No. 797,591. PATENTED AUG. 22, 1905.

L. N. LYON, JR.

ELECTRICAL RAILWAY SIGNALING SYSTEM.

APPLICATION FILED NOV. 29, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

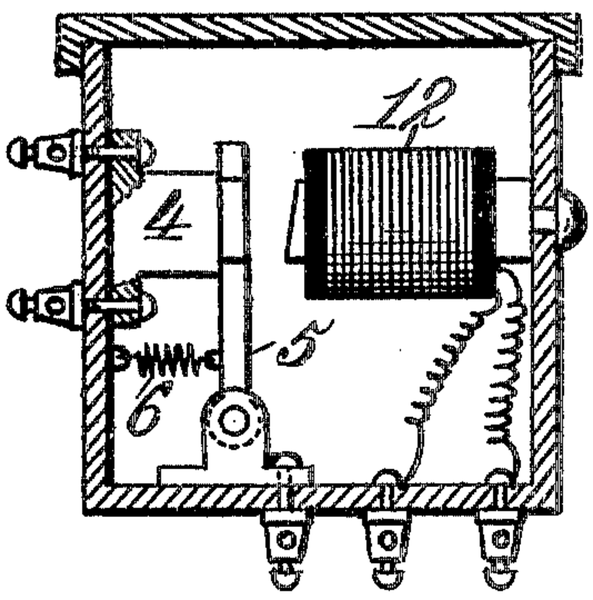


Fig. 2.

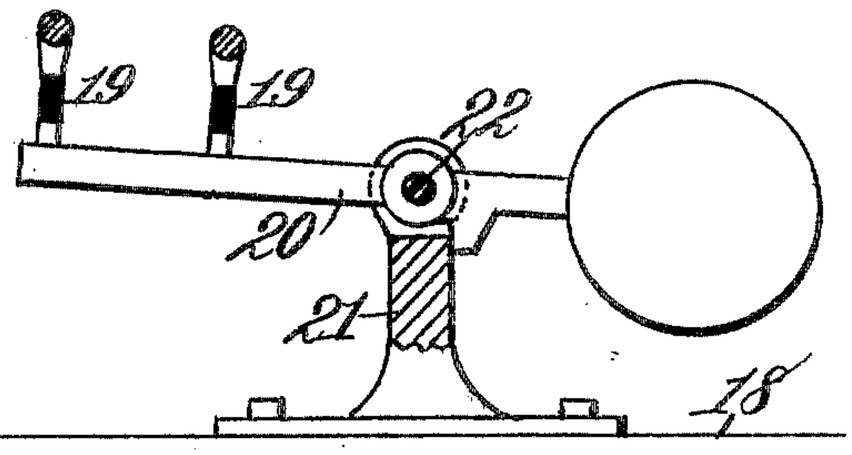


Fig. 3.

