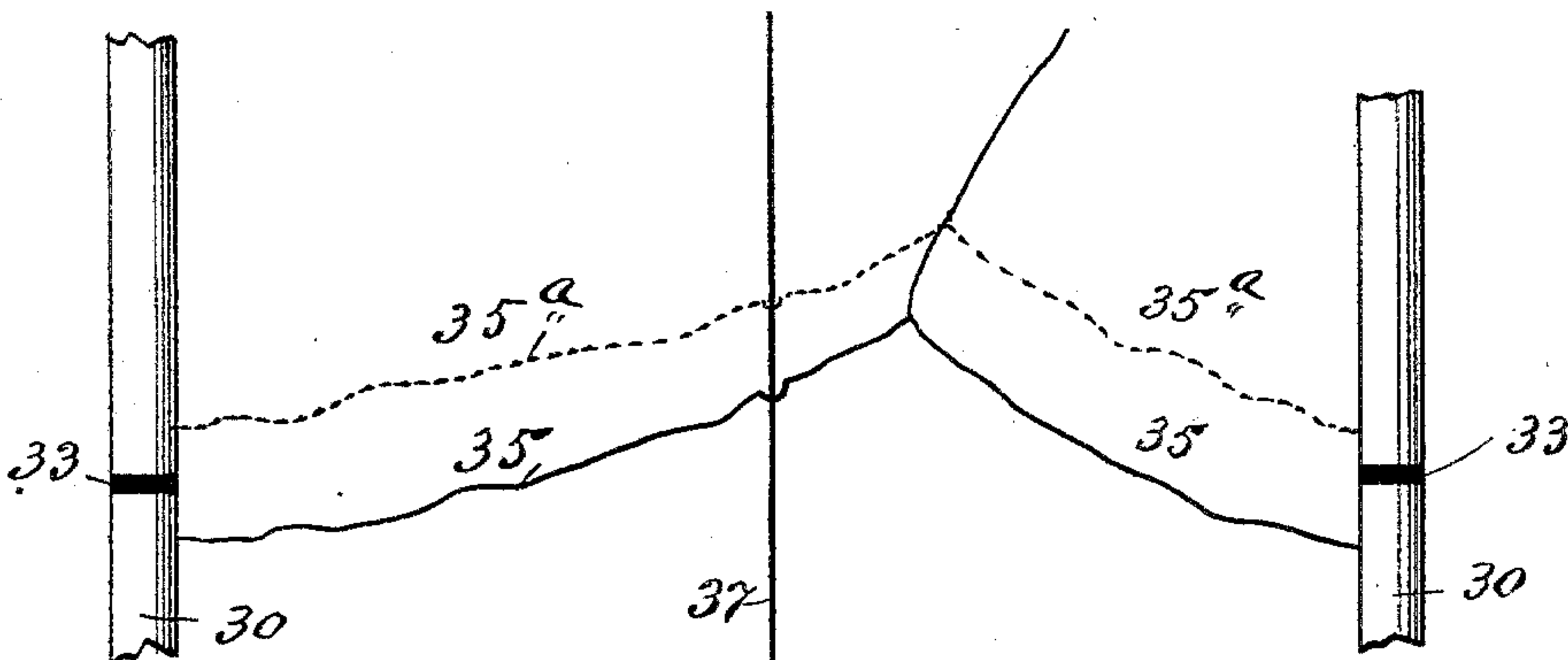
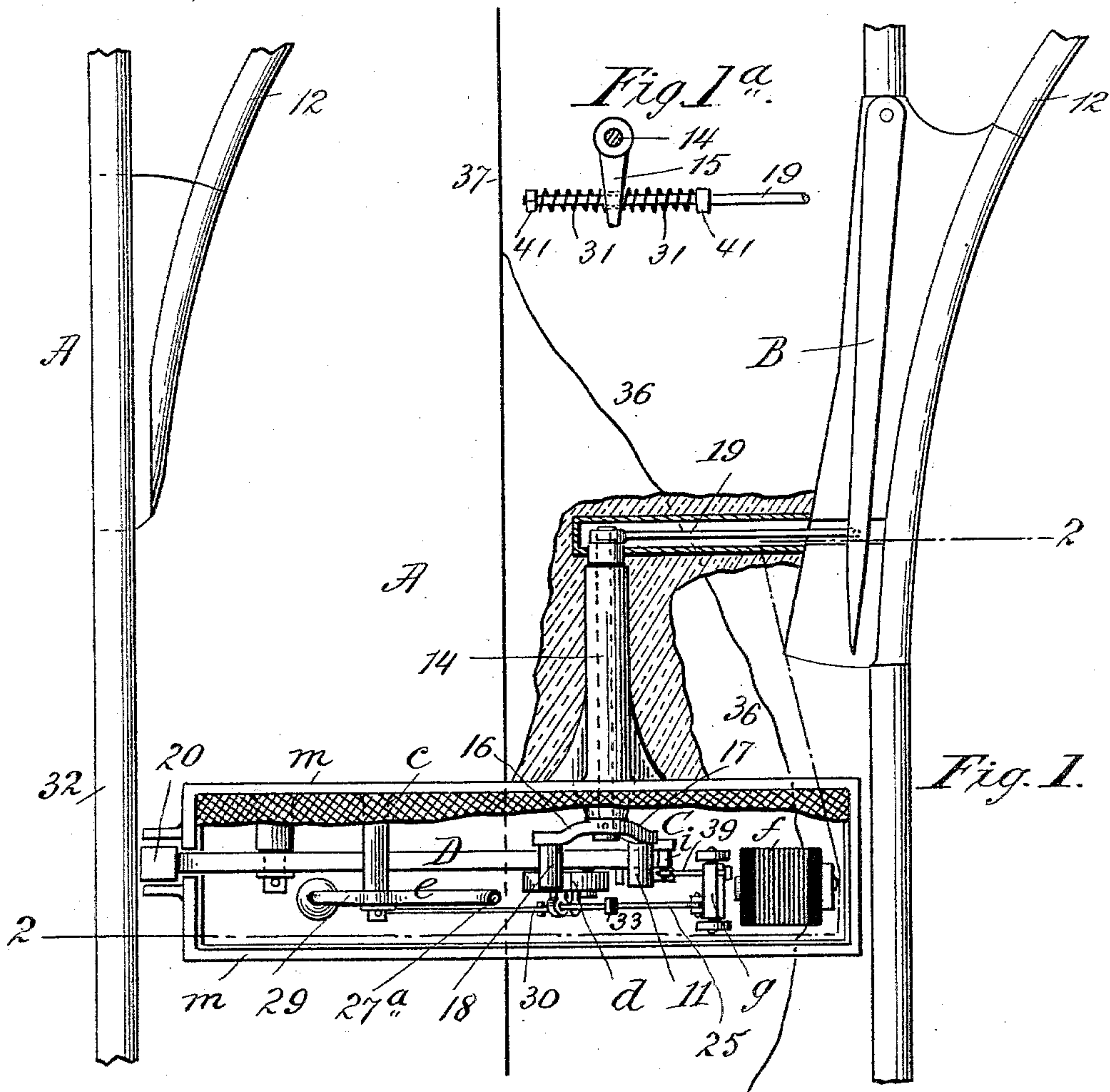


