J. P. TIERNEY & J. MALONE.

ELECTRIC TRACK SWITCH.

APPLICATION FILED JAN. 31, 1910.

989,730.

Patented Apr. 18, 1911.

3 SHEETS—SHEET 1.

Fig. 3.

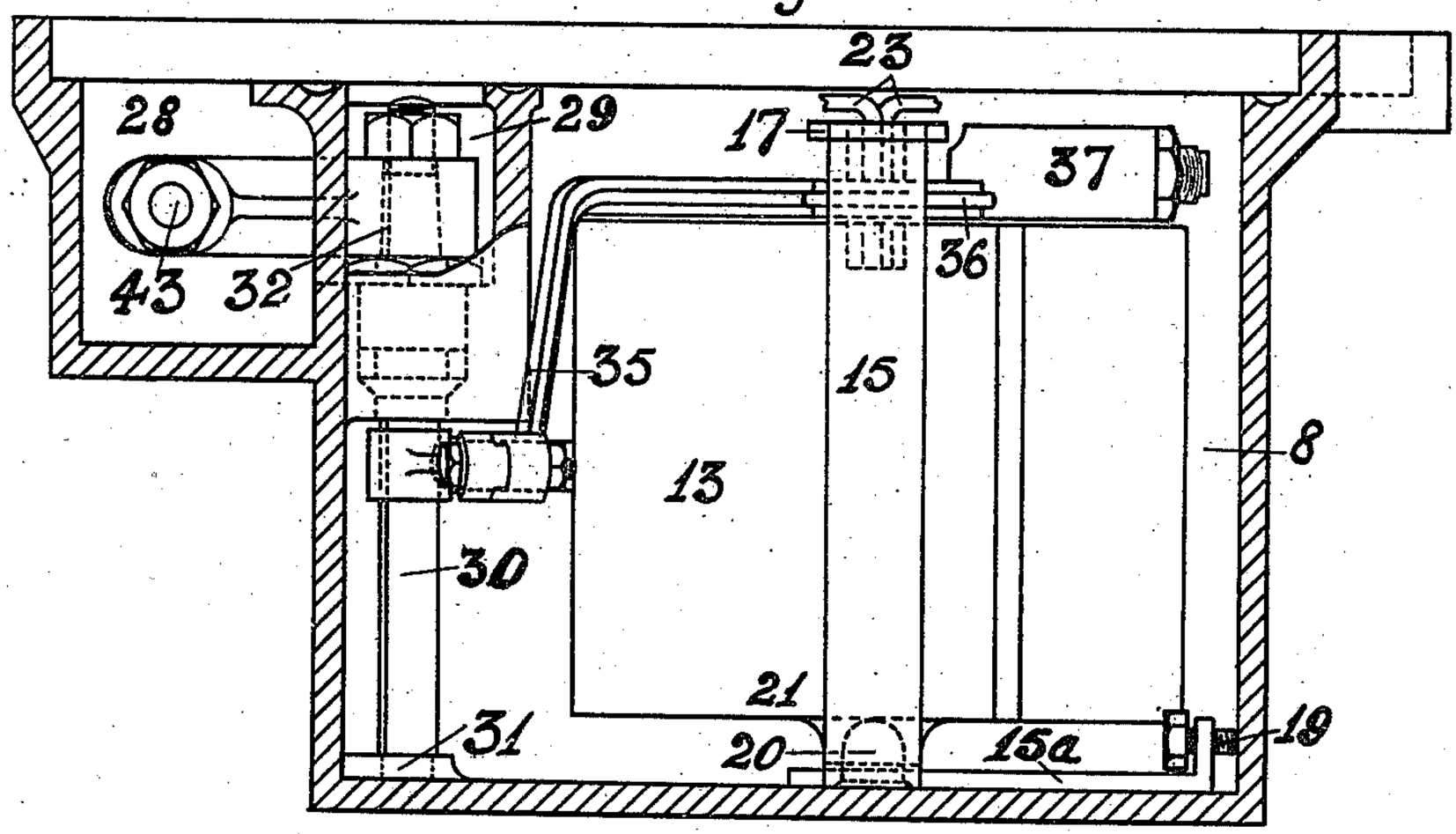
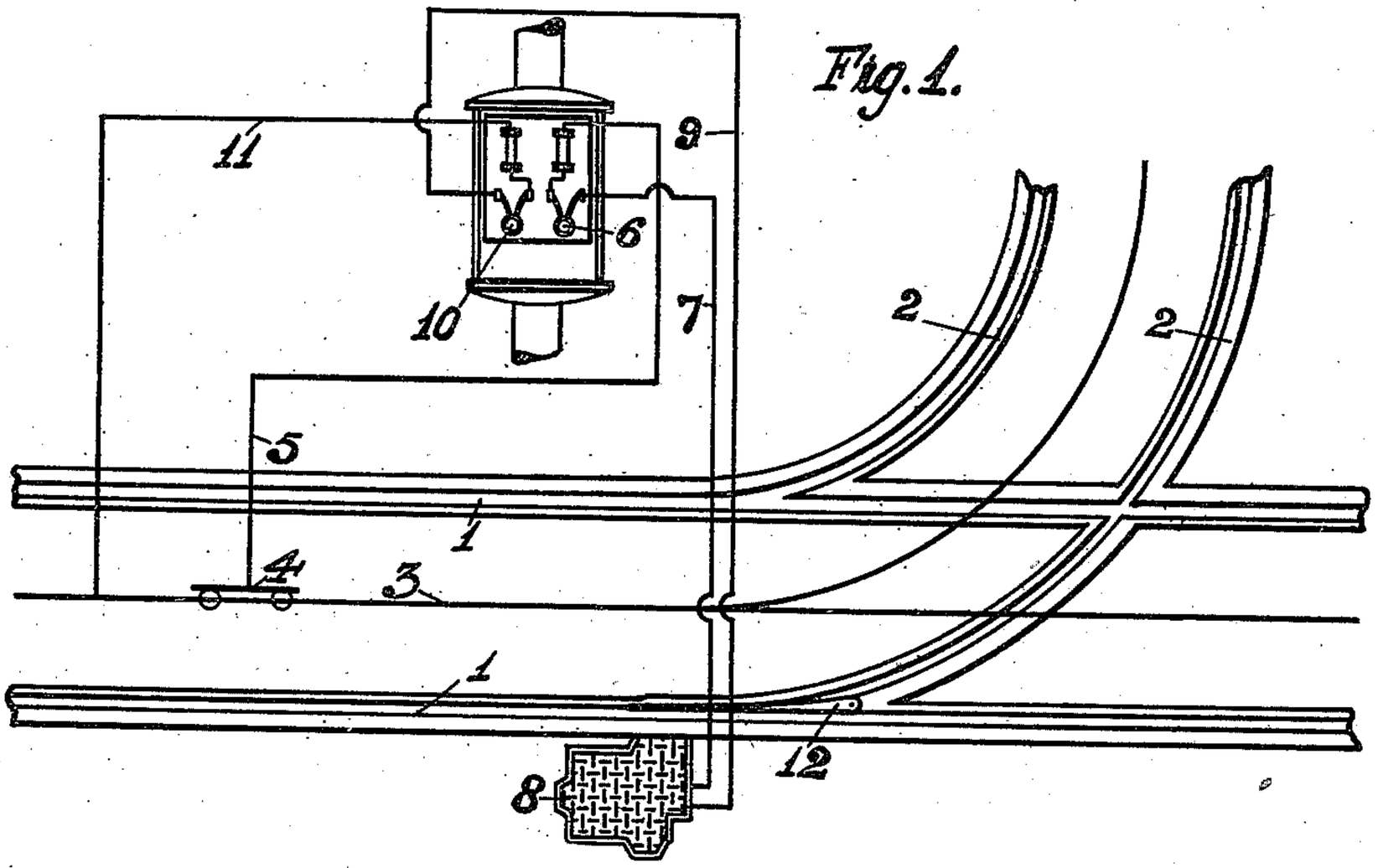


Fig. 1.



