

(No Model.)

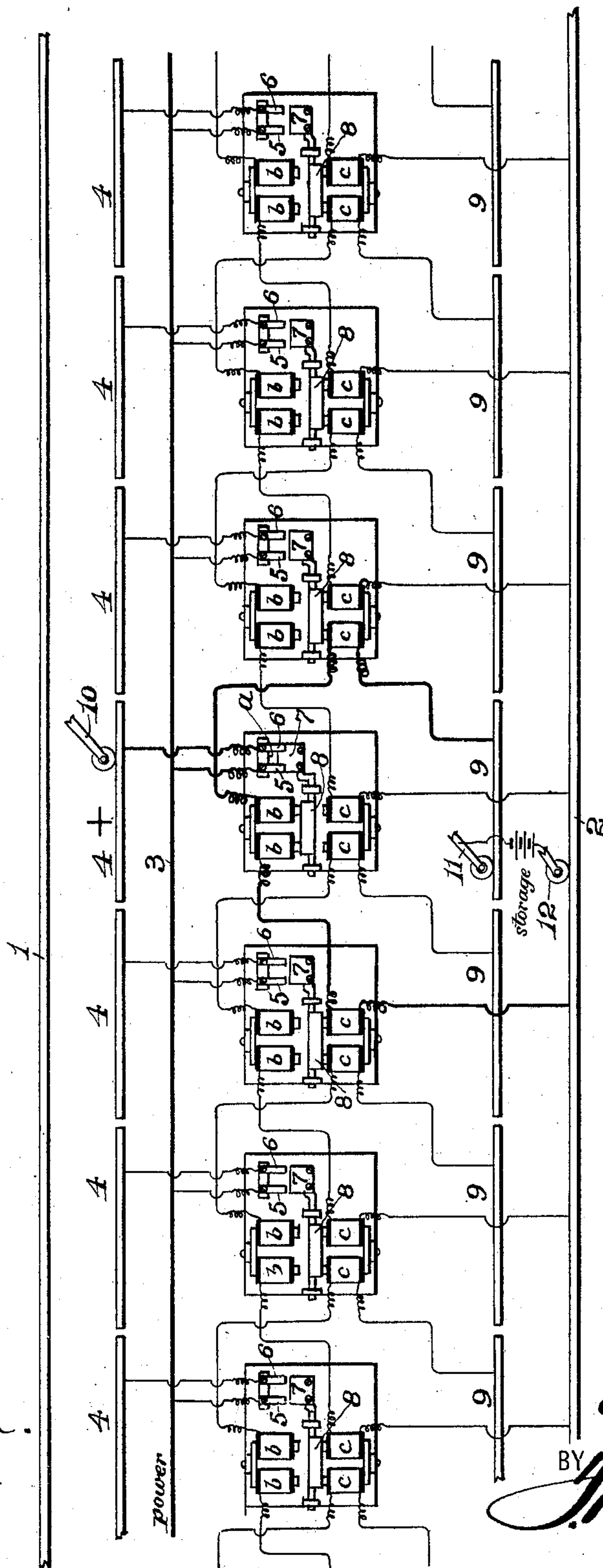
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E. C. CROCKER.  
ELECTRIC RAILWAY.

No. 603,624.

Patented May 10, 1898.

Fig. 1.



WITNESSES:

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INVENTOR

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ATTORNEY

(No Model.)