C. W. SQUIRES.

ELECTROMECHANICAL SWITCH OPERATING MECHANISM.

No. 597,472.

Patented Jan. 18, 1898.



Witnesses
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

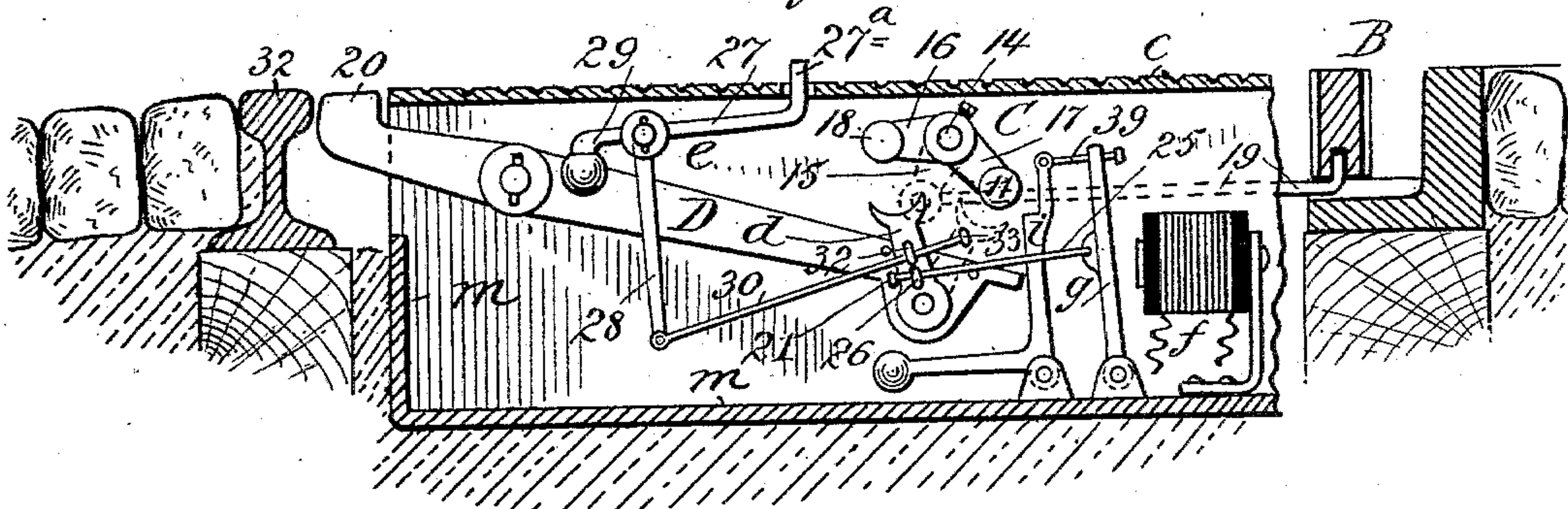


Fig. 3.

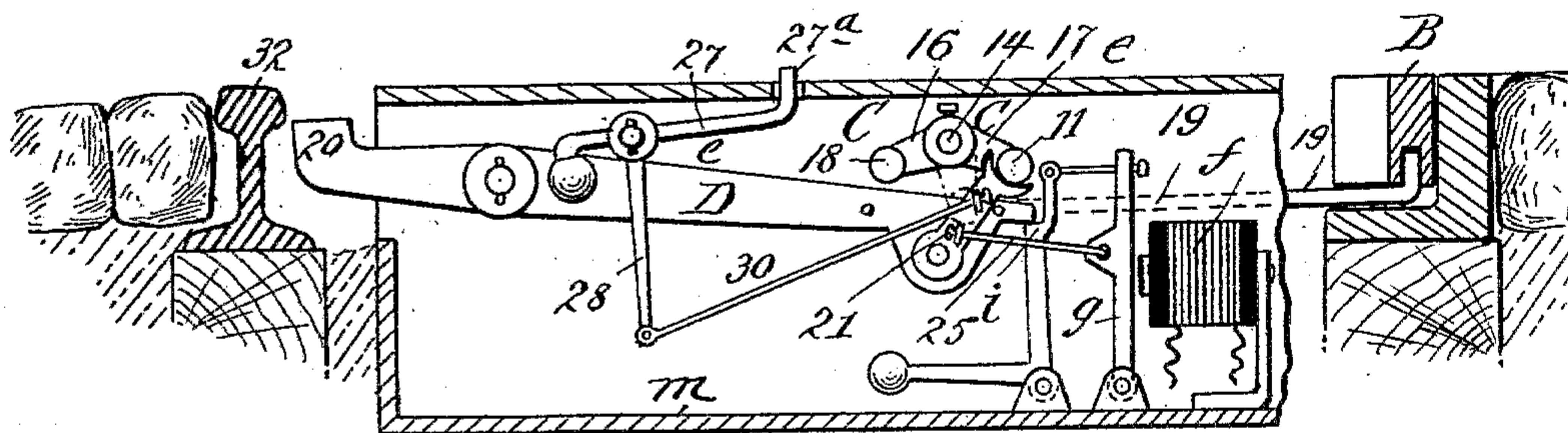
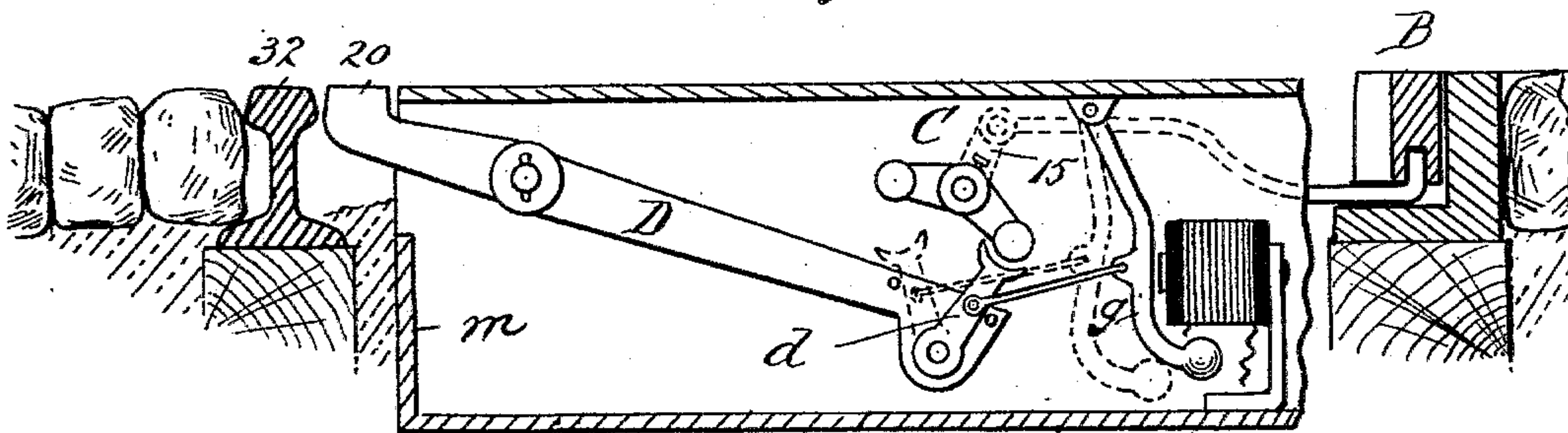


