(No Model.) 3 Sheets—Sheet 1.

F. C. SCHROEN.

ELECTRIC SIGNAL FOR RAILROADS.

No. 436,154. Patented Sept. 9, 1890.

Fig. 1.

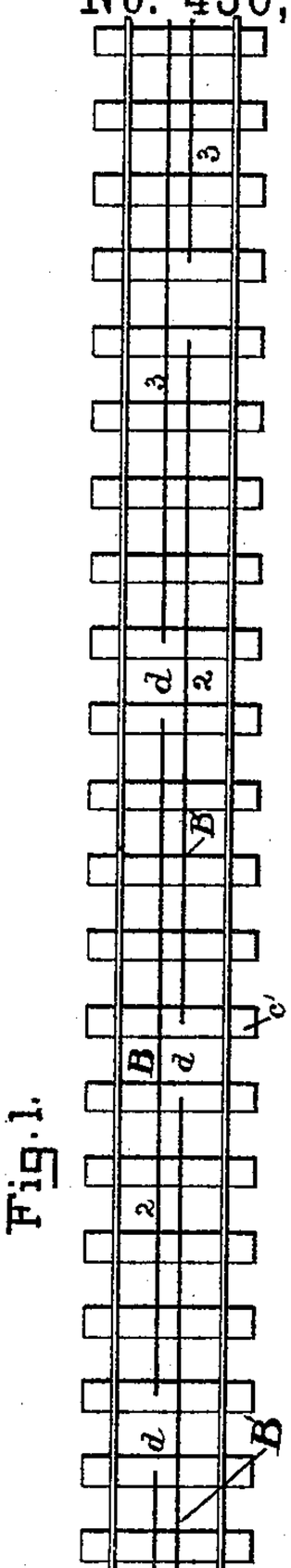

Fig. 2.

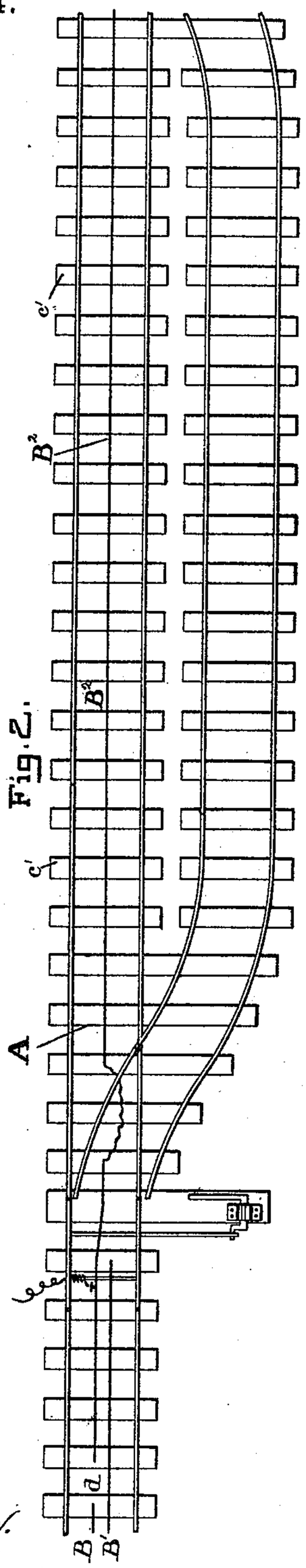

Fig. 3.