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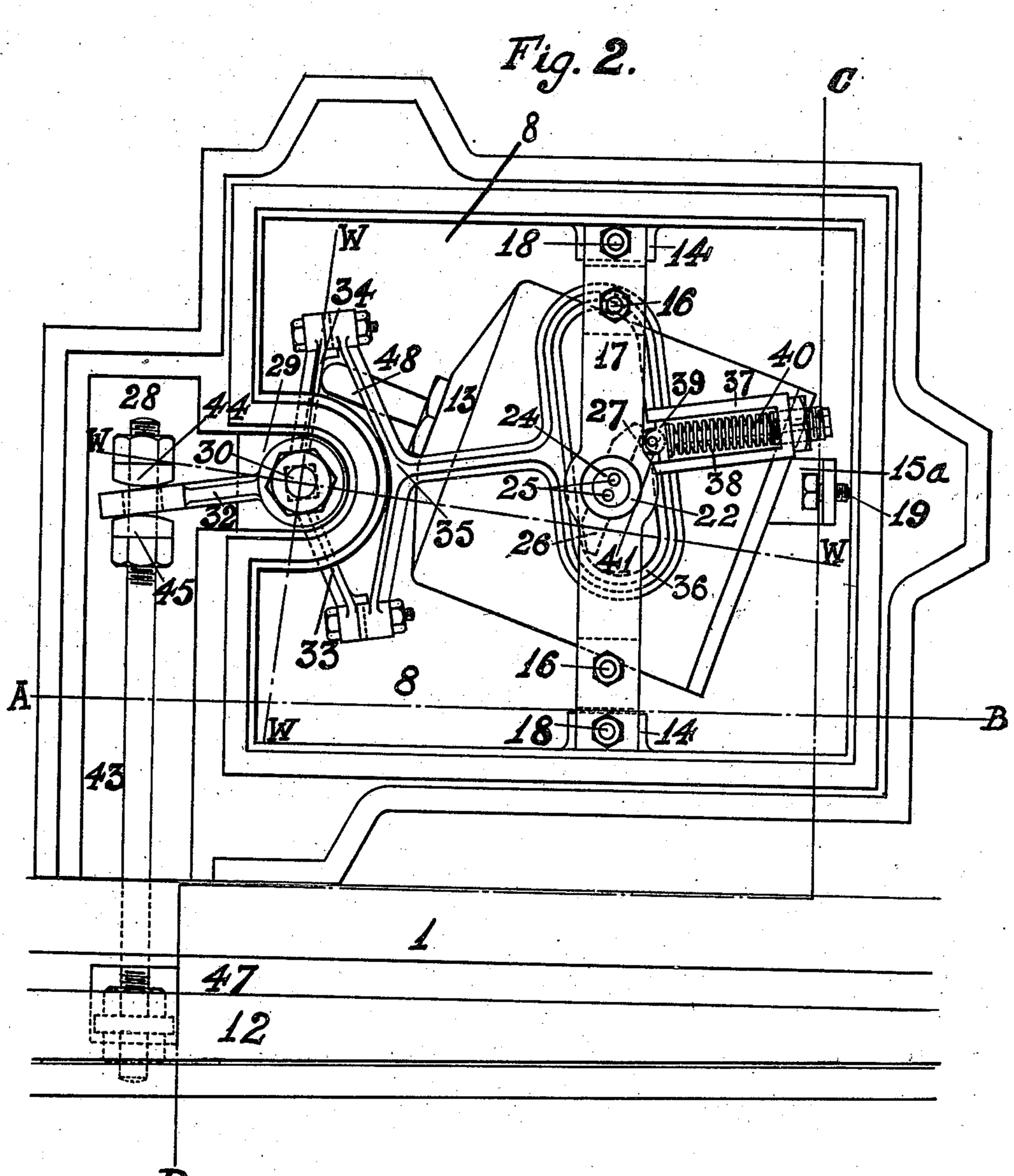
3 SHEETS—SHEET 2.

Fig. 2.



