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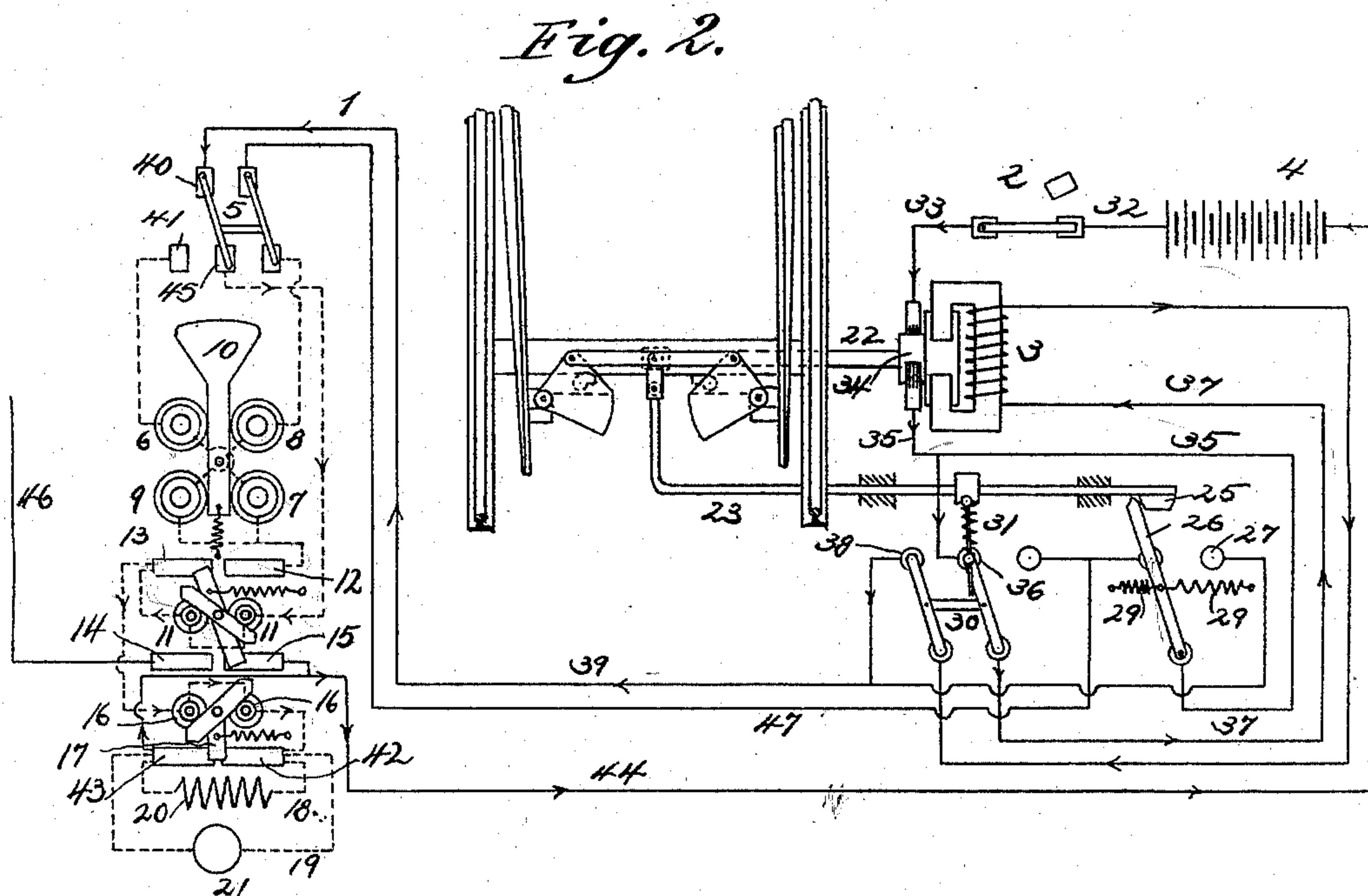