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES WM. SQUIRES, OF SPRINGFIELD, MASSACHUSETTS.

ELECTROMECHANICAL SWITCH-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 597,472, dated January 18, 1898.

Application filed April 9, 1897. Serial No. 631,392. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WM. SQUIRES, a citizen of the United States, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Electromechanical Railway-Switch-Operating Mechanism, of which the following is a specification.

This invention relates to improvements in mechanism for operating railway-switches, whereby the switch-point may have its position to cause the car to run on the straight track or around the curve, as may be desired, the straight-running or curve-rounding being accomplished by an act of the motorman while remaining on the running car, not necessitating his getting off the car to manually throw the switch-point.

The object of the invention is to devise a switch-operating mechanism or device which shall be efficient in operation, simple and comparatively inexpensive in construction, and generally more desirable and acceptable than mechanism for throwing switches, controlled or operated from the car, which have been heretofore proposed and used.

The invention contemplates a mechanism connected to and operating the switch-point by means of the power exerted by the car-wheel passing over a member of said mechanism, in conjunction with electromagnetic appliances which are operative to regulate or set shiftable parts of the mechanism, whereby the switch-tongue will be thrown from the one to the other of its positions, or whereby the tongue while in a given position may, if desired, be allowed to remain in such position without being affected by the movable member, which receives movement as the car-wheel passes over and past it by said wheel; and the invention consists in the constructions and arrangements or combinations of parts and devices, all substantially as will be hereinafter fully described, and set forth in the claims.

Exemplifications of the present invention are illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my electromechanical switch-operating mechanism. Fig. 1^a is a view of a detail of construction to be hereinafter referred to. Fig. 2 is a sectional elevation transversely of the track, as taken

on the planes indicated by line 2 2, Fig. 1, with the parts shown as in their normal positions. Fig. 3 is a view similar to Fig. 1, but showing the parts as operated by the passing car-wheel. Fig. 4 is a sectional elevation similar to Fig. 1, but illustrating the availability of a modification to be hereinafter explained.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents the railway having the straight track and branch or siding 12, B representing a switch point or tongue arranged as usual.

C represents a rocking switch-throwing device comprising a shaft 14, having the crank-arm 15, and the arms 16 and 17, having, respectively, the contact studs or members 18 and 11. This device is mounted in suitable supports therefor, with the shaft 14 ranging horizontally under the road-bed longitudinally of the railway, and a connecting-rod 19 has an engagement with the switch-point B and with the aforesaid arm 15, so that when the rock-shaft is oscillated the switch-point will be horizontally moved or shifted.