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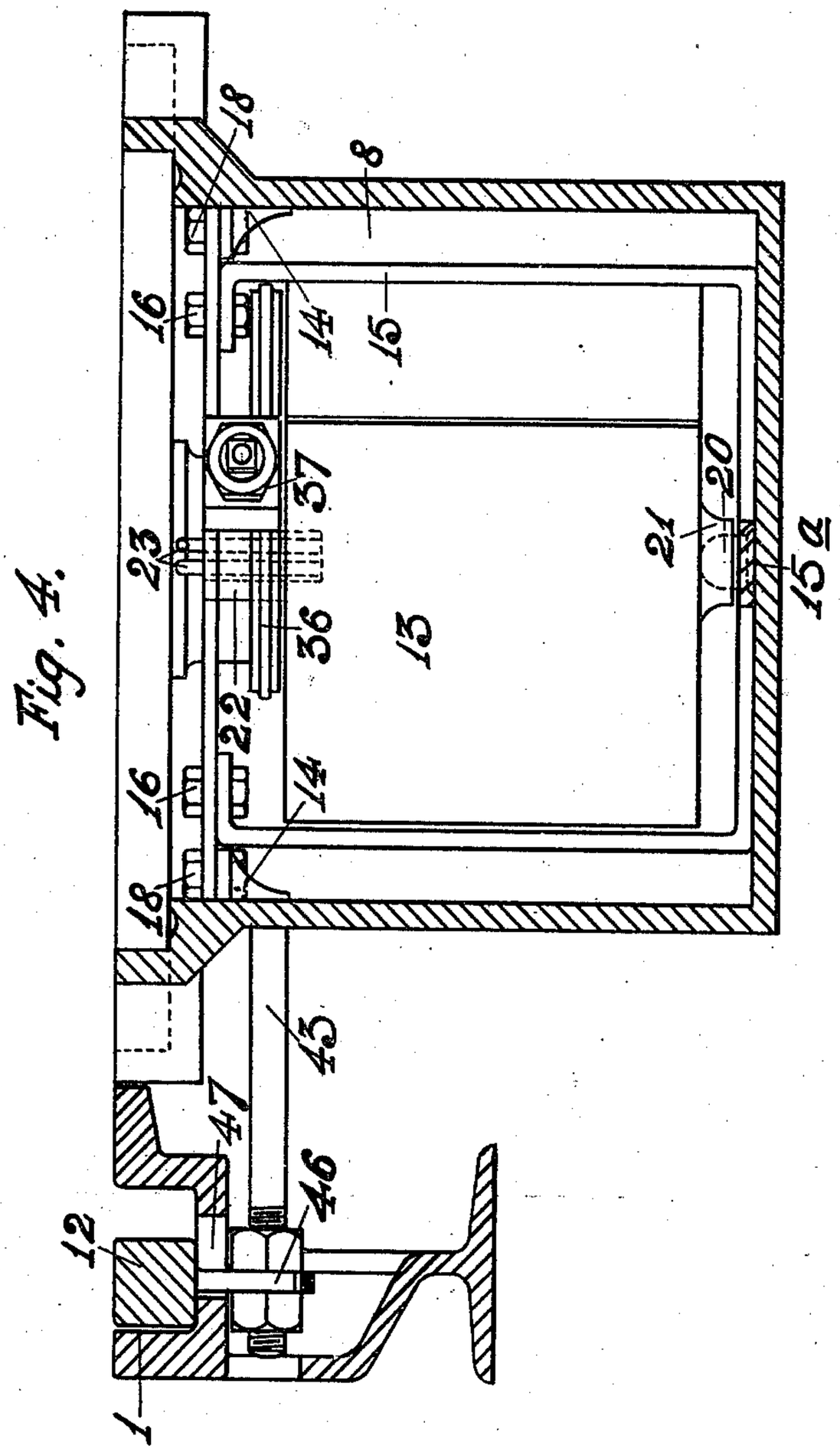
3 SHEETS—SHEET 3.

Fig. 4.



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ELECTRIC TRACK-SWITCH.

989,730. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed January 31, 1910. Serial No. 541,176.

To all whom it may concern:

Be it known that we, JOSEPH PATRICK TIERNEY and JOHN MALONE, subjects of the King of Great Britain and Ireland, residing at Booterstown and Phibsboro, respectively, in county Dublin, Ireland, have invented a new and useful Improvement in Electric Track-Switches, of which the following is a specification.