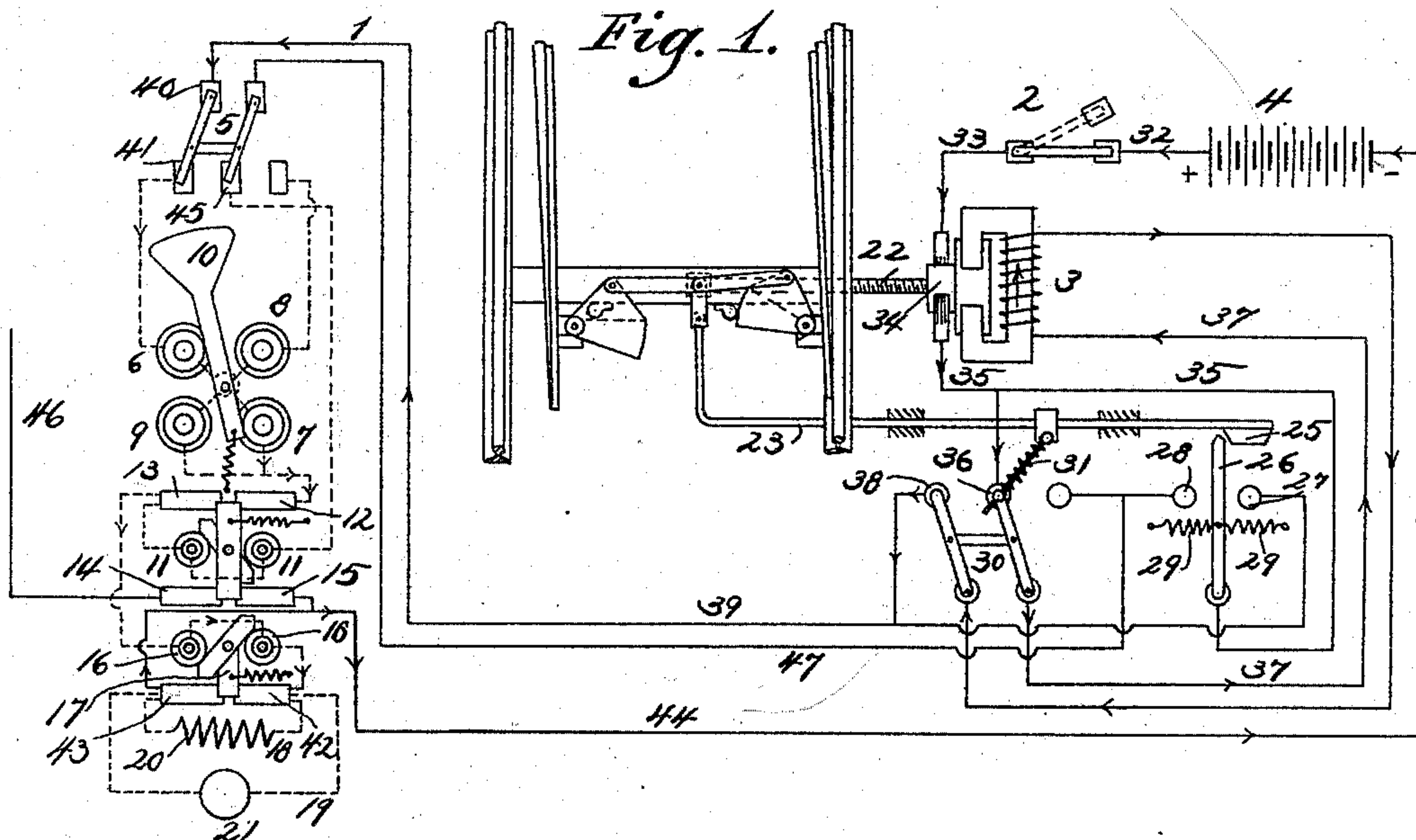
2 Sheets—Sheet 1.