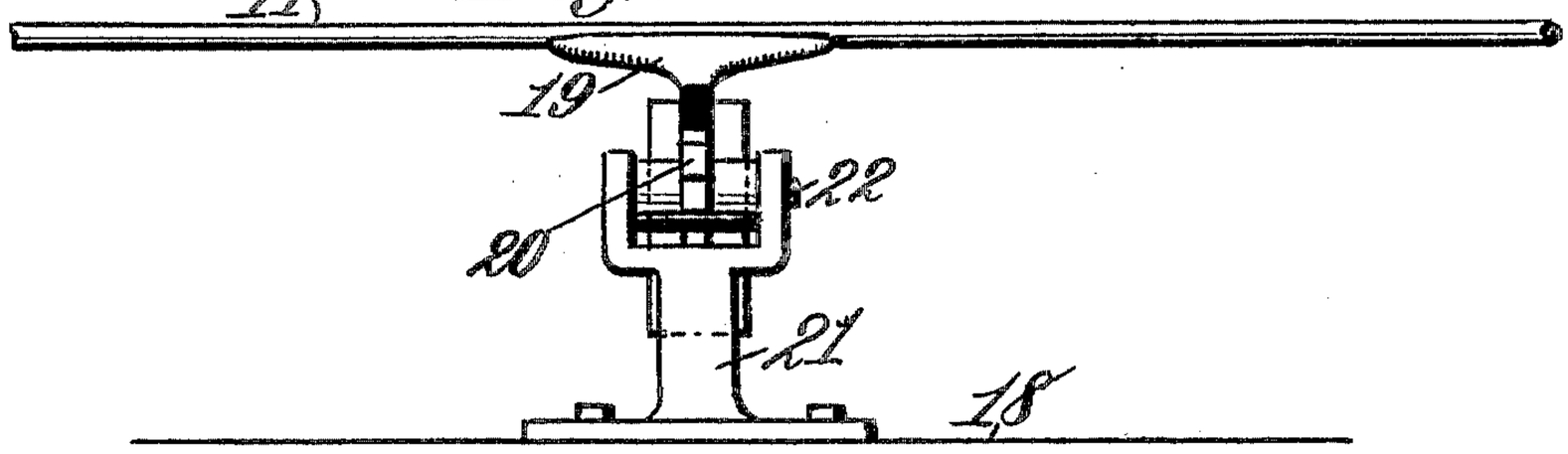
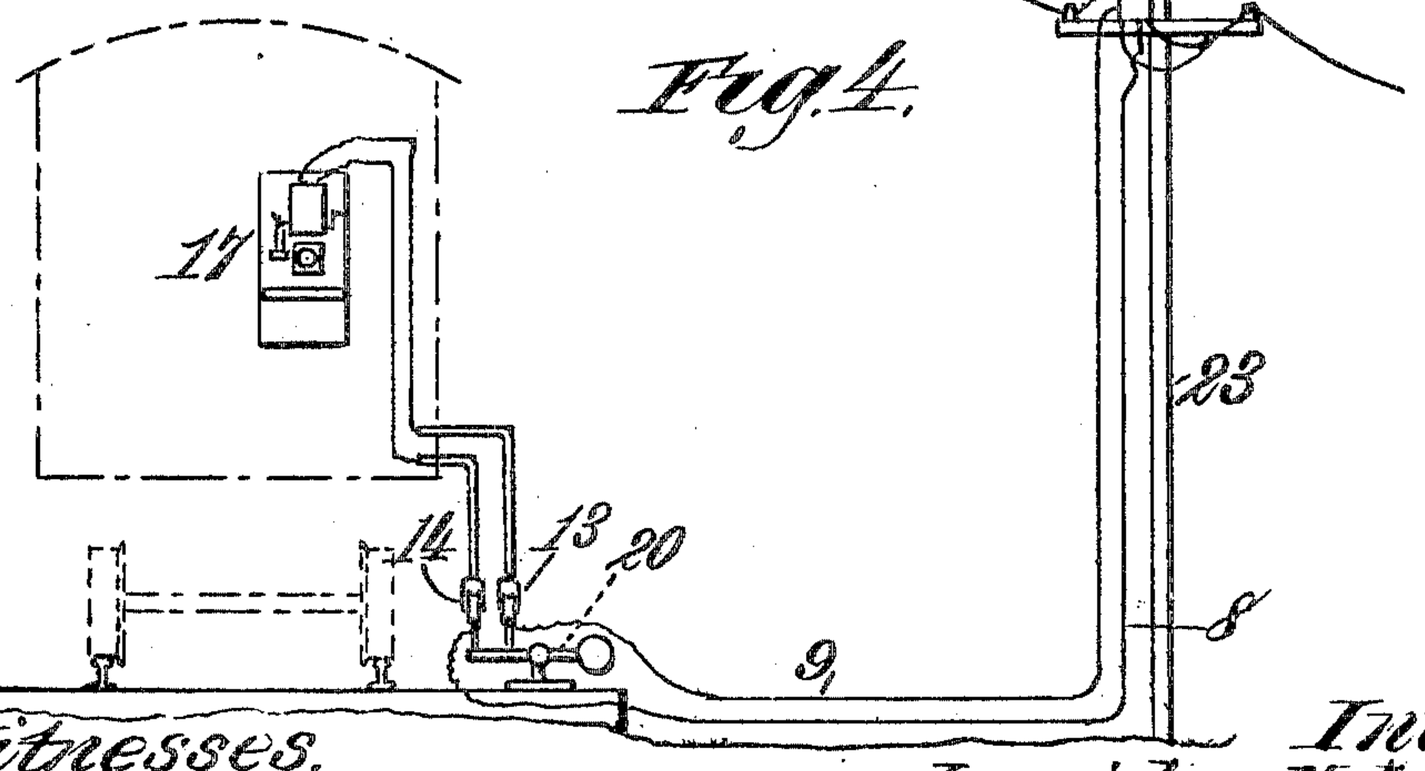


