

(No Model.)

C. W. WILLIAMS.
RAILWAY TELEGRAPH.

No. 377,344.

Patented Jan. 31, 1888.

Fig. 1.

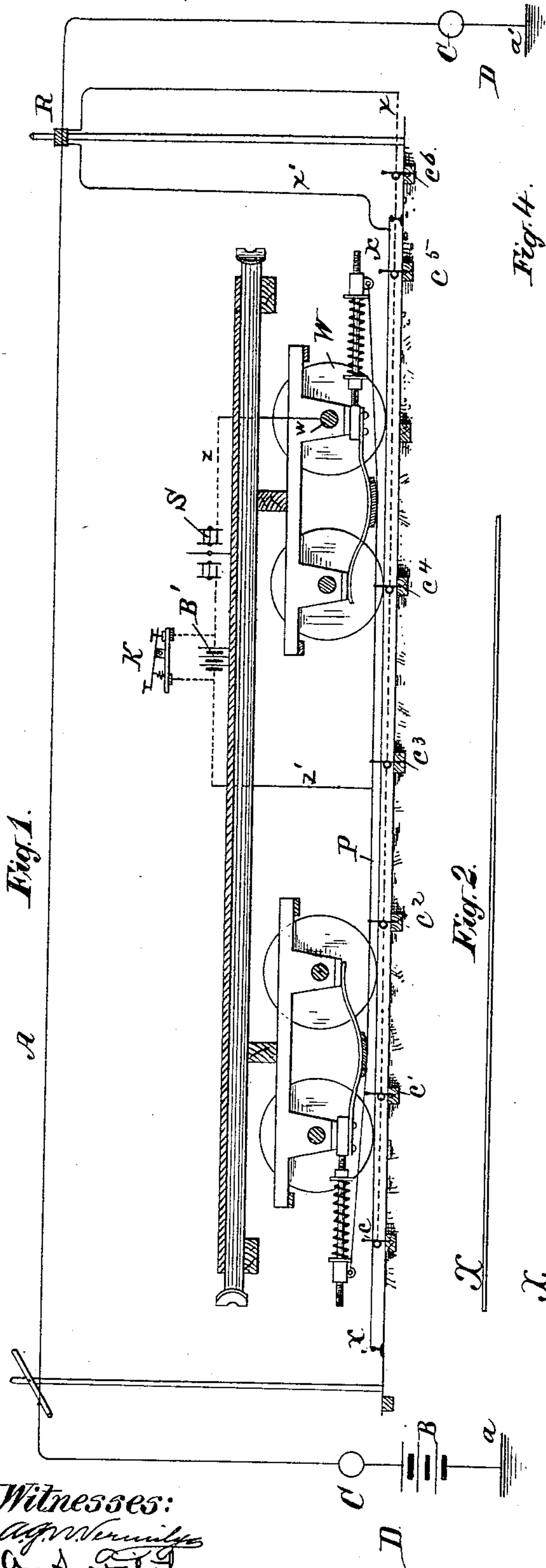


Fig. 2.



Fig. 3.