K. MODEREGGER.

ELECTRICAL SWITCH SETTING, INDICATING, AND CONTROLLING DEVICE.

No. 526,813.

Patented Oct. 2, 1894.



WITNESSES:

*John H. Deane*  
*John H. Deane*

INVENTOR

*Karl Moderegger*

BY

*John H. Deane*  
ATTORNEY

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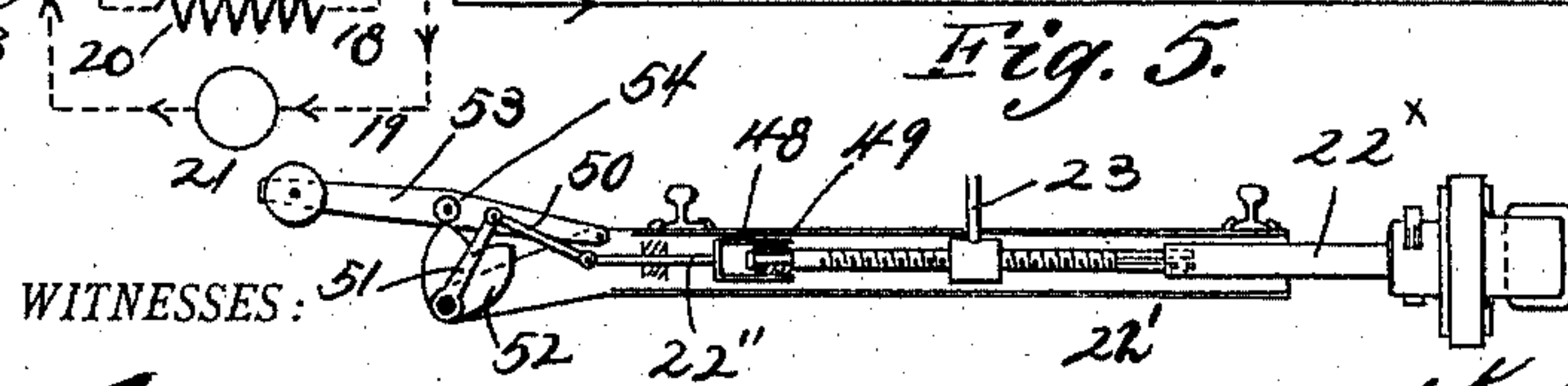
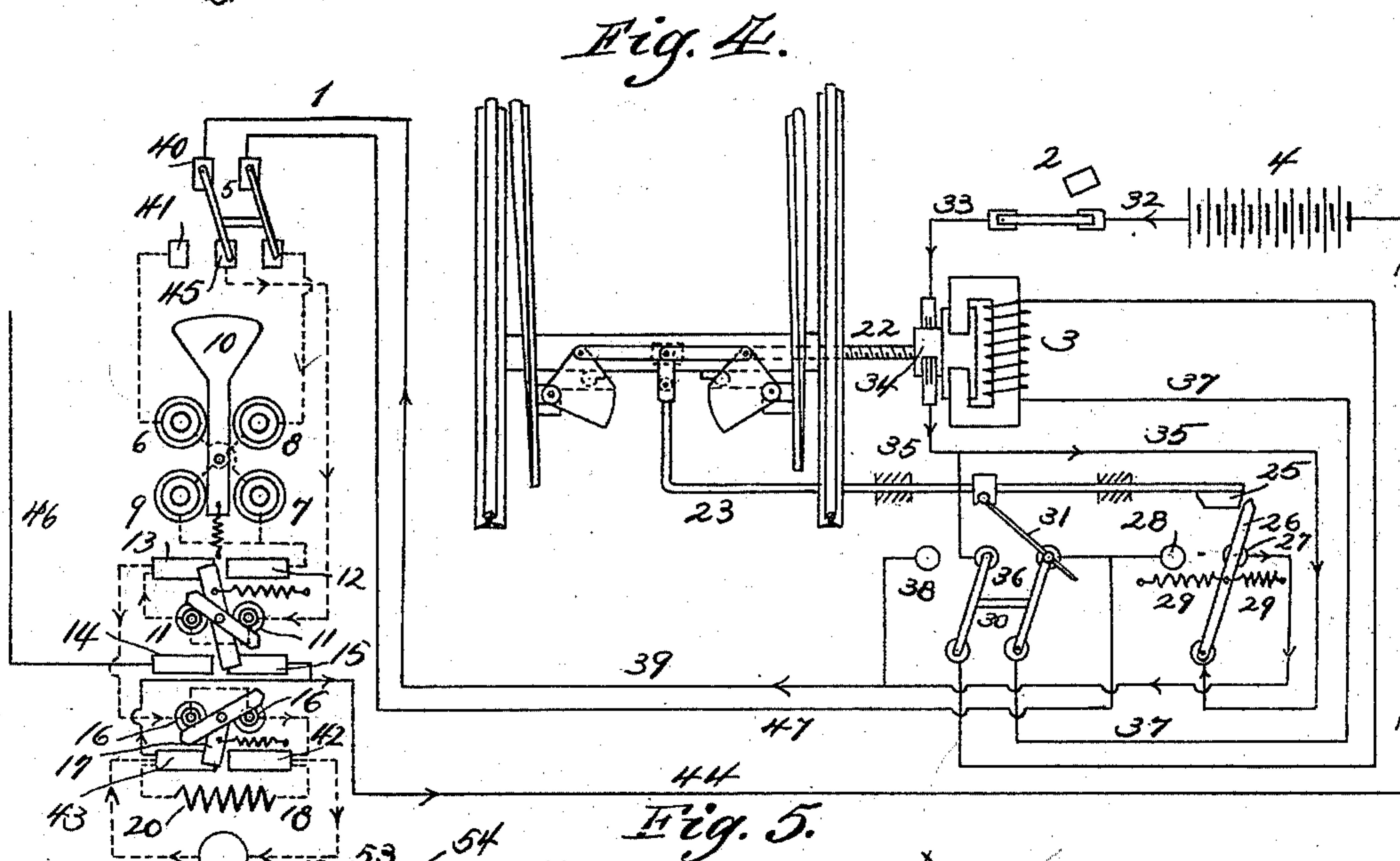
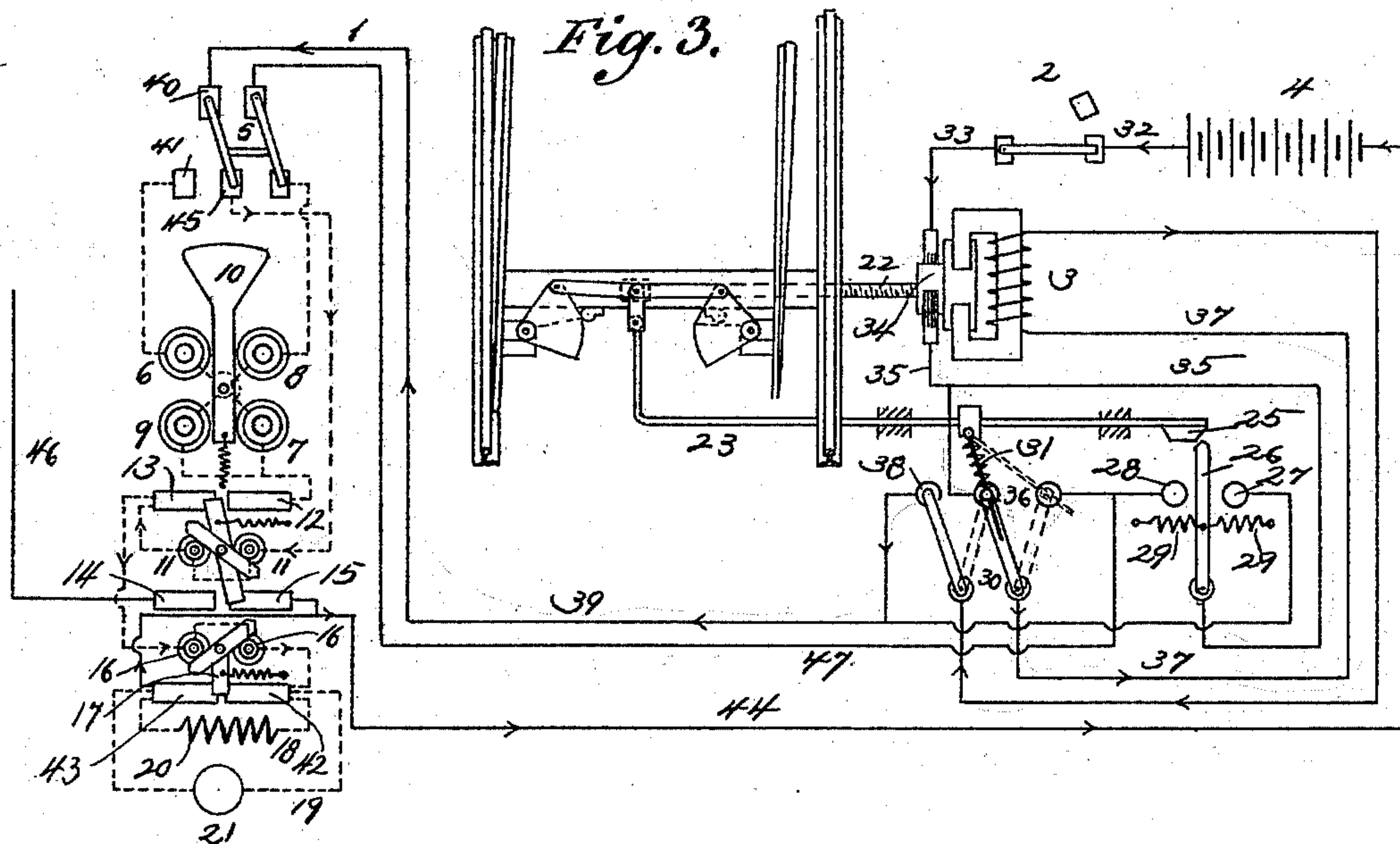
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WITNESSES:

INVENTOR

Karl Moderegger

BY

Wm. H. Benham

ATTORNEY



# UNITED STATES PATENT OFFICE.

KARL MODEREGGER, OF VIENNA, AUSTRIA-HUNGARY, ASSIGNOR TO  
SIEMENS & HALSKE, OF BERLIN, GERMANY.

ELECTRICAL SWITCH SETTING, INDICATING, AND CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 526,813, dated October 2, 1894.

Application filed November 15, 1893. Serial No. 491,038. (No model.) Patented in Germany September 6, 1891, No. 68,722; in Austria-Hungary January 29, 1892, No. 42,613 and No. 76,773; in Belgium November 11, 1892, No. 102,331; in France November 22, 1892, No. 225,853; in Switzerland November 24, 1892, No. 6,232; in Italy December 1, 1892, No. 33,076, and in England March 3, 1893, No. 4,976.

*To all whom it may concern:*

Be it known that I, KARL MODEREGGER, a subject of the Emperor of Germany, residing at Vienna, Austria-Hungary, have invented  
5 new and useful Improvements in Electrical Switch Setting, Indicating, and Controlling Devices, of which the following is a specification, and for which I have obtained Letters Patent as follows: Austria-Hungary, No.  
10 42,613, and No. 76,773, dated January 29, 1892; Germany, No. 68,722, dated September 6, 1891; Belgium, No. 102,331, dated November 11, 1892; Italy, No. 33,076, dated December 1, 1892; France, No. 225,853, dated November  
15 22, 1892; Switzerland, No. 6,232, dated November 24, 1892, and England, No. 4,976, dated March 3, 1893.

This invention relates to an electrical system for operating and controlling railway  
20 switches in which the rail switches are set from a central station by means of an electro-motor located at the rail switch, and in which the proper opening and closing of the movable rails and any defect in the apparatus  
25 are automatically announced. The electro-motor connected with the setting apparatus is also connected with the apparatus in the central station and with a current source by suitable contacts and three conductors, one  
30 of which supplies the current for actuating the motor in one direction, another for actuating it in the opposite direction thereto, while the third wire, which is the normal return conductor and is not traversed by the  
35 working current, is used to operate the signal indicating apparatus and control the system.