This invention relates to track switches for electric tramways, railways and the like, herein called tramways, of the kind in which the switch tongue is actuated and is moved in either direction by means of an electromagnet, the winding of which is connected at one end to the current carrying conductor of the electric supply system of the tramway and at the other end to a contact device that is carried by, but is insulated from, the current carrying conductor and is placed some distance in advance of the junction.

The invention further relates to electrically operated track switches of the kind in which the electromagnet is pivotally mounted and its core actuates the switch tongue through mechanism which, after each movement of the tongue, causes the electromagnet to turn or swing on its pivotal mounting and assume a position in which the core can, when the electromagnet is again energized, act upon the mechanism, move the same, and so operate the tongue, but in the opposite direction to that of its previous movement. In such arrangements, the circuit to "earth" or "return" from the contact device on the current carrying conductor is completed when the current collector of a tramcar comes in contact therewith, the motor controller being in one of its operative or "on" positions. The winding of the electromagnet is thus placed in series with the electrical propelling equipment of the tramcar, and when said winding is energized, the switch may be actuated thereby. If the motor controller is in the "off" position during the time that the current collector is in contact with the contact device, the circuit to "earth" or "return" is not complete and the switch tongue is not operated.

The improvements in accordance with the present invention will now be described with reference to, and by the aid of, the accompanying drawings.

Figure 1 is a plan view of a junction on a tramway having an overhead equipment and provided with an electrically operated track switch. It will be apparent from what follows that though the improvements are described in connection with an electric tramway on the overhead system, the invention is applicable to other systems of electric traction, such as surface contact or conduit systems. Fig. 2 is a plan view of an arrangement or construction of the improvements in accordance with the present invention, and contained within a street box, the cover of the street box being removed. Figs. 3 and 4 are sections on the lines A—B and C—D respectively of Fig. 2.

Referring first to Fig. 1. 1, 1 are the rails of the main track, 2, 2 are the rails of the branch track; 3 is the trolley wire and 4 is the contact device that is carried by, but is insulated from, the trolley wire 3 and is placed some distance in advance of the junction. The contact device is only illustrated diagrammatically as its construction is well known. The contact device acts, when the trolley of a tramcar traveling along under the trolley wire 3 comes in contact therewith, to cause the trolley pole to be very slightly depressed and the trolley wheel to be moved out of contact with the trolley wire so as to break the direct electrical connection of the motor controller and the propelling motors on the tramcar with the trolley wire. The contact device 4, though insulated from the part of the trolley wire 3 on which it is mounted, is in electrical connection therewith through the lead 5, the fuse and switch 6, the lead 7, the winding of the electromagnet which is contained within the street box 8, the lead 9, the fuse and switch 10 and the lead 11.

Now let it be assumed that a tramcar is advancing toward the switch on the track along which it has to travel, after arriving at and passing through the switch, is the branch track 2. As the switch tongue 12 is set, the branch track is closed. The point tongue 12 must therefore be moved. This is effected by the driver, who places or leaves his motor controller in an operative or "on"

position during the time the trolley is in contact with the contact device 4. An electric circuit is thus completed and current passes from the trolley wire 3 through the lead 11, the fuse and switch 10, the lead 9, the winding of the electromagnet, the lead 7, the fuse and switch 6, the lead 5, to the contact device 4 and from this device by way of the trolley, the motor controller and the propelling motors on the tramcar to "earth" or "return". The electromagnet is thus energized and its core actuates the mechanism hereinafter described and so causes the operation of the switch tongue 12 to open the branch track and close the main track. If the next tramcar or the following tramcars has or have also to travel along the branch track 2, the driver or each driver, just before the trolley on his car comes under the contact device 4, places his controller in the "off" position, or, if already in the "off" position, maintains his controller in that position during the time that the trolley and the contact device 4 are in contact. The circuit to "earth" or "return" from the trolley wire 3, through lead 11, fuse and switch 10, lead 9, the winding of the electromagnet, lead 7, fuse and switch 6, lead 5, the contact device 4, the trolley, the motor controller and the propelling motors is thus interrupted in or at the motor controller; the electromagnet is accordingly not energized nor the point tongue 12 actuated. But if a following car has to travel forward along the main track 1, the driver leaves or places his motor controller in an "on" or operative position during the time that the trolley and the contact device 4 are in contact. The circuit, which has been traced through above, is complete, current flows, the electromagnet is energized, its core actuates the mechanism, and the point tongue is moved to open the main track and close the branch track.