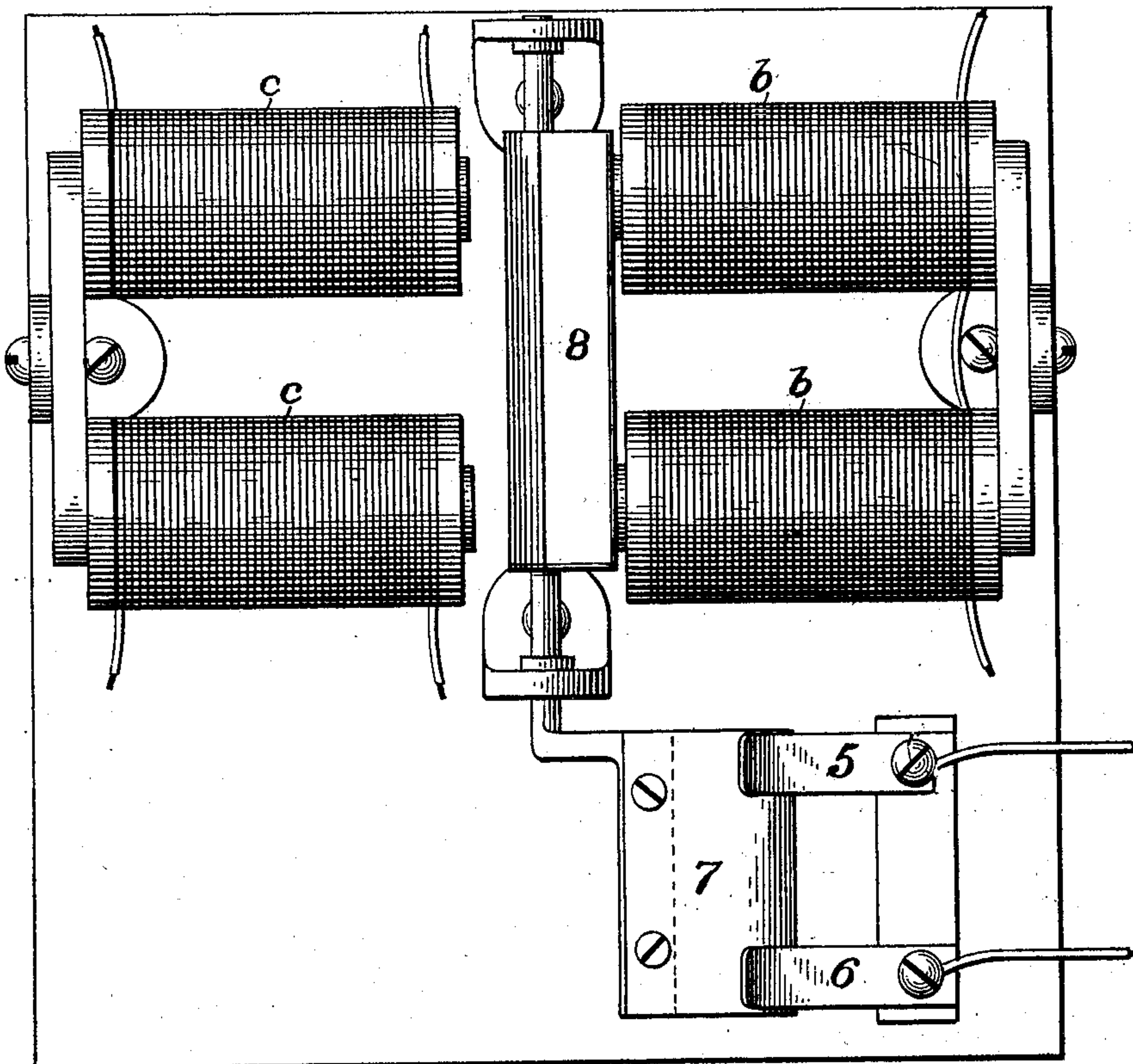
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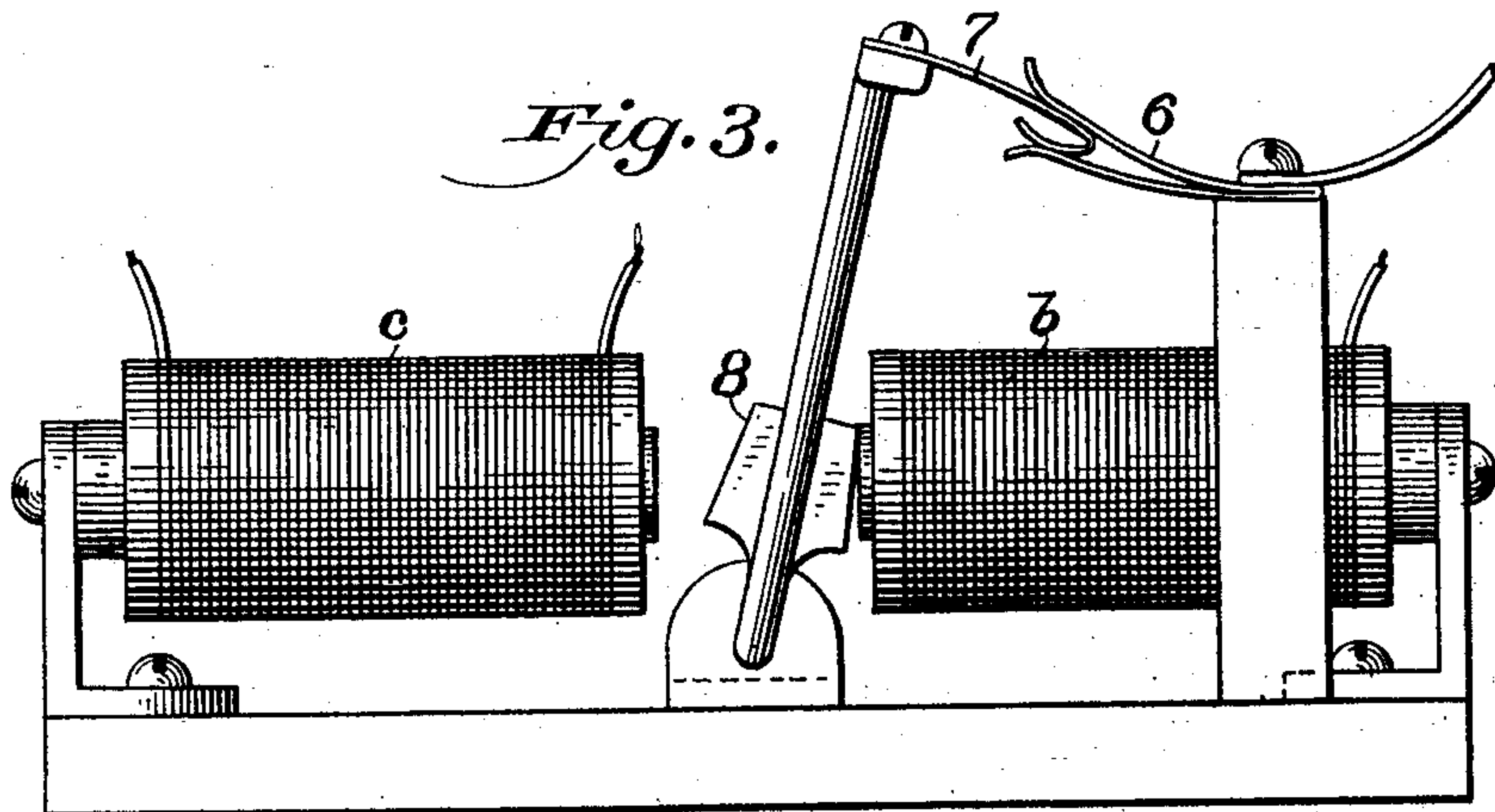
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*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