The controlling action of the apparatus is threefold. In the first place every interruption of a conductor or in any other part of  
40 the apparatus is indicated by a signal, through the interruption of a continuous circuit. In the second place when the switch is run through, the signal conductor is interrupted; and in the third place, the proper closing  
45 of the movable rails is indicated by a third signal.

In the accompanying drawings is shown an electrical railway-switch-setting and control-

ling apparatus embodying my invention, in which—

Figure 1 is a diagrammatic view of the apparatus at rest. Fig. 2 is a similar view showing the position assumed when the rail switch is being operated. Fig. 3 is a similar view showing the position assumed at the end of the setting of the switch. Fig. 4 is a similar view showing the position as assumed when the switch is forcibly run through by an engine or train; and Fig. 5 is a detail showing the devices employed for returning the rail  
60 switch to a set position after being run through.

As shown, the apparatus consists of four parts.

1 is the setting apparatus at the central  
65 station.

2 is an ordinary circuit-breaking device for making and breaking the circuit to the switch motor, and may be of any desired construction and retractile to normally close the circuit, if desired.

3 is the electro-motor that operates the switch rails and is connected with a setting or locking mechanism which is in turn in connection with an electro-mechanical switch; 75 and 4 is the generator or source of the current.

The setting apparatus 1 is provided with a mechanical switch 5, by means of which the railway switch can be operated from the central station and with the coils 6, 7, 8 and 9, which are composed of fine wire and are connected cross-wise to form two electro-magnets, so as to attract the signal-bearing armature 10, which is mounted for rotation between the two, to one side or the other, whenever a current flows through one or the other pair of coils 6, 7 or 8, 9. When the circuit is interrupted the armature 10 assumes a vertical position between the two pairs of coils.  
80 At the central station there is in addition an electro-magnet 11, 11, wound with coarse wire, and which when not traversed by the current connects the contact 12 with 13, and 14 with 15. There is also at central station a second  
95 electro-magnet 16, 16, also wound with coarse



wire, the armature 17 of which is so regulated by a retractile spring that it overcomes the tension of the spring whenever a determined current strength is exceeded, whereby the conductors 18 and 19 are short-circuited and the circuit is caused to pass through the resistance 20 and the windings of the electro-magnet of the bell or signaling device 21. Instead of the electro-magnet 16, 16, a fuse-block may be used, if desired, which will blow when the determined current strength is exceeded.

The electro-motor 3 is coupled with and operates switch-setting and locking mechanism (one form of which is shown in the drawings) as a link and cam construction by means of which the switch rails can be thrown and set to one side or the other. In this form of apparatus the motor 3 is geared directly to and rotates a spindle 22, turning in suitable journals and screw-threaded for a portion of its length. A traveling switch-rod 23, carrying on its end a screw-threaded collar, moves back and forth upon said spindle in obedience to the rotation thereof, and thus by means of suitable connections with the switch-rails operates said rails and sets and locks them in position. The switch-rod 23 is provided upon its free end with a trip or catch 25, which when the switch-rod is moved engages the free end of an electro-mechanical switch 26, and places it upon the contact 27 or 28, where it remains until the switch-rails are in perfect contact with the track rails, when it is released by the catch 25 and retracted to a neutral position by the springs 29. One arm of the switch 30 is connected to the switch-rod 23 by a link 31 carrying a spiral spring which tends to hold the switch-arm as far as possible from the switch-rod 23. The lateral movement of said switch-rod has no effect upon the switch 30, until the moment that the switch rails reach their ultimate positions and the switch-pivot, the knuckle of the link and the end thereof are in line, when the force of the spring pushes the switch to the position shown in dotted lines in Fig. 3 the moment that the knuckle of the link gets a little past a straight line connecting the end of the link and the switch pivot.

