(No Model.) 2 Sheets—Sheet 1.

F. J. DYETT.

ELECTRIC GATE OPERATING MECHANISM.

No. 557,497. Patented Mar. 31, 1896.

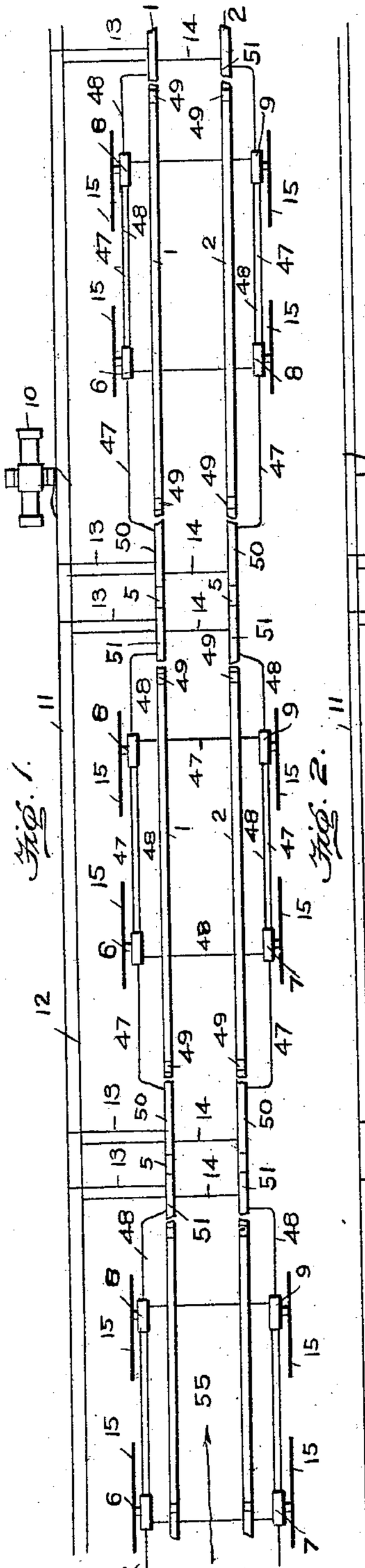


Fig. 1.

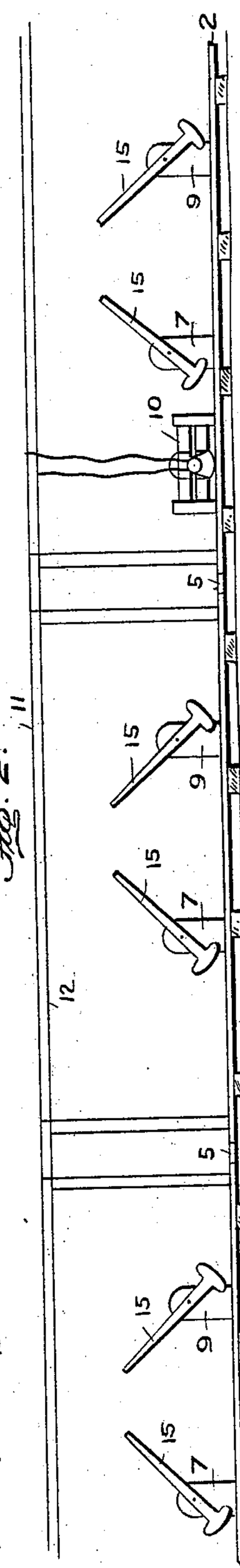


Fig. 2.