D represents a lever pivotally mounted under the road-bed and having a portion or member thereof, as seen at 20, located adjacent one of the track-rails, so that the wheel of a car in passing will swing the lever. Upon this lever D, at a point suitably distant from the member 20, a pawl *d* is pivotally mounted and adapted to occupy either of two positions on the lever—as, for instance, that seen in the full lines in Fig. 2 or that indicated by the dotted lines in Fig. 2, and also by the full lines in Fig. 3.

f represents an electromagnet, and *g* the armature therefor and arranged to operate in conjunction therewith. The rod 25 is connected to the armature and also has an engagement with the aforesaid shiftable pawl *d*. In Figs. 1, 2, and 3 this engagement is a loose sliding one under certain conditions, as acquired by the eye 26 on the pawl and the shoulder 21 on the rod, so that when the pawl is in the position shown in Fig. 2 and the armature moves toward the magnet the shoulder will engage the eye and thereby swing the pawl to the right; but, on the other hand, when the pawl is in the position shown in the

dotted lines in Fig. 2 and the armature returns to its normal position away from the electromagnet. the rod will slide freely through the eye without throwing the pawl back to the first position.

An angular lever *e*, comprising the arms 27 and 28, is pivotally hung on a suitable support therefor under the road-bed, the arm 27, having the extremity 27^a, projecting upwardly through an aperture therefor in the plate *c*, which covers the box or casing *m*, in which most of the parts of this mechanism are inclosed, this extremity 27^a being accessible to be depressed from the car by any of the well-known devices which are employed on cars to be thrown down for operating switch shifting or setting or controlling devices located adjacent the road-bed and not necessary to be here illustrated or described. This angular lever has the counterweight 29, whereby the angular lever will always remain in its normal position shown except when positively moved.

To the end of the arm 28 the connecting-rod 30 is pivoted, this rod playing through the eye 32, provided on the pawl, and having at its right-hand end beyond the eye the shoulder 33, so that when the pawl is in the position shown in full lines, Fig. 2, and the angular lever is swung the rod 30 may be drawn endwise through the eye without being interfered with by the latter, but so that when the pawl is in the other position (shown in Fig. 3) and the angular lever is swung the pawl will be swung therewith from the position shown in Fig. 3 to that shown in Fig. 2.

Now, referring to Fig. 1, it will be seen that the rails 30 in advance of the rails 32, between which is located the present improved mechanism, are insulated, as indicated at 33, from the said rails 32, and that the wires 35 run from said rails 30 and, being joined together, continue or extend to the electromagnet *f* at one pole thereof, and another wire 36 extends from its connection with the other pole of the electromagnet to connection with the ground-wire 37, commonly employed along electric railways.

Now the operation of the devices described will be explained: It will be assumed that the switch-tongue B is in its position shown in Figs. 1 and 2 to give the siding, and the pawl *d* is in the position of inclination upwardly to the left and under the contact member 18 of the rocker, which by reason of the position of the switch-tongue just stated is located out of reach of the throw of the pawl *d*. As the electric car approaches the switch, in coming on the rails 30, in electrical connection with the electromagnet and return-wire, the current coming through said rails 30 and the electromagnet from the overhead trolley-wire by way of the motor on the car and the car-wheel energizes the electromagnet, drawing the armature thereagainst, which, through the rod 25, shifts the pawl *d* into the position indicated in the dotted lines in Fig. 2 and

full lines, Fig. 3, the pawl being now in proximity to the right-hand contact 11 of the rocker device C, which contact member is in the downswung position. Now as soon as the wheels of the car have passed completely clear of the rails 30 the electromagnet becomes dead and the armature will fall away from the electromagnet without reversing the position of the pawl from said position shown in dotted lines in Fig. 3. Now when the car-wheel reaches the lever D it will swing said lever, elevating the pawl *d*, and through the latter, acting against the adjacent contact member 11, operate the rocker device and shift the switch-tongue to the position for the straight track seen in Fig. 3.