The circuit, when the rail switch is locked in the normal position, is as follows (see Fig. 1): From the generator 4 the current flows through the conductors 32, 33, armature 34 of the motor, conductor 35, contact piece 36, conductor 37, through the coils of the magnet, contact 38, conductor 39, contacts 40 and 41, electro-magnet 6, 7, which attracts the armature 10, then to contacts 12, 13, through electro-magnet 16, 16, (the armature of which is not attracted in consequence of the action of its spring,) contacts 42, 43, conductor 44, and back to source 4.

In consequence of the strong resistance of the coils 6, 7 only a weak current circulates in the conductors, and this current is not

strong enough to actuate the motor. Thus it will be seen that the working current to the motor is practically neutralized by the resistance of said coils, without interrupting the circuit through said motor or the other working parts of the apparatus.

When the circuit is interrupted for any reason, the armature 10 with its signal disk will occupy a central vertical position. When the motor and the switch-rails are to be operated, the attendant brings the mechanical switch 5 into the position shown in Fig. 2, when the current flows from source 4 through the conductors 32, 33, armature 34 of the motor, conductor 35, contact 36, conductor 37, through the coils of the electro-magnet, contact 38, conductor 39, contacts 40, 45, electro-magnet 11, 11, the armature of which is attracted, thus interrupting a signal conductor 46 (to an electrically actuated semaphore), which falls to "danger" through binding-posts 13, 15, and conductor 44 back to source 4. The motor 3 now begins to actuate the switch-rails, as shown in Fig. 2, and continues to move them until the electro-mechanical switch 26 (released by the catch 25), and the corresponding switch 30, are in the positions shown in full lines in Fig. 3, which is the end of the setting movement of the rail switch. The next moment, the link 31 and switch 30 are thrown over by the spring to the position shown in dotted lines in said view, and the current traverses the electro-magnet 8, 9, thus stopping the motor and restoring the signal-controlling circuit to the system, but through conductor 47 instead of 39.

It is evident that a whole series of switches and other motors and corresponding controlling devices may be operated from a central point by one or more dynamos, and many methods of constructing a system including a number of such switches and motors may be used. The simplest way, however, is to place the motors all in parallel of the line conductors from said dynamos, and each motor will then receive its proper supply of current, which, when the motor is not in operation, will be neutralized, in the manner hereinbefore described, by the resistance devices.

If, when in the resting position of Fig. 3, the rail switch is run through, the electro-mechanical switch 26 is thrown over to contact 27 (as shown in Fig. 4), but the switch 30 is not simultaneously thrown, but momentarily, and until completion of the throw of the rail switch, as hereinafter described, the full current circulates in the conductors, without actuating the motor, because the coils of the electro-magnet thereof are cut out of circuit by the interruption at point 12 of the circuit through the field coils. The armature of the electro-magnet 11, 11 is also attracted, whereby the signal conductor 46 is interrupted and the signal falls to "danger". At the same time the armature of the electro-magnet 16, 16 is attracted, causing the bell 21 to sound.



As it is evident that it would be dangerous to allow the rail switch to remain open after being run through by an engine or train, I have provided mechanism, as shown in Fig. 5, for automatically throwing the switch rail fully over to the opposing main line rail. This is a simple form of mechanism merely intended to illustrate one form of devices for accomplishing the desired result. Another and more elaborate form of mechanism is particularly shown and described in my companion application, Serial No. 461,414, filed February 8, 1893. In the construction herein shown the spindle 22 is made in sections, one of which 22<sup>x</sup> is connected directly with and rotated by the motor armature. The screw-threaded section 22' is connected with the section 22<sup>x</sup> by any coupling, such as a pin-and-slot-connection, that will permit the section 22' to rotate, but will also permit a reciprocating or telescoping movement thereof with respect to the section 22<sup>x</sup>. Said section 22' is also connected with a section 22'' by a coupling which will permit rotation and reciprocation of said section 22' and reciprocation but not rotation of section 22''. In the form shown this coupling consists of an outer sleeve 48 having a telescoping connection (such as by pin-and-slot) with an inner sleeve 49. The end of section 22' of the spindle is journaled in this inner sleeve and turns therein without rotating either sleeve.