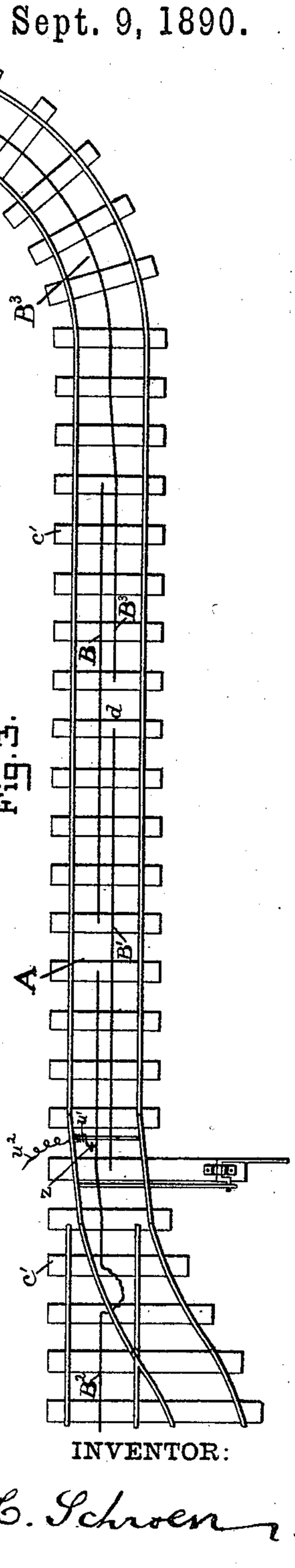

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Fig. 6.

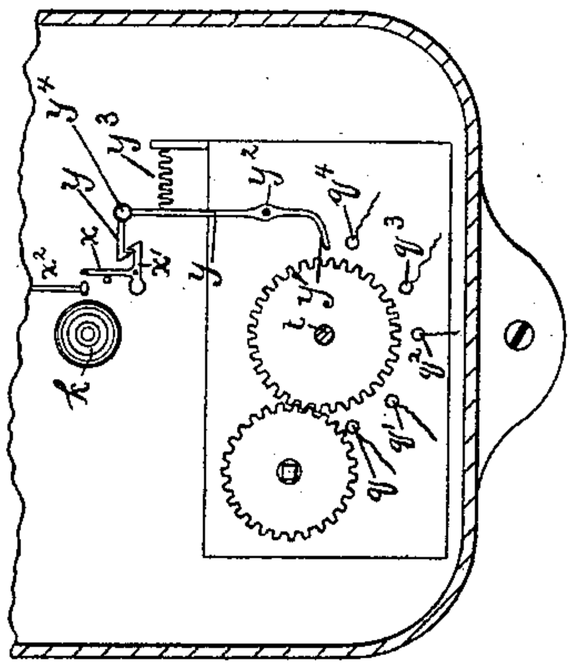

Fig. 5.

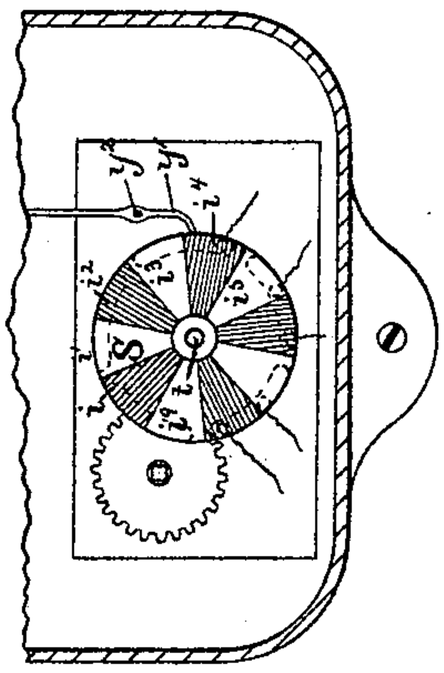

Fig. 4.