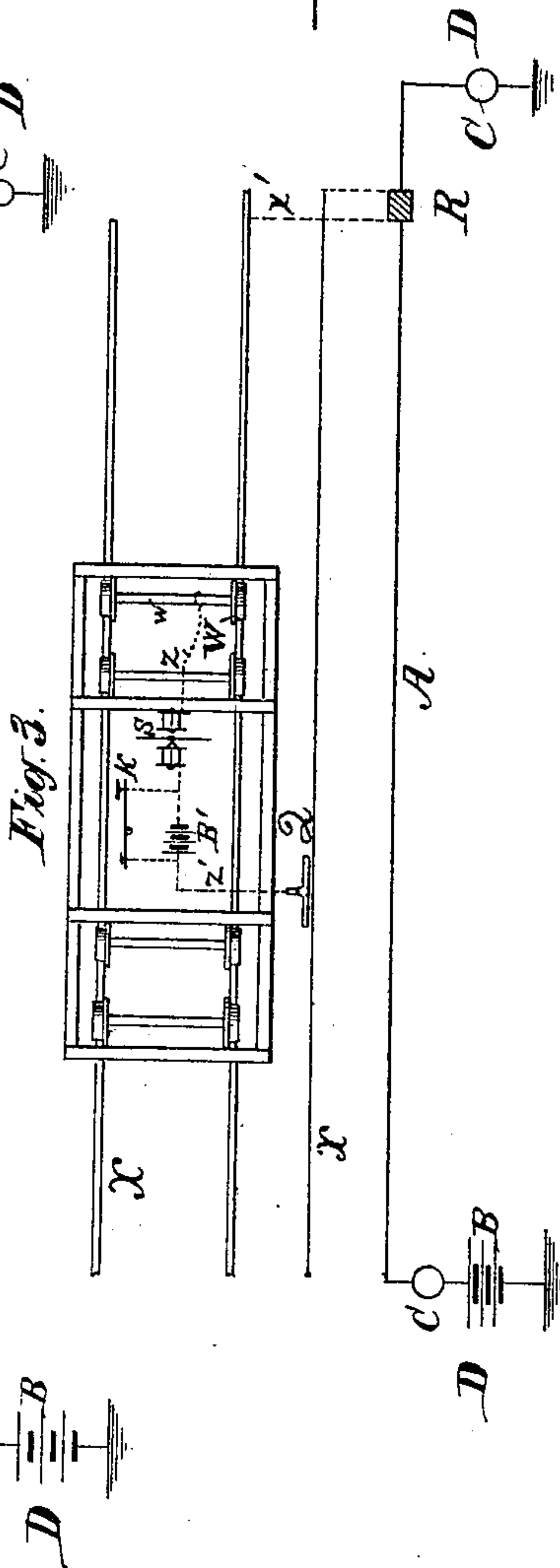
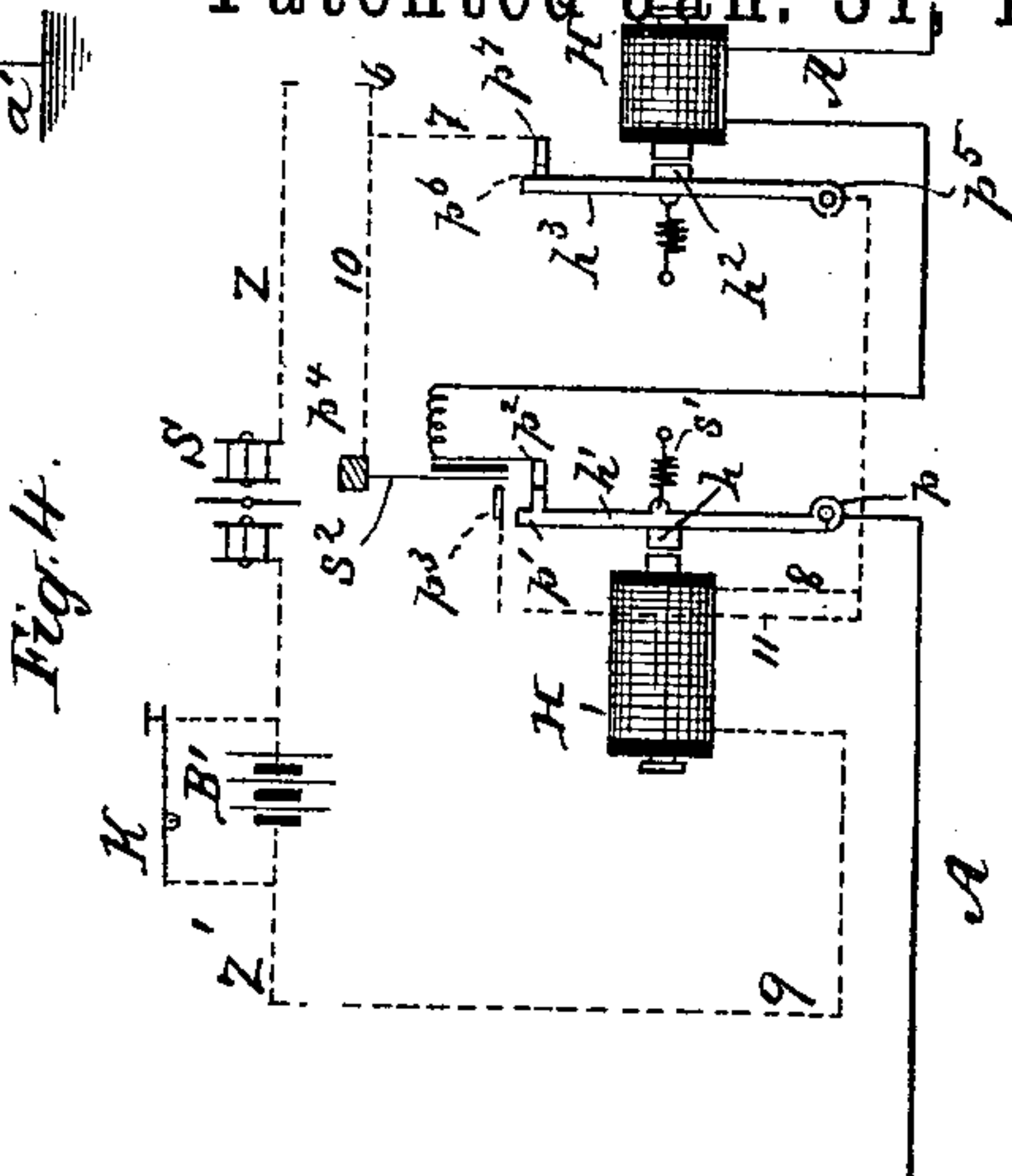