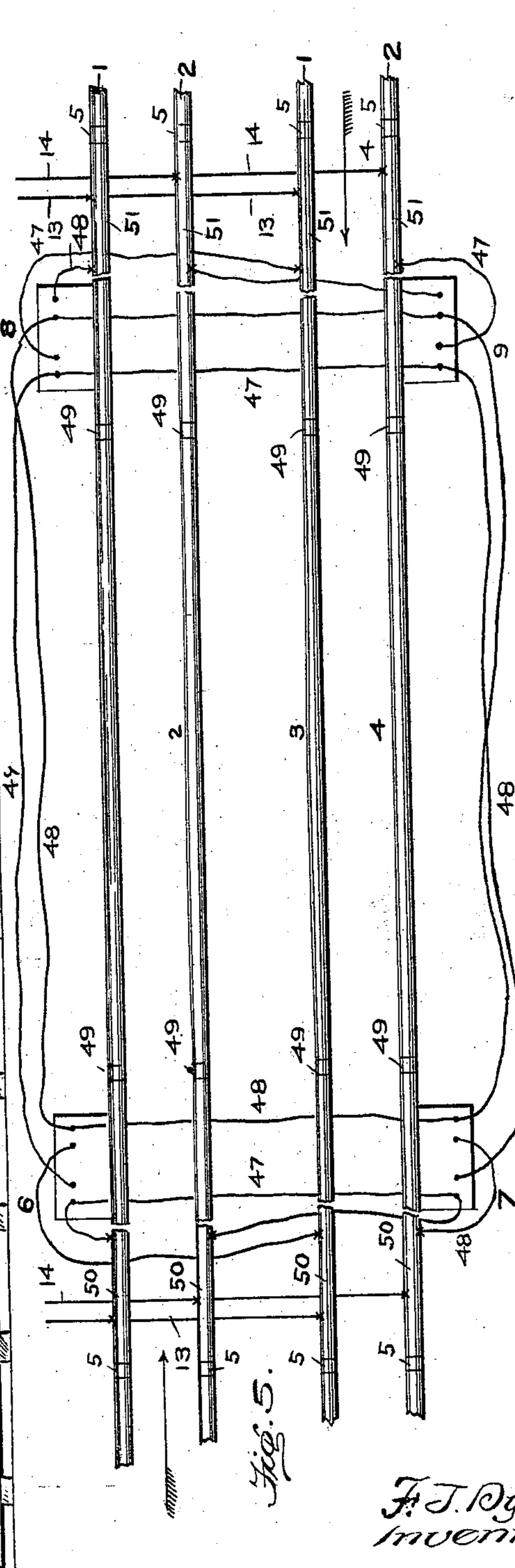


Fig. 3.

Fig. 4.

Fig. 5.

Witnesses:
Wm. C. Duckett.
Arthur L. Bryant.

F. J. Dyett.
Inventor
By Edson Bros.
Atty's

(No Model.) 2 Sheets—Sheet 2.

F. J. DYETT.

ELECTRIC GATE OPERATING MECHANISM.

No. 557,497. Patented Mar. 31, 1896.

Fig. 4.