The section 22'' is in the form of a draw-lever, and is connected with links 50, 51, the latter of which is rigidly secured to the pivotal point of a heart-cam 52 which is pivoted to an extension of the casing in which the spindle 22 works. A weighted lever 53 also fulcrumed to said extension of the casing carries a friction roller 54, which normally rests in the re-entrant angle of the cam 52. When the switch is run through, however, the switch rails force the switch-rod 23 to the right or left, and consequently the sections 22', 22'' of the spindle. If the switch rails draw the spindle to the right, as shown in Fig. 5, the link mechanism will oscillate cam 52 to the right and cause the roller to ride up out of the re-entrant portion of the cam, and over the corresponding point thereof, when the weight of the lever will turn the cam and its mechanism still farther to the right and throw the switch rail over against the opposing track rail, thus closing the switch. The switch lever 53 will thereafter be returned to its normal position by the attendant whose duty it is to take care of the apparatus.

I claim—

1. The method of operating and controlling a railway switch, which consists in passing a working current through an electro-motor and thereby throwing the switch; and automatically neutralizing said current upon the setting of the switch in the new position.

2. The method of operating and controlling a railway switch, which consists in passing a

working current through an electro-motor in either direction and thereby correspondingly throwing the switch; and simultaneously reversing and neutralizing the working current upon the setting of the switch in the new position.

3. The method of operating and controlling a railway switch, which consists in passing a working current through an electro-motor in either direction and thereby correspondingly throwing the switch; controlling said working current by a resistance device in a return conductor; and automatically cutting said return conductor into either working circuit after the switch has been thrown thereby.

4. The method of electrically operating and controlling a railway switching system, which consists in passing a line current through a series of electro-motors controlling corresponding railway switches; neutralizing the respective motor circuits while the switches are set; actuating the respective switches by cutting out the neutralizing media from the corresponding motor circuits; and automatically restoring said neutralizing media upon the re-setting of the corresponding switches.

5. The method of electrically operating and controlling a railway switching system, which consists in passing a line current through a series of electric motors controlling corresponding railway switches; neutralizing the respective motor currents while the switches are set; actuating the respective switches by cutting out the neutralizing media from the corresponding motor circuits; and automatically reversing the respective motor circuits and neutralizing the currents thereof upon the re-setting of the corresponding switches.

6. The method of electrically operating and controlling a railway switching system, which consists in passing a line current through a series of electro-motors controlling corresponding railway switches; neutralizing the respective motor currents while the corresponding switches are set; actuating said switches by the removal of the neutralizing media for the corresponding motor circuits; and automatically indicating the positions of said switches in accordance with the variations of electro-motive force in the respective motor circuits.

7. The combination with a railway switch, of an electro-motor; a generator for actuating the motor; means operated by the motor for actuating the switch; and switch devices and current controlling devices controlled by the setting of the railway switch for automatically stopping the motor, without destroying the continuity of the circuit.

8. The combination with a railway switch of an electro-motor; a generator for actuating the motor; switch devices and current controlling devices controlled by the setting of the railway switch for reversing the motor circuit and stopping the motor without destroying the continuity of the circuit; and



means operated by the motor for actuating the switch in either direction in accordance with the flow of current in the circuit.

9. In an electrical switching system for  
5 railways, the combination with a generator and a central station; of a series of switch-motors actuated by said generator; means for passing the motor currents through the motors in either direction; and indicators at  
10 central station controlled by the interruption and reversal of the respective circuits.

10. In an electrical switching system for railways, a series of electro-motors; switches correspondingly actuated thereby; and switch  
15 devices controlled by the setting of the rail-

way switch for controlling the direction and flow of the current in the switch motor circuits independently.

11. In an electrical switching system for railways, and electro-motor; a railway switch 20 controlled thereby; and switch devices controlled by the running through of said switch for short-circuiting said motor.

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

KARL MODEREGGER.

Witnesses:

A. SCHLESSING,  
JOSEF FEHETNER.