Fig. 4.



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RAILWAY-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 377,344, dated January 31, 1888.

Application filed June 2, 1886. Renewed October 24, 1887. Serial No. 253,233. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. WILLIAMS, of Cave City, Barren county, Kentucky, and a citizen of the United States of America, have invented certain new and useful Improvements in Railway-Telegraphs, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same, in which—

Figure 1 shows the trucks and platform of a car telegraphically equipped in connection with a main-line conductor and its usual appurtenances, a repeater (to be described) in said main line, and a partial circuit, which passes through the repeater mentioned, has one end connected to the rails of the road upon which the car is standing, and for a portion of its length before passing through the repeater runs substantially parallel with and in proximity to the track. Fig. 2 is a plan view of the system, showing a series of three of such partial circuits and three repeaters. Fig. 3 is a plan view of a modification of the system, and Fig. 4 is a detail view of the repeater.

My invention relates to railway-telegraphs of the class in which electric impulses produced on the car are transmitted through a circuit partly off the car, and in which the part off the car is connected with a repeater, which is also connected with a main-line telegraph-circuit in such manner that the aforesaid impulses cause the repeater to create new but similar impulses in the main-line circuit, and thereby operate the instruments in said main-line circuit, the reverse action being substantially the same, and impulses produced by instruments in the main-line circuit being caused, through the medium of the repeater, to create new but similar impulses in the circuit partly on the car, which latter impulses operate the instruments in the circuit on the car, and the particular novelty to be claimed herein is the combination of devices whereby the use of a key-block to break and close the circuit partly on the car and partly off the car, and thereby shunt the electric current through the instruments on the car, is avoided.

A is the main-line conductor, which is that of an ordinary telegraph-line, supported on poles, if desired, grounded at each end of the line, as at $a\ a'$, and provided with a battery,

B, and instruments C at the telegraph-station D.

X are the rails of the railway, along in proximity to which and at suitable distances apart are placed contact-plates $c\ c'\ c''\ c^3$, &c. These plates are usually pieces of wire bent into a loop and secured to the ends of the ties. One is clearly shown at Figs. 9 and 10 of the drawings of Letters Patent No. 307,888, issued November 11, 1884, and fully described therein. The plates belonging to any one partial circuit are all connected by a wire, x , running (in Fig. 1) from c to c' , and thence to and through the repeater R, and thence to rail X, being lettered x' on that part which runs from the repeater to the rail.

Each of the three partial circuits shown in Fig. 2 is substantially thus arranged.