Fig. 4.



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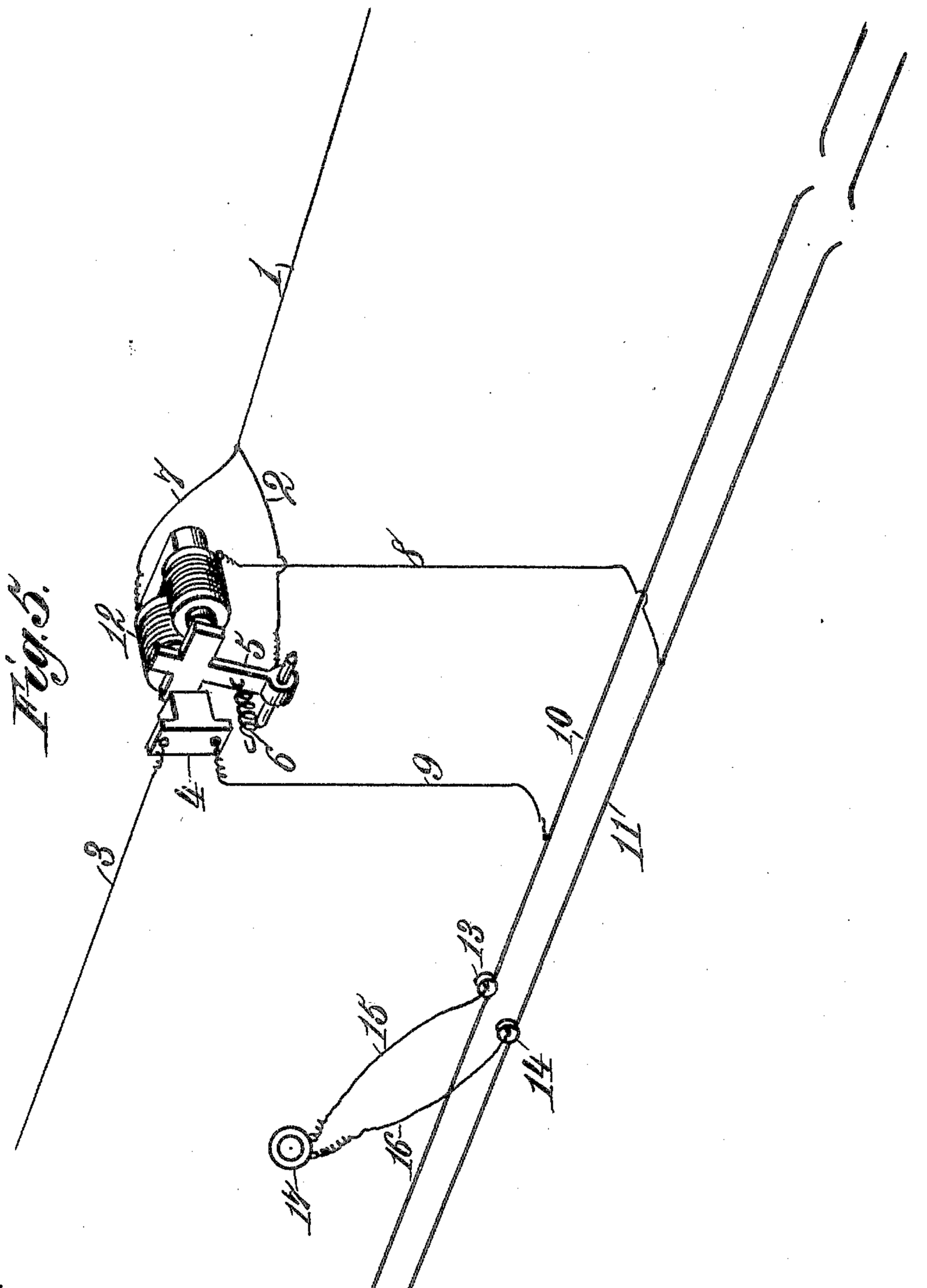
3 SHEETS—SHEET 2.