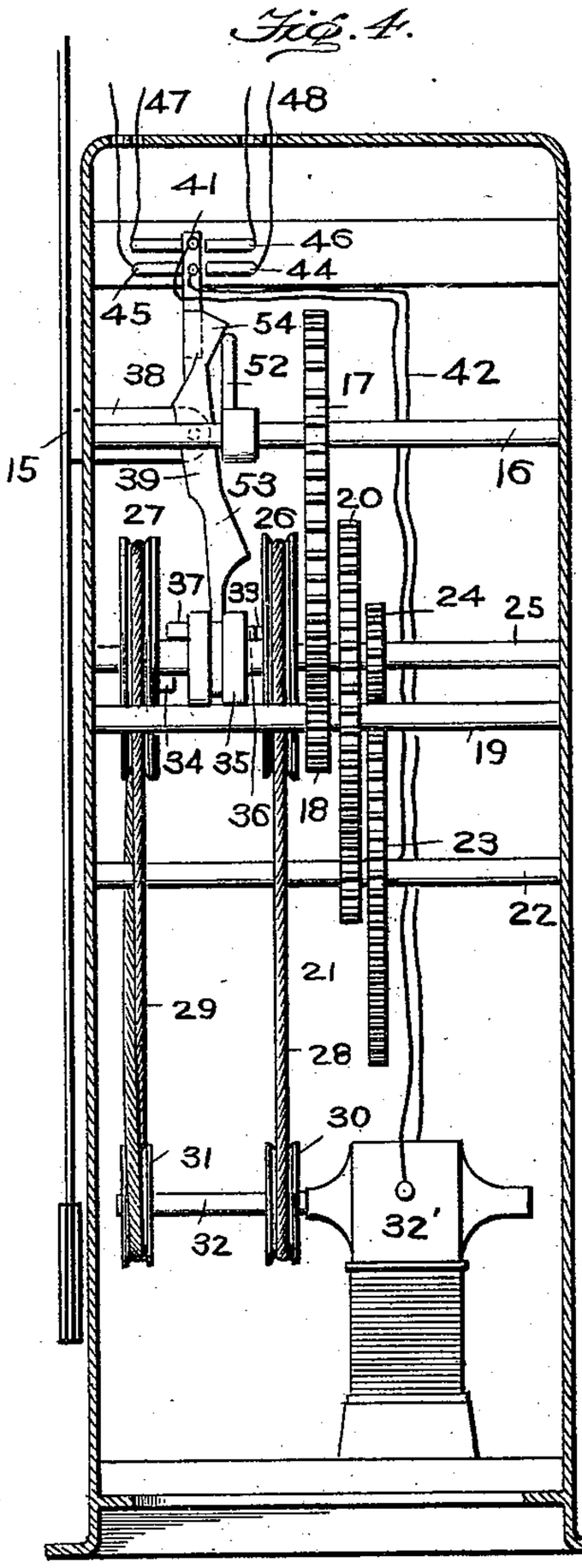


Fig. 3.