Secured to the car, here to arms bolted to the front and rear trucks, but insulated therefrom, is a wire or rod, P. The one I prefer to use is also shown and described in said Patent No. 307,888. This wire or contact-piece P is so placed and the plates c , &c., are so arranged that P will at all times make contact with one or more of said plates, and not only in each partial ground or repeater circuit of the car, but at the points where the wires of each are turned from running parallel with the track to pass to the repeaters, said plates are arranged at such distances apart with relation to the length of P that the latter will touch a plate of the succeeding partial circuit before it breaks contact with the last plate in the circuit from which it is passing.

Upon the car is a key, K, battery B', and sounder S, and wires connecting them, as shown. One wire, Z', runs from battery B' to contact-piece P, the other, Z, from the sounder S to the axle of a wheel of the car, and having electrical connection with the rail through said wheel and axle, thus forming a partial circuit on the car leading from the wheel through the instruments and to contact-piece P, adapted to complete the partial circuits off the car leading from the rail through a repeater and then to plates c , &c.

Plates c , &c., and wire x might of course be so placed that P and c would make contact if P were placed upon the side, top, or under the center of the car; or a second system of plates and wires off the car might easily be used in-

stead of the axle-wheel and rail by having a second piece, P, to make contact with them; or I might employ the two rails for my conductors and let both be brought into circuit through the wheels with the car-instruments; or brushes might be used; in fact any known means by which two electrical conductors might be brought and continued in contact with a conductor on a moving car would produce the result at which I aim, and any two conductors which might so be brought in contact would be the equivalent of my rail and wire.

In Fig. 3, while the connection between the partial circuit on the car and the rail is the same as that shown in Fig. 1, and the circuit from the rail to the repeater is also similar to that shown in Figs. 1 and 2, there is no actual metallic connection between the other end, Q, of the partial circuit on the car and the wire x of the partial circuit off the car. Said end Q is merely what might be called the "knob" or "handle" of an electrical machine, preferably constructed in the form of a bar extending parallel to the conductor of the partial repeater-circuit off the car. Now, if a current of sufficient tension is employed and the other parts of the two partial circuits (from the battery through wire, rail, wire, repeater, and conductor x opposite to Q, and also from the other pole of the battery to Q) are complete and connected, an impulse from the battery on the car will be transmitted to the repeater substantially as well as though Q were a contact-piece like P and made actual contact with wire x , or plates like c placed thereon.

The exact action which does take place, or the correct theory of the matter, I do not pretend to be thoroughly conversant with; but the thing has been done, and I therefore merely explain here the instrumentalities necessary to accomplish it, leaving each electrician to explain it according to his own ideas.

With the devices arranged as shown in Figs. 1 and 2, it is evident that at all times a complete metallic circuit will exist from battery B', through sounder S, wire Z, to axle w , wheel W, rail X, wire x' , repeater R, wire x , plates c , &c., (or those of some partial circuit,) contact-piece P, wire Z', to battery, and that a substantially complete operating-circuit through the same instruments will at all times exist when devices such as are shown in Fig. 3 are employed. There is thus provided a circuit partly on and partly off the car, even while the car is running, through which an impulse from the battery may be transmitted to the repeater R. This repeater R consists of an electro-magnet, H, in the train-circuit, and another, H', in the main circuit, the train-circuit wire being shown in dotted lines, Fig. 4, and the main-line wire in full lines. The first electro-magnet, H, is provided with an armature, h , secured to a swinging lever, h' , forming part of the main-line circuit, and the other, H', with an armature, h^2 , secured to a swinging lever, h^3 , which forms a part of the normal