Fig. 3.



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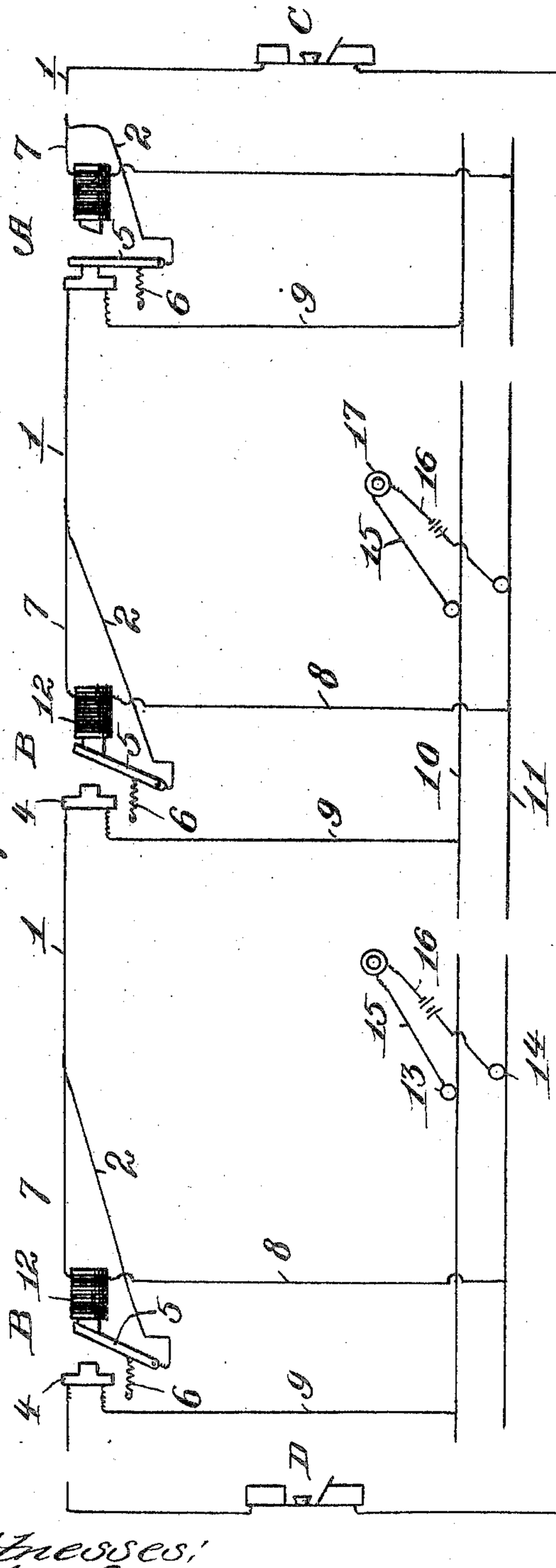
3 SHEETS—SHEET 3.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL RAILWAY SIGNALING SYSTEM.

No. 797,591. Specification of Letters Patent. Patented Aug. 22, 1905.

Application filed November 29, 1904. Serial No. 234,745.

To all whom it may concern:

Be it known that I, LEONIDAS N. LYON, Jr., a citizen of the United States, residing at Flatonia, in the county of Fayette and State of Texas, have invented new and useful Improvements in Electrical Railway Signaling Systems, of which the following is a specification.