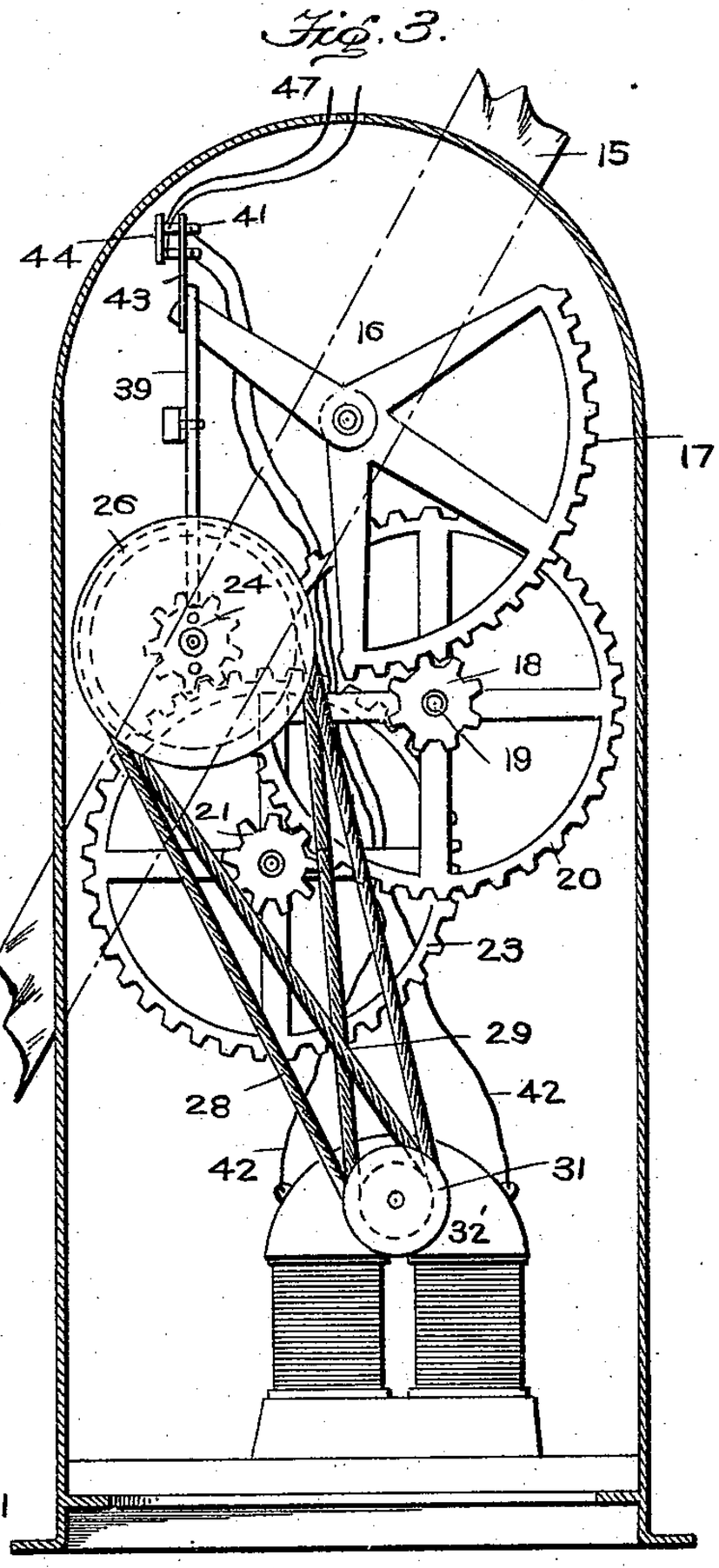


Fig. 6

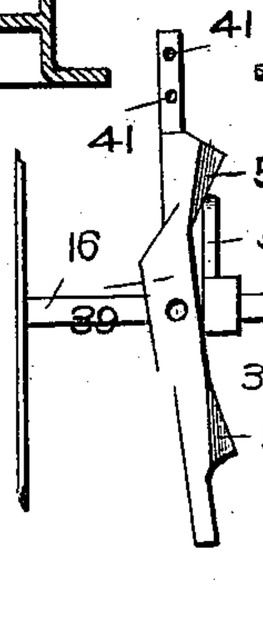
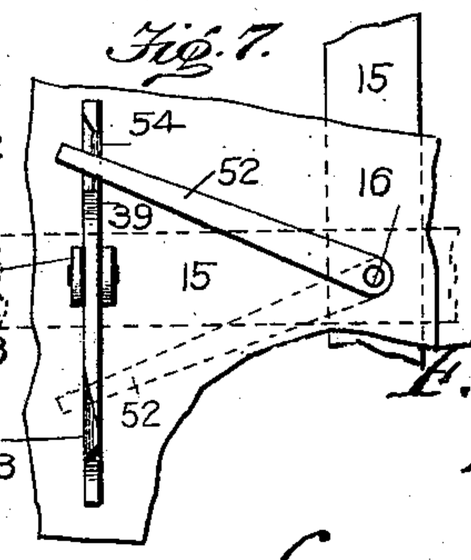


Fig. 7.



Witnesses:

Wm. C. Dashiell.

Arthur L. Bryant.

F. J. Dyett.

Inventor

By Edson Bros.

Attys.

UNITED STATES PATENT OFFICE

FRANCIS J. DYETT, OF ILION, NEW YORK.

ELECTRIC GATE-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 557,497, dated March 31, 1896.

Application filed November 1, 1893. Serial No. 489,742. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS JOSEPH DYETT, a citizen of the United States, residing at Ilion, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Electric Gate-Operating 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 invention relates to improvements in electrically-operated mechanism for automatically closing the gates at railway-crossings as a train approaches the same and opening said gates after the train has passed.

The object of the invention is to provide mechanism of the character specified which will be simple in construction and economical in the use of electric energy.

Another object of the invention is to provide means whereby the power necessary to operate all of the gates in one division of the road will be supplied from a single station or generator in said division.

With these and other ends in view my invention contemplates the employment of a normally open feeder-circuit connected with the rails of the track on opposite sides of a crossing, a forward motor-circuit connected with the rails of the track between the points of connection of the feeder-circuit and with the mechanism for operating the gates at the crossing, and a rear motor-circuit connected with the gate-operating mechanism and with the rails of the track on the opposite side of an insulated portion thereof from the points of connection of the forward motor-circuit, whereby as a train approaches the crossing and closes the feeder-circuit the forward motor-circuit will be energized and the gate mechanism operated to close the gates, and after the train has passed, and again closes the feeder-circuit, the rear motor-circuit will be energized and the gate mechanism operated to open the gates.

My invention further consists in the combination, with a track which is divided by suitable insulating means into a series of independent sections, of a normally open feeder-circuit connected with a suitable source of electric energy and with each section of the track on opposite sides of the crossing therein, a forward motor-circuit arranged in each section of the track and connected with the rails and the gate-operating mechanism, and a rear motor-circuit arranged in each section of the track and connected with the gate-operating mechanism and the rails on opposite sides of insulated portions thereof, so that as a train approaches the crossing and closes the feeder-circuit the forward motor-circuit will be energized and the gate mechanism operated to close the gates, and after the train has passed the crossing, and again closes the feeder-circuit, the rear motor-circuit will be energized and the gates automatically opened, the feeder and both motor-circuits being open and the gate-operating mechanism stationary while the train is passing the space between the points at which the conductors of the feeder-circuit are connected with the rails in each section of the track.

My invention further consists in the peculiar construction and arrangement of parts as will be hereinafter more fully pointed out and claimed.