The mechanism interposed between the switch tongue 12 and the core of the electromagnet and the disposition and working of the electromagnet will now be described.

Referring to Figs. 2 to 4 inclusive. The electromagnet 13 is contained, as already stated and as is usual, in the street box 8 that is buried in the roadway either between or outside the rails 1 and has its cover, which is removable to allow of access to the electromagnet and the mechanism hereinafter described, level with the paving. The electromagnet is, according to the present improvements, arranged to turn or swing about a vertical axis or in a horizontal plane, and is, to permit of this movement mounted in the following manner. 14 are lugs or brackets; two of these lugs or brackets are provided and they are cast on or attached to the side walls of the street box 8 that are parallel with the track rails 1. The lugs or brackets are positioned so as to be in line and at or near the upper portions of the side walls. 15 is a framework of U-shape that is placed within the street box and arranged so that its vertical members are adjacent and parallel with the side walls on which the lugs or brackets are cast or attached. The size of the framework is such that when its horizontal member is resting on the bottom of the street box, the upper ends of its vertical members, which are turned or bent as shown in Figs. 2 and 4, are level with or in the same horizontal plane as the upper faces of the lugs or brackets 14. The distance apart of the vertical members is also such that they will come between the lugs or brackets. The framework is connected to or with the lugs or brackets 14 by a plate 17, the plate 17 being secured to the turned or bent over ends of the vertical members by nuts and bolts 16 and to the lugs or brackets 14 by nuts and bolts 18. 15^a is a member that is connected at one end to, or is integral with, the horizontal member of the framework. This member extends laterally from the horizontal member, at or about its central portion, and parallel with the track rails 1 toward a side wall of the street box and at its free or outer end is bent or turned upward as shown in Figs. 2 and 3. 19 is a set screw which is mounted in the bent or turned up portion of the member 15^a and is arranged to bear against the side wall of the street box. By the set screw 19 and the bolts and nuts 18, the position of the framework in the street box can be easily adjusted. The holes in the lugs or brackets 14 are made as slots to permit of the adjustment of the framework. At or about the point at which the member 15^a connects with the horizontal member of the framework, the horizontal member is formed or provided with a bearing 20, a spud bearing is shown, which is adapted to coöperate with a bearing 21 formed or provided on the casing of the electromagnet in such position that when the electromagnet is mounted in position its core will be horizontal and it will be capable of movement in a horizontal plane. 22 is a tubular part that is formed on or attached to the casing of the electromagnet 13 so as to be in line with the part bearing 21. This part 22 extends, when the electromagnet is mounted in position, through a hole formed in the plate 17 and serves to steady and guide the electromagnet; it also acts as a guide for the wires 23 which are connected with the winding of the electromagnet and for this purpose is lined or filled with a piece of insulating material 24, such as porcelain, each wire 23 passing through a separate hole 25. On the part 22 between the lower face of the plate 17 and the upper and horizontal face of the electromagnet a two armed lever 26, 27 is rigidly mounted. 28 is a side chamber integral with or at-