In order to render still further more clear the operation and availability of the mechanism, it will be assumed that the switch-tongue is in the position for causing the car to proceed on the straight track, the rocker device to correspond to this position of the tongue being in the position shown in Fig. 3. Now as the car comes onto the rails 30 and the magnet draws the armature and reciprocates the rod 25 the latter will simply play loosely through the eye 26 without establishing any new conditions, and when the car-wheel-operated lever D is swung the pawl moving therewith will be thrust to its upward limit before it reaches the right-hand contact member 11 of the rocker device and no shifting will ensue; but again, assuming the switch-tongue is set for the straight track, that the pawl is shifted to the position of the dotted lines, Fig. 2, and the rocker is in the position shown in Fig. 3, and it is desired to have the car switched around the curve, of course it is understood that the electromagnetic appliances operate as next last above explained without effect to shift over the pawl to the right, and the motorman or other person, through whatever means are provided for such purpose, mechanically depresses the member 27^a of the angular lever *e*, whereupon the pawl is shifted to its other position—that is, in its inclination upward to the left and under the lower contact member of the rocker, so that as the car-wheel proceeds over the power-lever D the rising pawl will shift the switch-throwing device C so as to swing the switch-tongue to the position to cause the car to take the siding.

In Figs. 2 and 3 a snap-catch device or automatic latch *i* is shown as operatively combined in relation to the lever D, so that after the first wheel of the car has passed to depress it and through it to effect the operation as purposed this catch will prevent the lever from being reciprocated by the successive wheels of the same car, as is unnecessary, and as also tends to unduly wear out the mechanism. It is understood that this restraining of the lever occurs at a time when the electromagnet is dead, and it is also perceived that the said latch *i* is, through the rod 39, engaged with the armature *g*, so that when

the next car comes along to the rails 30 and the armature is drawn against the electromagnet the latch will automatically release the lever for the latter to resume its normal position in readiness to be again operated by the next car.

I will now describe a manner of utilizing essential portions of my improved and novel mechanism, whereby the angular mechanically-operating shifting-lever and its connecting-rod 30 is dispensed with, the electrical appliances being arranged and operating to shift the switch or leave it as it may have been set, as required.

The rocker device C, which throws the switch-point in Fig. 4, is shown inverted—that is, the crank-arm 15 thereof is upwardly extended. Here the connecting-rod 25 is pivoted to the armature and to the pawl, so that there is no lost motion in either direction. The wiring for the electric connections with the electromagnet is here slightly different, in that the wires 35 35, instead of running from connection with the rails 30 through the magnet, run, as indicated in the dotted lines 35^a, Fig. 1, to and through the magnet from the rails 32, next to which the lever D is located. It is understood that there is some considerable length of rail 32 to be traversed by the car-wheel between the time the wheel first reaches such rail and the time it reaches the lever D.

Now supposing the pawl *d* and armature are in the positions shown in Fig. 4 by dotted lines before the car-wheel reaches the rail 32 and the switch-tongue is placed for the straight track, so soon as the car-wheel comes upon the rail 32 it energizes the electromagnet and draws the armature, which brings the pawl *d* under the contact member of the rocker which is lowermost and in readiness to receive the shifting thrust by the pawl, and this shifting thrust causing the right-hand arm of the rocker to rise and the crank member 15 to move to the left throws the switch-tongue open, so that the car will take the siding and run around on same under its electric motive power. Now if it is desired to run on the straight track, the electric-power current is switched off at the car, so that momentarily it does not run through the motor, so that the circuit comprising the rail 32 and the electromagnet *f* becomes broken and the electromagnet dead, and the rocking pawl *d* is thrown back to its leftward inclination by reason of its positive connection with the armature as the latter falls away from the magnet and before the car-wheel reaches the lever D. This reversal of the arm 15 shown in Fig. 4 from its position shown in Figs. 2 and 3 is preferable, but not essential, and it is preferable for the reason that it is more requisite to run the electric car on power while taking the switch for the siding than it is to run on power for the straight track, which may be readily done under the momentum of the car and while the power is off for

the short time required until the car has passed the switch mechanism.

As will be perceived on reference to Fig. 1^a, the switch-operating mechanism may advantageously comprise a yielding connection between the arm 15 comprised in the rocker device for throwing the switch-tongue and the connecting-rod engaged with said arm and the tongue, whereby in the event of a stone or other unyielding object becoming lodged in the switch the mechanism will not become broken when the lever D is very forcibly depressed under the weight of the passing car, and, as shown in Fig. 1^a, the connection between the arm 15 and connecting-rod 19 is made by having the rod passed through an aperture in the arm and having the shoulders 41 41 fixed thereon at either side of the arm suitably distant therefrom, between each of which and the arm are the encircling springs 31. The springs have sufficient stiffness, so that ordinarily the arm and connecting-rod move as one; but, of course, in the event of the switch-tongue becoming blocked the movements of the mechanism comprising and intervening between the lever D and the rocker device may ensue without effect to move the connecting-rod or without resistance imparted thereby, except such as is developed by the reaction of the one of the springs which is compressed.