This invention relates to electrical railway signaling systems, and aims to provide a system, hereinafter more specifically described, which will enable the sending of telephonic or telegraphic messages back and forth between two or more locomotives or trains and between a locomotive or train and a station and which is also further adapted for electrically signaling in other manners between two or more locomotives or trains and between a locomotive or train and a station; and to this end the system consists of a main circuit and one or more what may be termed "auxiliary" or "shunt" circuit or circuits coöperating with the main circuit, said auxiliary or shunt circuit or circuits being formed by a suitable electromagnetic shunt or shunts arranged in the main circuit.

With the foregoing and other objects in view the system consists of the novel construction, combination, and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawings, which form a part of this specification, and wherein is shown the preferred embodiment of the invention; but it is to be understood that changes, variations, and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings, wherein like reference characters denote corresponding parts throughout the several views, Figure 1 is a sectional elevation of a circuit-breaker interposed in the main open circuit. Fig. 2 is a transverse sectional view of one of the supports for the track-wire sections. Fig. 3 is a side elevation thereof. Fig. 4 is a front elevation showing the trolleys carried by the train or locomotive. Fig. 5 is a diagrammatical view of an electrical railway signaling system constructed in accordance with this invention, and Fig. 6 is a view similar to Fig. 5.

The auxiliary or shunt circuit or circuits, which is or are formed through the medium of the electromagnetic shunt or shunts, (to be hereinafter described,) will be hereinafter referred to as an "auxiliary" circuit or circuits. When setting up the system, as many auxiliary circuits are employed as desired, and in the example shown in Fig. 5 but one complete auxiliary circuit is shown, whereas in the example shown in Fig. 6 two complete auxiliary circuits are shown. For each auxiliary circuit the necessary electromagnetic shunt and wire connections are used. As each of the auxiliary circuits is formed alike, it is thought unnecessary to show more than two and to only describe one.

Referring to the drawings by reference characters, the main circuit comprises the conductors 1, 2, and 3, preferably wires. The conductor 2 branches off from the conductor 1. The electromagnetic shunt is arranged in the main circuit and consists of a fixed contact 4 and a movable contact 5, the normal position of the latter being against the contact 4 and which is held in such position through the medium of the spring 6.

The reference character 12 denotes the magnets of the shunting device.

The conductor 3 of the main circuit is connected to the fixed contact 4. The conductor 2 of the main circuit is connected to the movable contact 5, while the magnets 12 are connected with the conductor 1 by the conductor 7.

The auxiliary or shunt circuit consists of the conductors 8 9 10 11 15 16, trolleys 13 14, and signaling device 17, which, as shown, is a telephone. The conductor 8 leads from the magnets 12 to the conductor 11. The conductor 9 leads from the fixed contact 4 to the conductor 10. The trolley 13 14 travels upon the conductors 10 11, respectively, the conductor 15 leads from the trolley 13 to the signaling device 17, and the conductor 16 leads from the trolley 14 to the signaling device 17.

The travel of the main circuit when the auxiliary or shunt circuit is not formed is from station over the conductors 1 2 through the contacts 4 and 5 and over conductor 3 to station. When the auxiliary circuit is formed, the travel of the current is as follows: Over conductor 1, branch 7, through the magnets 12, conductors 8 11, trolley 14, conductor 16, signaling device 17, conductor 15, trolley 13, conductors 10 9, contact 4, and conductor 3.

The conductors 10 and 11 are what are termed "track-conductors" and preferably are constructed of wire. The conductors 10 and 11 are arranged in proximity to the track-bed and are arranged in sections, each section consisting of a pair of conductors, the pair being designated by the reference characters 10 and 11. Each section of the track conductors or wires is separate from the adjacent

section of the track conductors or wires. By separating each section of the track conductors or wires separate auxiliary or shunt circuits are formed which coöperate with the main circuit.