EBEN C. CROCKER, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR OF ONE-HALF TO EDWIN C. HOWE, OF SAME PLACE.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 603,624, dated May 10, 1898.

Application filed September 17, 1897. Serial No. 652,033. (No model.)

*To all whom it may concern:*

Be it known that I, EBEN C. CROCKER, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Electric Railways; 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 certain new and useful improvements in electric railways such as employ insulated rail-sections from which the electrical current is collected by the car, said rail-sections being electrically connected with and disconnected from the supply-conductor through switches interposed between said conductor and the respective rail-sections.

In my present invention I employ two series of magnets which have no electrical connection with the line-wire, but are vitalized by a storage battery carried by the car. The functions of said magnets are to respectively open and close the electrical switches interposed between said line-wire and the insulated rail-sections, from which the current to drive the car is collected by the latter, as above referred to.

In the accompanying drawings, which form a part of this specification, Figure 1 is a plan view of my improved system; Fig. 2, a detail plan view of one of the switches which I employ, and Fig. 3 a detail elevation of the same.

Similar numbers and letters of reference denote like parts in the several figures.

1 2 are the usual rails upon which the car travels.

3 is the supply-conductor, and 4 are insulated rail-sections from which the current is collected to drive the car. The conductor 3 is connected with the several insulated brushes or contact-points 5, while the insulated rail-sections are severally connected with the insulated brushes or contact-points 6.

7 is a circuit closer and breaker carried by a pivoted oscillating armature 8. It will be evident that when the closer 7 is engaged with the brushes 5 6, as shown at *a* in the drawings, the circuit between the supply-conduc-

tor and the section 4 which is connected with that particular point 6 will be closed.