train-circuit. h^3 is hinged at p^5 and provided with a contact-point, p^6 , at or near its other extremity, which, when the armature h^2 is drawn toward H', makes contact with a contact-post, p^7 , connected with wire 6 (which is a continuation of x') by wire 7. Said armature has also a spring which draws it away from H', and thereby breaks the contact at p^6 whenever the circuit through H' is broken, and it thereby loses its attractive power. h' is hinged at p , and provided near the other extremity with a contact-point, p' , which makes contact with contact-piece p^2 , which is in the main-line circuit, and also a spring which acts counter to the force of H. Another contact-post, p^3 , is provided, connected to wire 9 (which wire 9 is a continuation of wire x) by wire 11; also a spring, s^2 , secured to a post, p^4 , and at its free end to piece p^2 , from which it is insulated. Spring s^2 has a wire, 10, running from it to wire 6. These springs, posts, &c., are so arranged that when the armature h is drawn toward H, carrying lever h' and its point p' away from p^2 , and thus breaking the main-line circuit and interrupting the current through H', which will permit the spring of h^3 to draw it back and break the train-circuit at p^6 , the spring s^2 will before the break at p^6 is accomplished have made contact with p^3 , thus establishing another complete circuit through H.

The devices on the car are so arranged that at the pleasure of the operator either a strong or a weak current may be employed, and this result is here accomplished by having short wires running from the respective poles or polar connections of the battery to the respective contact-points of the key K, as shown, which will result in short-circuiting the main part of the battery-current while the key is closed. If at any time there is not force enough in the current passing through the sounder to operate it, a small battery may be placed in its circuit to assist in so doing.

The operation of this telegraph is as follows: The car is in one of the series of repeater-circuits—say the first. Then there is a complete circuit from the car-battery and sounder, as before mentioned—that is, (key K being closed,) battery B', wire, sounder S, wire z , axle w , wheel W, rail X, wire x' , through repeater R, by wires 6 and 7, post p^7 , lever h^3 , wire 8, H, wire 9, wire x , plates c , &c., contact-piece P, wire Z', to battery. The main-line circuit is at the same time through repeater R by main-line wire A, lever h' , point p' , piece p^2 , wire to H', through its coil, and on by wire A. Now, if the operator on the train wishes to signal an operator along the line, he opens key K. This sends the whole force of battery B' through H, which attracts h , draws it and h' toward it, breaking contact between p' and p^2 , and thus causing a break in the current, which gives a signal to the way-operator. Closing the key closes the main circuit, and thus messages may be sent. If no provision were made, however, to avoid it, when the main circuit was broken the lever h^3 , being drawn back by its spring,

would break the train-circuit at p^7 , and at once H would lose its attractive power; but, as has been said before, the main-line circuit is broken at p^2 , spring s^2 touches p^3 , thus furnishing a subsidiary circuit through H for the car-battery current by way of 6, 10, s^2 , p^3 , 11, 8, H, 9, x , &c. If a way-station operator wishes to signal the train, he breaks his circuit, the current through H' ceases, h^3 is drawn back by its spring, breaking the train-circuit, and the sounder announces the fact on the car.

Thus it is seen that an impulse in the "train-circuit" (as I call that made up of the two partial circuits, one on the car and the other off) or the main-line circuit is by the repeater duplicated in that circuit in which it was not produced, and by having a series of repeaters the system can be indefinitely extended without the danger of grounding the currents or having a slight break derange the whole system, and also that by the arrangement here submitted the train-circuit is always through the car without the necessity of having key-blocks to make a break in the circuit off the car for the purpose of shunting the current through the car-instruments, which I consider a considerable advantage.

What I here claim, and desire to secure by Letters Patent, is—

30 1. In a railway-telegraph system, the combination of a main-line-circuit conductor, a partial circuit carried on a railway-car, sig-

naling-instruments in said partial circuit, an electrical conductor off the car adapted, substantially as described, in connection with the partial car-circuit, to transmit electrical impulses, and a repeater, substantially as described, connected to both the main-line-circuit conductor and the electrical conductor, which completes the car-circuit, as and for the purpose specified.

2. In a railway-telegraph system, the combination of a main-line-circuit conductor, a partial circuit carried on a car, signaling-instruments in said partial circuit, contact devices upon said car, substantially as described, a series of electrical conductors off the car adapted to complete the car-circuit, portions of which series of conductors run parallel with and in close proximity to the line of the railway and separated from each other by intervals so short that the contact devices on the car will make contact with a second of said series of circuits before it breaks contact with the first of said series, and a series of repeaters, substantially as described, which are connected, respectively, to the main-line conductor and one of the circuits of said series, substantially as and for the purpose specified.

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