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

1. In a switch-operating mechanism of the character described in combination with the switch-tongue, a device for throwing the tongue, a car-wheel-operated lever, a shift-able pawl to have a thrust imparted thereto by the lever and to shift the switch-throwing device, an electromagnet and its armature engaged with the pawl, a catch device for automatically engaging the lever when depressed, and a part through which the catch is engaged with the armature substantially as described.

2. In a switch-operating mechanism of the character described in combination with the switch-tongue, a device for throwing the tongue, a car-wheel-operated lever, a shift-able pawl to have a thrust imparted thereto by the lever and to shift the switch-throwing device, an electromagnet and its armature engaged with the pawl, a catch device for automatically engaging the lever when swung and a rod connected to the armature and having a shoulder to engage said catch as the armature moves onto the magnet, substantially as described.

3. In a switch-operating mechanism in combination, the switch-tongue, the rock-shaft 14 having arm 15, also having the differently-extended contact members, a connection between arm 15 and the tongue, the lever D having the pawl *d* pivotally mounted thereon, and adapted to be swung adjacent either of the contact members of the rocker-shaft, the electromagnet and its armature, a rod engaged

with the armature, adapted for a play relative to said pawl, and having a shoulder to engage same, a device adapted to be reached and moved from the car when adjacent the switch, having a lost-motion engagement with said pawl for shifting the pawl when the latter is in one of its given set positions, all substantially as and for the purposes set forth.

4. In combination the switch-tongue, the rock-shaft 14 having arm 15 and arms or extensions 16 and 17, the connecting-rod 19, the lever D having the pawl *d* pivoted thereon, and having the apertures or eyes 26, 32, the electromagnet and its armature, the rod 25 playing through said eye 26, and having the shoulder 21, the angular lever *e*, one arm thereof being accessible at the road-bed and the rod 30 connected to its other arm, and playing through the said pawl-eye 32, and having the shoulder 33, substantially as described.

5. In a switch-operating mechanism of the character described, the combination with a switch, and a movable device operatively connected to the switch, and having two points of contact, of a lever adapted to be operated by the wheel of a passing car having a portion thereof projected adjacent said contact-points of the said switch-operating device, a pawl or dog *d* pivoted on the portion of the lever which is adjacent said points of contact and adapted to be shifted into positions to engage one or the other thereof, an electromagnet comprised in circuit-conductors which will also comprise the car when suitably adjacent the switch and having an armature therefor, and a rod moved by the armature and adapted in its movement to have a shifting engagement with said lever-supported pawl, substantially as described.

6. In a switch-operating mechanism of the character described, the combination with a switch, and a movable device operatively connected to the switch, and having two points of contact, of a lever adapted to be operated by the wheel of a passing car having a portion thereof projected adjacent said contact-points of the switch-operating device, a pawl

or dog *d* pivoted on the portion of the lever which is adjacent said points of contact and adapted to be shifted into positions to engage one or the other thereof, an electromagnet comprised in circuit-conductors which will also comprise the car when suitably adjacent the switch and having an armature therefor, and a rod engaged with the armature and adapted in its movement in conjunction with the attracted armature to have a shifting engagement with said lever-supported pawl in the corresponding direction, and a mechanical device accessible from the road-bed, and connected with said pawl and adapted when operated to swing said pawl into its position the reverse of that in which it may be placed by the armature connected therewith, for the purposes set forth.

7. In a switch-operating mechanism of the character described, the combination with the track-rails 32 adjacent the switch, and the track-rails 30 insulated from said rails which are adjacent the switch, the wire 37 running along the trackway, an electromagnet located adjacent the switch, and wires running from connection with said insulated rails, connecting the electromagnet, and continuing from connection with the latter to said wire 37, of a device connected to the switch for operating it, the same being movably mounted whereby it may occupy either of different set positions, a car-wheel-operated lever, a shiftable pawl or dog for establishing according to its position, engagement or non-engagement between the lever and said switch-setting device, and an armature engaged with said shiftable pawl for setting it when said electromagnet becomes vitalized, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 7th day of April, 1897.

CHARLES WM. SQUIRES.

Witnesses:

WM. S. BELLOWES,
M. A. CAMPBELL.