The armature 8 is within the magnetic field of two series of electrical magnets *b c*, and it will be clear that by alternately vitalizing and devitalizing these series of magnets said armature will be made to oscillate, thus causing the closer 7, carried thereby, to open and close the circuits between the insulated rail-sections 4 and the supply-conductor. The current which vitalizes these magnets is entirely independent of the current transmitted by the supply-conductor and is supplied by a storage battery carried by the car. I have not shown either the battery or the car, since the illustration of the same is not deemed necessary to the complete understanding of my invention.

I will now describe the manner in which the current from the storage battery referred to is transmitted to the magnets.

9 are insulated rail-sections, which have no electrical connection with the rail-sections 4, but are arranged directly opposite the latter. By reference to Fig. 1 it will be observed that the various groups of magnets are arranged in pairs directly opposite each other, the armatures 8 being within the magnetic field of each pair.

*b b* represent really single magnets in each instance, although I prefer to employ two coils in order to afford a little more strength, and each magnet *b b* is in a separate branch circuit, with two single magnets *c*, selected from the pairs of these magnets *c* which immediately succeed and precede the magnets *b b* in each instance—that is to say, there are various branch circuits, each circuit taking in three magnets, one magnet *b b* and two single magnets *c*. The terminals of these branch circuits are connected respectively with the sections 9 and the car-rail 2, so that it will be clear that these magnets have no connection whatever with the supply-conductor.

The main power-current is transmitted to the car by the usual collector 10, the return being made by grounding to either of the rails 1 2 in the ordinary manner.

The storage-current is supplied to the insulated rail-sections 9 by an ordinary trolley or brush 11, carried by the car, and is re-



turned from the rail 2 by a similar brush or trolley 12.

One of the principal advantages of my improved system is the comparatively small amount of wire necessary to make the proper electrical connections, which is a very important item of expense in the equipment of an electrical road, and also the wire which is used for the storage-battery circuit need only be of a comparatively small gage by reason of the light voltage of the current carried.

An additional advantage of my improved system resides in the fact that no matter at what point the car may be stopped by reason of an accident at the power-station, resulting in the temporary shutting off of the power-supply, the power-collector will be always in closed circuit with the supply-conductor, and as soon as the supply of power is resumed the car can continue its travel without resource to any special appliances for effecting an initial contact with said conductor.

It will be borne in mind that the sole function of the storage battery is to operate the switches to close the circuit between the insulated rail-section from which the power is collected and the supply-conductor and to successively open the circuits containing said insulated sections as soon as the power-collector leaves them, so that all of said rail-sections 4 will be in open circuits except the one through which the current is being used directly beneath the car, so that all danger by reason of accidental contact with said rail-sections is entirely removed.

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

1. In an electric-railway system comprising a power-collector carried by the car, insulated power-collecting sections, a supply-conductor, and the rails on which the car travels, the combination of a second series of insulated rail-sections, the series of single magnets and the series of pair magnets arranged

opposite each other, the armatures within the fields of these oppositely-arranged magnets and carrying switches, the contact-points connected respectively with the power-collecting sections and the supply-conductor, and the storage battery carried by the car and provided with a shoe capable of traveling on said second series of sections, said magnets being in separate branch circuits comprising one of the single magnets and two single magnets from the pair magnets immediately succeeding and preceding the single magnets, the terminals of these circuits being connected respectively with said second series of sections and one of the car-rails, substantially as set forth.

2. In an electric-railway system comprising a supply-conductor, insulated power-collecting sections, and a power-collector carried by the car, the combination of the two series of magnets composed respectively of single magnets and pair magnets arranged opposite to each other and connected in separate branch circuits comprising one of the single magnets and two magnets selected from the pair magnets which immediately succeed and precede the single magnet in each instance, the insulated sections 9 and the car-rail 2 with which the terminals of said circuits are connected, the armatures within the fields of the oppositely-arranged magnets and carrying switches, the insulated contacts connected respectively with the power-collecting sections and with the supply-conductor, and the storage battery carried by the car and operating through the sections 9 to energize said magnets whereby the switches are operated, substantially as set forth.

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

EBEN C. CROCKER.

Witnesses:

M. T. LOUGDEN,  
J. S. FINCH.