In the accompanying drawings, Figure 1 is a plan view of a portion of a single-track railway provided with my improvements. Fig. 2 is a side elevation. Figs. 3 and 4 are respectively a side and rear elevation of one of the gate-supports, one side of such support being removed in each figure in order that the operating mechanism may be clearly seen. Fig. 5 is a view showing my improvements applied to a double-track railway. Figs. 6 and 7 are detail views, in front and side elevation, respectively, of the cam-switch lever, the gate-shaft, and the operating-arm 52 on the gate-shaft.

Like numerals of reference denote corresponding parts in all of the figures of the drawings, referring to which—

1 and 2 designate the rails of a track-railway which is divided into a series of sections corresponding to the number of crossings at which gates are placed by means of suitable insulation 5. In the drawings I have shown three sections and four gates, the supports of which are indicated by numerals 6, 7, 8, and 9 at each crossing.

At a suitable point on the road, at one side of the track, is arranged a dynamo 10, and

from said generator extend suitable electric conductors 11 12, which are connected at intermediate points of their length with each of the sections of both rails of the track on both sides of the crossing therein. It will be seen that the conductor 11 is connected with the rail 1 through a branch conductor 13 near each end of each section of the track, and that the conductor 12 is connected with the rail 2 through branch conductors 14. Hereinafter in this specification the conductors 11, 12, 13, and 14 will be referred to as the "feeder-circuit" of my system. Such feeder-circuit is designed to transmit electrical energy generated by the dynamo 10 to all of the gates in a division of the road, which division may be one hundred to one hundred and fifty miles long, and each of the crossings in said division is in one of the electrically-independent sections into which the track is divided, as hereinbefore described.

In the drawings I have shown the gates at the crossings as consisting simply of a pivoted bar or arm of such length as to extend from one side to substantially the middle of the crossing, and in Figs. 3 and 4 I have illustrated in detail the mechanism by which each of said gates is raised or lowered. Referring particularly to said figures, the pivoted arm or bar 15 is rigidly connected to a rock-shaft 16, which is journaled in suitable bearings supported by opposite side walls of a suitable casing or hollow support. On the rock-shaft 16, within the gate-support, is secured a segment-gear 17, which meshes with a pinion 18, carried by a shaft 19, and on said shaft is also secured a gear 20, which meshes with a pinion 21, secured on a shaft 22. On the shaft 22 is also secured a gear 23, that meshes with a pinion 24, carried by the main driving-shaft 25. On the shaft 25, at one side of the pinion 24 thereon, are loosely mounted two peripherally-grooved band wheels or pulleys 26 27, and said pulleys are connected by endless bands or belts 28 29 with similar wheels or pulleys 30 31, secured on the armature-shaft 32 of an electric motor 32′, which is arranged on a suitable support within the lower portion of the gate-support. The belt or band 28, connecting the pulleys 26 30, is an open belt, while the belt 29, connecting the pulleys 27 31, is a crossed belt, so that, although the armature-shaft 32 will always rotate in the same direction, the direction of rotation of the main shaft 25 and the train of gears operated thereby can be changed or reversed by locking one of the pulleys 26 27 to the shaft, by means to be hereinafter described, and causing it to rotate therewith. The pulleys 26 27 are provided on their inner or adjacent faces each with a laterally-projecting stud or lug 33 34, respectively, and on the shaft 25 between said pulleys is fitted a clutch 35, which is provided on opposite sides with laterally-projecting lugs 36 37. The clutch 35 is secured to the shaft 25 by a suitable key or spline fitted in a longitudinal way or groove formed in the shaft, so that while said shaft and clutch will rotate together the clutch is capable of being moved longitudinally on the shaft sufficiently far to bring one of the lugs 36 37 thereon into position to come in contact with the adjacent stud or lug 33 or 34 on one of the pulleys 26 27 and cause said pulley to rotate with the shaft 25. To a bracket 38 is pivoted a switch-lever 39, one end of which is reduced and extends into a central peripheral groove 40 in the clutch 35, while to the other end of said lever are secured suitable binding-posts 41, to which are connected conductors 42, leading from the motor 32′. The binding-posts 41 are preferably carried by a plate 43, of any suitable non-conducting material, which is securely fastened to the switch-lever. The switch-lever projects partially across a switchboard 44, and to said board, on opposite sides of the binding-posts 41, carried by the switch-lever, are arranged binding-posts 45 46, from which, respectively, extend conductors 47 48. The binding-posts 45 46 are preferably provided with flexible or yielding fingers, which are designed to contact with the binding-posts 41 as the latter are moved into proper position by the switch-lever, for a purpose to be hereinafter more clearly pointed out.