The system as illustrated is shown set up for use in connection with a telephone, although any other manner of signaling can be employed, and the telephone is designated by the reference character 17 and is carried by the locomotive, although it can be carried by one of the cars of the train, and to the telephone is connected the conductors 15 and 16. These latter, as before stated, are connected with the trolleys 13 and 14, which are carried by the locomotive or, if desired, can be carried by one of the cars of the train. The trolleys 13 14 depend and, as before stated, contact with the track-conductors 10 11, which are arranged in proximity to the track-rails and supported above the ties 18 through the medium of the insulators 19, mounted on the inner end of a counterbalanced arm 20, pivoted to the support 21, as at 22, there being as many counterbalanced arms 20 as is desired, and the function of making the said arms counterbalanced is to cause the conductors 10 11 to bear against the trolleys 13 14, or, in other words, cause the conductors 10 11 to be also in contact with the trolleys 13 14 when said trolleys are passing over one of the sections of the track conductors or wires.

Arranged at a point in suitable relation with respect to the track-bed are the poles 23 for supporting the conductors 1, 7, and 3 and also for supporting the electromagnetic shunt devices.

The main circuit when used in connection with a telephone signaling apparatus is what may be termed "a normally open circuit," as such term is generally used in telephonic work to denote the fact that no current is on, rather than a broken metallic circuit, as the term "open circuit" literally denotes. As a matter of fact the metallic circuit is, to be sure, closed normally.

In Fig. 6 of the drawings a two-train system is set up so that two trains can communicate with each other as well as communicate with the headquarters' offices. Normally without any trains on the road the position of all the electromagnetic shunt devices will be the same as shown at A in Fig. 6. Under these conditions the current will travel from the positive ground at office C by conductor 1, thence conductors 1 2 through movable contact 5, stationary contact 4, and onto conductor 3, and so on until ground at the negative end at office D is reached. Under such circumstances it is evident that it is normally a closed circuit. In telephone-work the wire normally has no current turned on and is usually called an "open circuit," not that the metallic connection is broken at all, but because there is no electric current all the time, as it is under the Morse telegraphic system. Reverting again to Fig. 6 of the drawings, should there be two trains on the road, as soon as their trolleys come in contact with the track-rails the batteries carried by their telephone will energize the magnets 12, which draws the movable contact 5 away from the stationary contact, which action shunts the current flowing through the conductors in a manner hereinbefore referred to and causes it to flow over conductors 1 7, through magnets 12, conductors 8 11, trolley 14, conductor 16, signaling device 17, conductor 15, trolley 13, conductors 10 9, contact 4, and conductor 3, to other end of line or to and through the next train-signaling device or telephone in circuit. It is to be understood that the batteries carried by the train should be strong enough to energize the magnets 12. The wires 1 and 3 lead to headquarters' office, where they are grounded or the current returned on a return metallic circuit.

The operation set forth in the preceding paragraph is had when a telephone is employed. Consequently the main circuit is permanently open. Should a "Morse" key and sounder be substituted for the telephone, it would be necessary to employ a closed circuit; otherwise the operator on the train could not "break" the operator sending to him. The term "main circuit" is employed as generic to permanently-open or a permanently-closed circuit. If desirable, a ground-wire can be attached to either of the elements 15, 16, and 17.

The batteries that are placed at C and D, Fig. 6, are harmoniously opposed to each other—*i. e.*, the positive pole at C and the negative pole at D. In the train are carried other batteries which are also in harmonious polarity with those at C and D, having the positive pole connected with conductor 16 and the negative pole connected with conductor 15. However, if the resistance through the movable contact 5 and stationary contact 4 be greater than through magnet 12 and conductors 8, 11, 14, 16, 17, 15, 13, 10, and 9, the current will take this route when a pair of trolleys comes on that section. However, if the train carries batteries, it will make assurance doubly sure in the energizing of the magnet 12. As long as there is a metallic circuit in contact when the trolleys move upon the section of track-wires it will energize magnet 12, diverting the flow of current down through the track-wires. The batteries carried by the train, as before stated, should be strong enough to energize the magnet 12, thus pulling the movable contact away from the stationary contact and diverting the current to the track-wires.