tached to a side wall of the street box and 29 is another chamber that projects into the street box and is in communication with the chamber 28. These two chambers are open at their upper ends and are closed or covered by the cover plate of the street box. 30 is a vertically arranged spindle. This spindle, which is mounted at its lower end in a bearing 31 formed on the bottom wall of the street box below the chamber 29, passes through the lower wall of the chamber 29 and through a packed bearing. Within the chamber 29 there is mounted on the upper end of the spindle 30 one end of a lever 32, the free end of which extends into the chamber 28. 33, 34 is a two armed lever which is also mounted on the spindle 30 but is arranged on that portion that is within the street box. The free end of each arm of the lever 33, 34 is connected to a member 35 that extends upwardly in front of and backward over the electromagnet. At its rearward end the member 35 is formed with a stirrup like portion 36 within which is arranged the tubular part 22 and the two armed lever 26, 27. The connection of the member 35 with the lever 33, 34 is such that the member is held and supported quite clear of the electromagnet. 37 is a spring carrier and guide that is mounted on and carried by the stirrup-like portion 36. 38 is the spring which bears at one end against a nut carried by the spring carrier and at the other end against a collar or flange 39 formed or provided on a pin 40. The pin 40 at one end passes through the nut, which is adjustable to enable the stress on the spring to be regulated, and at the other end is guided by the engagement of the collar or flange 39 with the carrier 37. At this end the pin 40 is also provided with a roller 41 which is arranged to bear upon the lever 26, 27. Through a hole 42 in the free end of the lever 32 there is passed a rod 43. 44, 45 are nuts on the end of the rod 43 and arranged on opposite sides of the lever 32. The other end of the rod 43 is connected to a downwardly extending lug 46 formed on the underside of the tongue 12 and passing through a hole 47 in the lower part of the groove of the track rail.

The operation of the arrangement, the construction of which has just been described is as follows:—The trolley of a tramcar passes along under the trolley wire 3 and comes into contact with the contact device 4, the circuit to "earth" or "return" being completed as hereinbefore traced by reason of the motor controller being in an "on" or operative position. The electromagnet is accordingly energized and its core 48 drawn into the heart of the magnetic field. The core when so moved strikes against the free end of the lever arm 34 which together with the lever arm 33, member 35, stirrup-like portion 36 and spring carrier 37 are in the positions indicated by the dotted lines W—W, the roller 41 bearing against the end of the lever arm 26. The free end of the lever arm when so struck is moved and the parts mentioned move into the position in which they are shown in Fig. 2. This movement causes a rotary movement to be imparted to the shaft 30 and the free end of the lever 32, to press upon the nuts 44, 45 and so push, through the rod 43, the tongue 12 over. When the electromagnet is deënergized the pressure of the core 48 upon the end of the lever arm is relieved, the spring 38 can then come into action and does so, pressing upon the end of the lever 26 and causing the electromagnet to turn about its vertical axis, until the core is opposite the end of the lever arm 33. When the electromagnet is again energized, the core will act upon the end of the lever arm 33 and the parts connected therewith will be constrained to take up the position indicated by the dotted lines W—W, the lever 32 will press against the nuts 44, 45 and through the rod 43 pull the tongue 12 over. When the electromagnet is deënergized, the spring 38 will act upon the end of lever arm 27 and the electromagnet will be turned about its vertical axis so that its core 48 can, when the electromagnet is next energized, act upon the end of lever arm 34.

We claim:

1. In an electrically operated track switch, the combination with a switch tongue of an electromagnet pivotally mounted to move in a horizontal plane, of mechanism intermediate said tongue and electromagnet adapted to be moved by said electromagnet, for operating said tongue and for turning said electromagnet about its pivotal mounting.

2. In an electrically operated track switch, the combination with a movable switch tongue of an electromagnet pivotally mounted to move in a horizontal plane, of mechanism intermediate said tongue and electromagnet adapted to be moved by said electromagnet, for actuating said tongue and for displacing the electromagnet in a horizontal plane and for bringing said electromagnet into a position in which it can again act on said mechanism.

3. In an electrically operated track switch, the combination with a movable switch tongue of an electromagnet pivotally mounted to move in a horizontal plane, of mechanism intermediate said tongue and electromagnet and adapted to be moved in one direction by said electromagnet and for operating said tongue, for displacing said electromagnet in a horizontal plane and for bringing the same into a position into which it can again act on said mechanism.

4. In an electrically operated track switch,

the combination with a movable switch tongue of an electromagnet pivotally mounted to move in a horizontal plane, of mechanism intermediate said tongue and electromagnet and adapted to be moved in one direction by said electromagnet for operating said tongue and for displacing the electromagnet about its pivotal mounting.

5. In an electrically operated track switch, the combination with a switch tongue, of an electromagnet pivotally mounted to move in a horizontal plane, a lever mechanism intermediate said tongue and electromagnet and adapted to be moved by said electromagnet for operating said tongue and for turning said electromagnet about its pivotal mounting.