By reference to Fig. 1 of the drawings it will be seen that one of the conductors 47 from the gate 6 is electrically connected with the rail 1 of the track, and that the other conductor 47 is connected with a similar conductor from the gate 8. One of the conductors 48 of said gate 6 is connected with a similar conductor from the gate 7, while the other of said conductors 48 is connected with a similar conductor leading from the gate 8. One of the conductors 47 of the gate 7 is electrically connected with the rail 2 of the track, while the other conductor 47 from said gate is connected with one of the conductors 47 from the gate 9, the other conductor 47 of which is connected with one of the conductors 47 leading from the gate 8. One of the conductors 48 of the gate 9 is connected with one of the conductors 48 of the gate 7, while the other conductor 48 of said gate 9 is connected with rail 2 of the track. One of the conductors 48 of the gate 8 is connected with the rail 1 of the track.

The conductors 47 constitute what I have termed the "forward motor-circuit," and the conductors 48 the "rear motor-circuit."

The rails of each section of the track are divided into three sections by suitable insulation (indicated by 49 in Fig. 1) so that a section 50 of each of the rails will be included in the forward motor-circuit and a section 51 in the rear motor-circuit, while the central portion of each section of the track is not included in any of the circuits. The sections 50 51 of each rail are also included in the feeder-circuit.

To the shaft 16 is secured an arm 52, which, as said shaft is rocked in its bearings, alternately contacts with one of two inclined cam-

surfaces 53 54, formed on the switch-lever 39, on opposite sides of the pivot-point of said lever.

It is usual in railway-gates of the class to which my invention relates to swing the gate so as to describe an arc of a circle of ninety degrees, (90°,) and thereby give the gate-shaft 16 a quarter-turn. To cause the arm 52 on the gate-shaft to properly engage with one cam-surface 54 and then the other cam-surface 53 as the gate is lowered and raised, I place the arm 52 on the shaft 16 in the position shown by Figs. 6 and 7 of the drawings. The cam-switch lever 39 is hung or pivoted quite close to the gate-shaft and the arm 52 is secured to the shaft so as to play or move therewith between the two cam-surfaces 53 54 as the gate-shaft is turned to lower or raise the gate, whereby as the shaft 16 is turned to lower the gate the arm 52 will ride upon the cam 53 when the gate is lowered to a horizontal position, so as to shift the cam-switch lever, and when the gate is raised by the reversal of the shaft 16 the arm 52 will ride against the cam-surface 54 to again switch the cam-lever 39 and restore it to the normal position.

Although I have shown and described the cam-switch lever 39 and gate-shaft arm 52 as constructed to operate the switch-lever when the gate-shaft 16 moves a quarter-turn, yet I do not confine myself to this proportion and arrangement of parts, because the switch-lever and gate-shaft arm may be so proportioned and arranged as to shift the lever when the gate swings in an arc of a circle more or less than ninety degrees, (90°.)

The operation of my invention may be briefly stated as follows: When the gates are open or the bars 15 elevated, the feeder and both motor-circuits are open and the various parts occupy the positions shown in Figs. 3 and 4. As a train approaches in the direction indicated by the arrow 55 and the engine passes onto the sections 50 of the rails 1 2 the feeder-circuit is closed and the forward motor-circuit energized. The current passes into the support of each gate-bar on the conductors 47, through the binding-posts 45 41 and the conductors 42, to the motor 32′. As the armature-shaft rotates the motion thereof is communicated to the main shaft 25 through the open belt 28 and the pulley 26, which is locked to said main shaft by the clutch 35, and the motion of the main shaft is communicated through the intermediate train of gears to the gate-shaft 16 and the gate-bar 15 lowered into a horizontal position. As the rock-shaft turns, the arm 52 carried thereby comes into contact with the cam-surface 54 on the switch-lever and turns said lever on its pivot, so as to break the connection between the binding-posts 41 45 and bring the binding-posts 41 into contact with the binding-posts 46. The movement of the switch-lever also disengages the clutch 35 from the pulley 26 and moves it into position to lock the pulley 27 to the shaft 25. After the engine, which acts as a circuit-closer, passes the section 50 of the rails 1 2 the circuits are all opened and remain so until the engine passes onto sections 51 of said rails, when the feeder-circuit is closed and rear motor-circuit energized. The current then enters the gate-supports through the conductors 48, and as the armature-shaft is revolved the motion thereof is communicated to the main shaft through the cross-belt 29 and said main shaft rotated in a reverse direction from that in which it turned when driven by the open belt 28, and the bar 15 is returned to its former elevated position. During such movement of the gate-bar the arm 52 operates to turn the switch-lever to disengage the clutch 35 from the pulley 27 and cause the same to take the position shown in Figs. 3 and 4.

