pipes 15 20 and to bring the contact 58 into engagement with the contact 60, whereupon current flows from the trolley-wire through wire 59, contacts 58 60, wire 63, contacts 75, the spring-contact 69, wire 68, magnet 27, wire 67, magnet 28, and thence by wire 65 to ground. The magnets 27 28 being energized, the pump-piston is elevated and, the valve 25 being seated, oil under pressure is forced through the pipes 15 and 21 to the switch-tongue piston. When near the end of the upstroke of the piston, the contacts 75, which have been deflected by the inclined bar, snap from the end of the latter and break the circuit at the magnets 27 28, and by engagement with the spring-contact 72 a circuit is established through the magnets 25 26 through the medium of the wires 71, 66, 64, 43, 44, and 65 and the described connections with the contacts 75. At the end of each stroke of the double-acting piston a change in polarity occurs through the medium of the contacts 75, which act as a snap-switch. The car having entered the divergent track, the trolley-wheel by engagement with the contact 46 closes a circuit through the magnet 42, the current flowing from the trolley-wire through the wheel 47, contact 46, wire 48, magnet 42, wire 43, wire 44, and wire 65. It will be understood that the energization of the starting-magnet 41 is of but short duration; but inasmuch as the lever 51 is counterbalanced its rocked position is maintained after the deënergization of said magnet. The energization of the magnet 42 retracts the armature 50 and restores the lever to normal position, breaks the operating-circuit, and unseats the valve 25, whereupon the switch-tongue is returned by its spring to first position.

The switch-tongue may be retracted or set to straight track by breaking the operating-circuit through the medium of the cable 80, which is so attached as to prevent excessive movement of or jar to the armature 50, the limit of movement to the left of said armature being fixed by the taut condition of the rope between the point 81 and sheave 82. This hand means for breaking the operating-circuit is especially advantageous when through accident the trolley-wheel leaves the divergent wire.

It will be understood that the lights 62 are in circuit when the switch is thrown to direct the car onto the divergent rails and constitute the signal to the operator that the switch is so set.

I claim as my invention—

1. A switching mechanism comprised of a switch element, fluid actuating means including a double-acting pump for moving said element, solenoid-magnets for reciprocating the pump-piston, and a pole-changer for the magnets operated in the movement of the magnet-armatures.

2. A switching mechanism comprised of a switch element, fluid actuating means including a double-acting pump for moving said element, solenoid-magnets for reciprocating the pump-piston, and a pole-changer for said magnets consisting of a contact carried by a moving part, spring-contacts each electrically connected with one of said magnets and alternately engaged by said contact, and an inclined bar between the spring-contacts for deflecting the contact whereby the latter is snapped from one contact to the other at the end of its movements.

3. A switching mechanism comprised of a switch element, fluid actuating means including a double-acting pump for moving said element, solenoid-magnets for reciprocating the pump-piston, a flexible forked contact carried by the magnet-armature, spring-contacts each electrically connected with one of said magnets, and an inclined insulation-rod between the spring-contacts, said forked contact being interposed in its movements between the rod and spring-contacts and arranged to snap from one contact to the other at the end of its movements.

4. In a switching mechanism, a feed-wire, a wire in parallel relation thereto, and a contact-maker supported on the car to be elevated to bridge said wires.

5. In a switching mechanism, fluid-pressure means for operating the switch including a pump, a valve in the fluid-pressure discharge-pipe, solenoid-magnets for reciprocating the pump-piston, starting and stopping solenoid-magnets, an armature between said last-named magnets, a three-arm lever connected with said armature and with said valve, and a contact in the operating-circuit arranged in the path of a contact on one of the lever-arms.

6. In a switching mechanism, a pair of yoked end-to-end solenoid-magnets, an armature movable by said magnets, a pivoted lever connected with said armature, a contact in the path of a contact on said lever, and hand means for retracting said lever consisting of a cable or the like fixed at one end and attached intermediately to said lever.

7. In an electro fluid-pressure switching mechanism, a pair of yoked end-to-end solenoid-magnets, an armature movable by said magnets, a valve in the fluid-pressure discharge-pipe, a pivoted three-arm lever connected at one arm with said armature, a rod having an insulation-joint and connecting another arm with said valve, and an operating-circuit contact in the path of movement of a contact on the third arm of said lever.

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

WALTER J. BELL.

Witnesses:
E. A. WATERMAN,
C. S. COLEMAN.