6. In an electrically operated track switch, the combination with a movable switch tongue, of an electromagnet pivotally mounted to move in a horizontal plane, a lever mechanism intermediate said tongue and electromagnet adapted to be moved by said electromagnet for operating said tongue, for turning the electromagnet in a horizontal plane and for bringing the same into a position in which it can again act on said mechanism.

7. In an electrically operated track switch, the combination with a movable switch tongue of an electromagnet pivotally mounted to move in a horizontal plane a lever mechanism intermediate said tongue and electromagnet adapted to be moved in one direction by said electromagnet for operating said tongue, for displacing successively to said operation said electromagnet in a horizontal plane and for bringing the same into a position in which it can again act on said mechanism.

8. In an electrically operated track switch, the combination with a movable switch tongue of an electromagnet pivotally mounted to move in a horizontal plane, a lever mechanism intermediate said tongue and electromagnet and adapted to be moved in one direction by said electromagnet for operating said tongue and for imparting movement to said electromagnet about its pivotal mounting.

9. In an electrically operated track switch, the combination with a switch tongue of an electromagnet pivotally mounted to move in a horizontal plane, a lever mechanism intermediate said tongue and electromagnet and adapted to be acted upon at one end and to be moved by said electromagnet for operating said tongue, for displacing said electromagnet in a horizontal plane, and for bringing the same into a position in which it can act on the other end of said lever mechanism.

10. In an electrically operated track switch, the combination with a switch tongue, of an electromagnet pivotally mounted to move in a horizontal plane, a lever mechanism intermediate said tongue and electromagnet and adapted to be acted on at one end and to be moved by said electromagnet in one direction for operating said tongue and in succession thereto for displacing said electromagnet in a horizontal plane and for bringing the same into a position in which it can act on the other end of said lever mechanism.

11. In an electrical track switch the combination of a casing, a switch tongue, an electromagnet pivotally mounted within said casing, a core movable within said electromagnet and projecting therefrom, means in engagement with said core for actuating said switch tongue, and an element in connection with said means for swinging said magnet about its pivotal axis in a horizontal plane, when said means are actuated.

12. In an electrical track switch the combination of a switch tongue, a casing, an electromagnet pivotally mounted within said casing, a core movable within said electromagnet and projecting therefrom, means detachably engaged at one end by said core for actuating said switch tongue when said core is moved in one direction, an element in connection with said means for swinging the magnet in a horizontal plane and causing engagement of said core with the other end of said means.

13. In an electrical track switch the combination of a switch tongue, a casing, an electromagnet pivotally mounted within said casing, a core movable within said electromagnet and projecting therefrom, a lever detachably engaged at one end by said core, said lever being adjustably connected with said switch tongue, an element in connection with said lever for swinging said electromagnet about its pivotal axis in a horizontal plane and causing engagement of said core with the other end of said lever, and means for returning said magnet into starting position.

14. In an electrical track switch the combination of a switch tongue, a casing, an electromagnet pivotally mounted within said casing, a core movable within said electromagnet and projecting therefrom, an oscillatable double arm lever, said core being in frictional engagement with said lever, said lever being adjustably connected with said switch tongue, an element for swinging said electromagnet about its pivotal axis in a horizontal plane and causing engagement of said core with the other arm of said lever and resilient means for maintaining said electromagnet in its end positions.

15. In an electrical track switch the combination of a switch tongue, a casing, an electromagnet pivotally mounted within said casing, a core movable within said electromagnet and projecting therefrom, a lever

detachably engaged at one end by said core, said lever being adjustably connected with said switch tongue, an element in connection with said lever for swinging said electromagnet about its pivotal axis in a horizontal plane and causing engagement of said core with the other end of said lever, resilient means for maintaining said electromagnet in its end position and means for adjusting the pivotal support of said magnet with respect to the walls of the casing.

Dated this 15th day of January, 1910.

JOSEPH PATRICK TIERNEY.
JOHN MALONE.

Witnesses:
JAMES MOORE,
MATTHEW CALLANAN.