In Fig. 5 I have illustrated a section of a double-track railway provided with my improved system. When used in this connection, one of the conductors 47, leading from the gate-support 7, is connected with section 50 of rail 1, and the other of said conductors is connected with one of the binding-posts 45 in the support 8. One of the conductors 47 from the support 8 is connected with section 50 of rail 2, and the other of said conductors is connected with one of the binding-posts 45 in the support 9. One of the conductors 47 from said support is connected with section 51 of rail 4 of the track, and the other of said conductors is connected with one of the binding-posts 45 in the support 6. One of the conductors 47 from the support 6 is connected with section 51 of rail 3, while the other of said conductors is connected with one of the binding-posts 45 in the support 7.

One of the conductors 48, leading from the support 7, is connected with section 50 of rail 3 of the track, and the other of said conductors is connected with one of the binding-posts 46 in the gate-support 8. One of the conductors 48, leading from the support 8, is connected with section 50 of rail 4, and the other of said conductors is connected with one of the binding-posts 46 in the gate-support 9. One of the conductors 48, leading from the support 9, is connected with section 51 of rail 2, and the other of said conductors is connected to one of the binding-posts 46 in the gate-support 6. One of the conductors 48 from said support 6 is connected with section 51 of rail 1, and the other of said conductors is connected with one of the binding-posts 46 in gate-support 7. As a train approaches the crossing on either of the tracks the feeder-circuit will be closed and the forward motor-circuit energized, as the engine passes onto sections 50 of rails 1 2 or sections 51 of rails 3 4, and the gates at the crossing will be automatically closed. After the train has passed the crossing and the engine passes onto sections 51 of rails 1 2 or sections 50 of

rails 3 4 the feeder-circuit is closed again and the rear motor-circuit energized and the gates automatically opened.

It will thus be seen that I have provided a very simple and efficient mechanism for automatically operating the gates at railway-crossings, and that a single dynamo or generator can furnish all the power required to operate all the gates in a division of the road extending over a long distance.

Although I have shown my invention as particularly adapted for operating gates consisting of a single pivoted arm, I do not wish to be understood as intending to limit myself to any form of gate, as I am aware that various other forms can be substituted for that shown herein without departing from the spirit of my invention.

I am also aware that other changes and modifications of the embodiment of my invention herein shown and described may be made without departing from the spirit or sacrificing the advantages of the invention. For example, instead of the arrangement of pulleys and belts connecting the armature-shaft of each motor with the gate-carrying shaft, any suitable arrangement of gearing may be employed for such purpose; also, it may be desirable to employ two motors in each gate-support, one in each of the motor-circuits, instead of a single motor, as shown in the present case, and a bell or other suitable alarm may be arranged in each forward motor-circuit. A storage-battery may be arranged at a suitable location and charged from the generator 10, so that in case of said generator being disabled the system will not be rendered inoperative, but the different circuits can be energized from said battery.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a gate-shaft, and a motor, of the driving-shaft having the reversing-gears connected with the motor-shaft, a clutch operating to alternately make one or the other of the gears fast with the driving-shaft, and a switch-lever in circuit with said motor and connected with the clutch, for the purposes described, substantially as set forth.

2. The combination with a gate-shaft, and a motor, of the loose gears on a driving-shaft connected with the motor-shaft, a clutch keyed to the driving-shaft between said gears, the circuit-contacts, a switch-lever connected with the clutch and adapted to make the circuit-contacts, connections between the motor and switch-lever, and an arm on the gate-shaft to operate the switch-lever, substantially as described.