It will be evident from a system set up in the manner as hereinbefore pointed out that signaling can be had between two or more locomotives or trains and between a locomo-

tive or train and a station, as the trolleys of the train will be traveling over sections of the track conductors or wires simultaneously, so as to form auxiliary circuits, each coöperating with a main circuit. As the trolleys leave one section of the track conductors or wires and pass upon another section of the track conductors or wires an auxiliary circuit will be broken and a new one formed. The auxiliary circuit which has been broken will not be formed again until another pair of trolleys travels upon that section of the track conductors or wires which forms a part of the said auxiliary circuit which has been broken.

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

1. In an electrical railway signaling system, a main circuit, a plurality of independent pairs of conductors, a magnetic shunt device interposed in said main circuit, auxiliary-circuit wire connections between each pair of said conductors, said device and said main circuit, and means traveling upon said independent pairs of conductors and coöperating with said auxiliary-circuit wire connections for forming separate auxiliary circuits coöperating with said main circuit.

2. In an electrical railway signaling system, a main circuit, a plurality of independent pairs of wire conductors, a magnetic shunt device interposed in said main circuit, auxiliary-circuit wire connections between each pair of said conductors, said device and said main circuit, a pair of trolleys electrically connected with a signaling device and adapted to travel over said independent pairs of conductors, said trolleys when traveling over each pair of conductors forming an auxiliary circuit coöperating with said main circuit, and a counterbalanced means for retaining said conductors in contact with said trolleys while these latter are traveling over each independent pair of conductors.

3. An electrical system for signaling from a moving train, embodying a plurality of independent pairs of conductors arranged in close proximity to the track-rails and adapted to be engaged by trolleys carried by the moving train, and a counterbalanced means for supporting said conductors and for retaining them in contact with the trolleys when the latter are traveling over the conductors.

4. In an electrical railway signaling system, comprising a permanently-open main circuit embodying a fixed and a movable contact and electrical conductors suitably connected with said contacts, and an auxiliary circuit coöperating with said main circuit and comprising an electromagnetic device connected with one of the conductors of the main circuit and coöperating with said movable contact, said auxiliary circuit further comprising a pair of electrical conductors electrically connected with said fixed contact and said electromagnetic device and means traveling upon said pair of electrical conductors for bridging them.

5. An electrical system for moving trains, comprising a main circuit, a pair of parallel conductors, an electromagnetic device connected with the parallel conductors, trolleys carried by a moving train and traveling over said parallel conductors, and connections between the conductors, magnetic device, and main circuit, whereby the electric current of the main circuit may be shunted or diverted to flow through said parallel conductors, trolleys, connections and return to the main circuit.

6. In an electrical railway signaling system, embodying a circuit breaking and forming means consisting of an electromagnetic device, a fixed contact, a movable contact cooperating with said fixed contact and the electromagnetic device, said movable contact adapted when said electromagnetic device is energized to be moved against said device, thereby forming an auxiliary circuit for closing the main circuit, and suitable main and auxiliary circuit forming connections coöperating with said fixed contact, said movable contact and said electromagnetic device.

7. In an electrical railway signaling system, a plurality of independent pairs of conducting-wires, a traveling means contacting with said wires for bridging them, a counterbalanced support for said wires, said support adapted to keep said wires in contact with said traveling bridging means, and main and auxiliary circuit wire connections coöperating with said traveling bridging means and said independent pairs of conducting-wires.

8. An electrical railway signaling device for moving trains, comprising a main circuit, electromagnetic means interposed in said circuit and connected with the train for shunting the current of the main circuit, forming thereby an auxiliary circuit coöperating with the main circuit to permit of signaling to or from the train from or to a station, and means for automatically breaking the auxiliary circuit.

9. In an electrical signaling system for moving trains, a main circuit, electromagnetic means interposed in said circuit and connected with a pair of trains for shunting the current from the main circuit to form auxiliary circuits coöperating with the main circuit to enable the signaling from one train to the other or from the train or trains to a station or from a station to a train or trains, and means for automatically breaking the auxiliary circuits.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LEONIDAS N. LYON, Jr.

Witnesses:

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W. Willeford.