3. The combination of a gate-carrying shaft journaled in suitable bearings in a hollow support, an electric motor arranged within the support and having its armature-shaft connected with a driving-shaft, gearing intermediate of the driving and gate-carrying shafts, a feeder-circuit connected with an electric generator and with the rails of a railway-track, on opposite sides of the gate-operating mechanism and of an insulated portion of said rails, a forward motor-circuit connected with the rails of the track, between the points of connection of the feeder-circuit, and with suitable binding-posts arranged within the gate-support, a rear motor-circuit connected with the rails of the track, between the points of connection of the feeder-circuit but on the opposite side of the insulated portion of the rails from the points of connection of the forward motor-circuit, and with suitable binding-posts within the gate-support, a switch-lever fulcrumed within the gate and carrying binding-posts, to which are connected conductors leading from the motor in said support, adapted to contact with the binding-posts in the forward and rear motor-circuits, and means carried by the gate-shaft to actuate the switch-lever, said switch-lever being connected with reversing-gear on the driving-shaft, substantially as and for the purpose described.

4. The combination with a gate-carrying shaft journaled in suitable bearings in a hollow support, an electric motor arranged within the gate-support, a driving-shaft geared to the gate-carrying shaft, two pulleys, 26, 27 loosely fitted on the driving-shaft and connected with pulleys on the armature-shaft of the motor by an open and crossed belt, respectively, a clutch fitted on the driving-shaft and adapted to lock either of the pulleys, 26, 27, thereto, a feeder-circuit connected with an electric generator and with the rails of a track, on opposite sides of the gate-support and of an insulated portion of said rails, electric conductors extending from binding-posts, 45, within the gate-support, to the rails of the track at a point between the points of connection of the feeder-circuit thereto, electric conductors extending from binding-posts, 46, within the gate-support, to the rails of the track at a point between the points of connection of the feeder-circuit thereto, but on the opposite side of the insulated portion of the rails from the points of connection of the conductors from the posts, 45, a switch-lever fulcrumed within the gate-support and connected, at one end, with the clutch on the driving-shaft and having binding-posts, to which are connected conductors from the motor within the gate-support, adapted to contact with the binding-posts 45 and 46, and means for turning the switch-lever on its pivot as the gate is opened or closed to shift the clutch on the driving-shaft and contact with the binding-posts, 45, or, 46, substantially as and for the purpose described.

5. In an electric gate system, a gate-shaft, an electric motor, and the shiftable clutch and gear mechanism between the gate-shaft and motor-shaft, in combination with the forward and rear motor-circuits connected with insulated portions of a track on opposite sides of the gate and each motor-circuit having ter-

minal switch-contacts, a reversing-switch operated by a projection on the gate-shaft and arranged to alternately make the contacts of said forward and rear motor-circuits, and a feeder-circuit including a source of electrical energy and having its conductors connected with the insulated track-sections to which the two motor-circuits are connected, substantially as described.

6. In an electric railway-gate, the combination with outlying conductors of two motor-circuits provided with terminal contacts, of a gate-shaft carrying an actuating-arm, a motor, duplex reversing-gear between the motor-shaft and the gate-shaft, and a switch-lever included in the motor-circuit and arranged to make contact with either set of the terminal contacts of said outlying conductors, said switch-lever lying in the path of the arm on said gate-shaft and connected with the reversing-gear to mechanically actuate the same, for the purposes described, substantially as set forth.

7. In an electric railway-gate, the combination with two sets of terminal contacts to which are connected the outlying conductors of two motor-circuits, of a switch-lever fulcrumed to move from one set of said terminal contacts to the other set, a motor having conductors connected with said switch-lever, a gate-shaft carrying an arm adapted to strike the switch-lever and to shift the same back and forth as the gate is opened and closed, and duplex reversing-gear connecting the motor-shaft and gate-shaft and having a clutch which is connected with the switch-lever and is actuated thereby to cause the gearing to operate the gate-shaft in either direction, substantially as and for the purposes described.

8. In an electric railway-gate, the combination with two sets of terminal contacts to which are connected the outlying conductors of forward and rear motor-circuits, of a gate-shaft carrying a switch-actuating arm, a motor, a counter-shaft geared to the gate-shaft and having pulleys which are connected with the main shaft to be driven thereby in opposite directions, a clutch on the counter-shaft between said pulleys, and a cam-formed switch-lever lying in the path of said actuating-arm and connected at one end to the clutch, said switch-lever being hung to make contact with either set of terminal contacts and having conductors which lead to said motor, substantially as and for the purposes described.

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

FRANK J. DYETT.

Witnesses:
GEO. H. DYETT,
HENRY VAN GUMSTED.