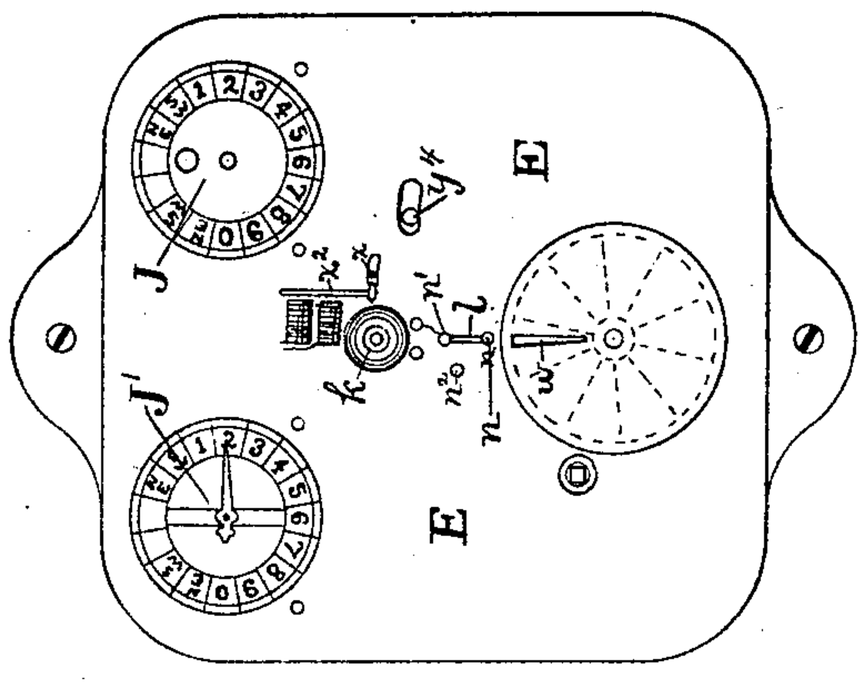

Fig. 9.

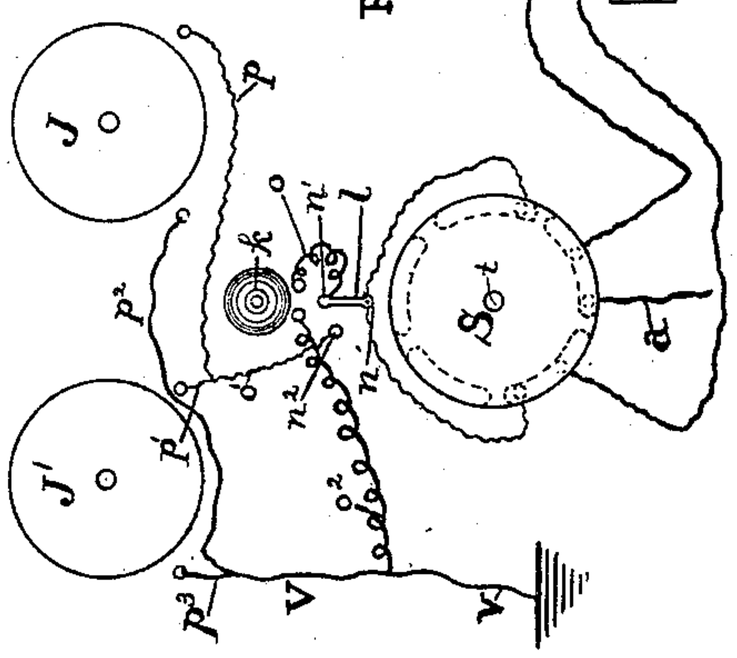

Fig. 8.

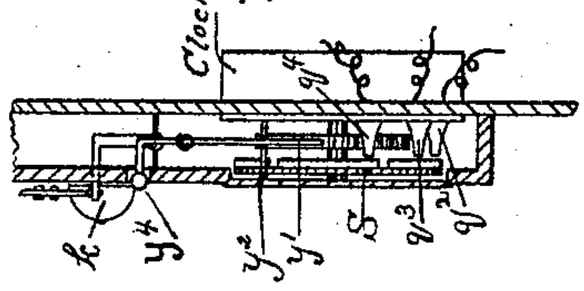

Fig. 7.

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ELECTRIC SIGNAL FOR RAILROADS.

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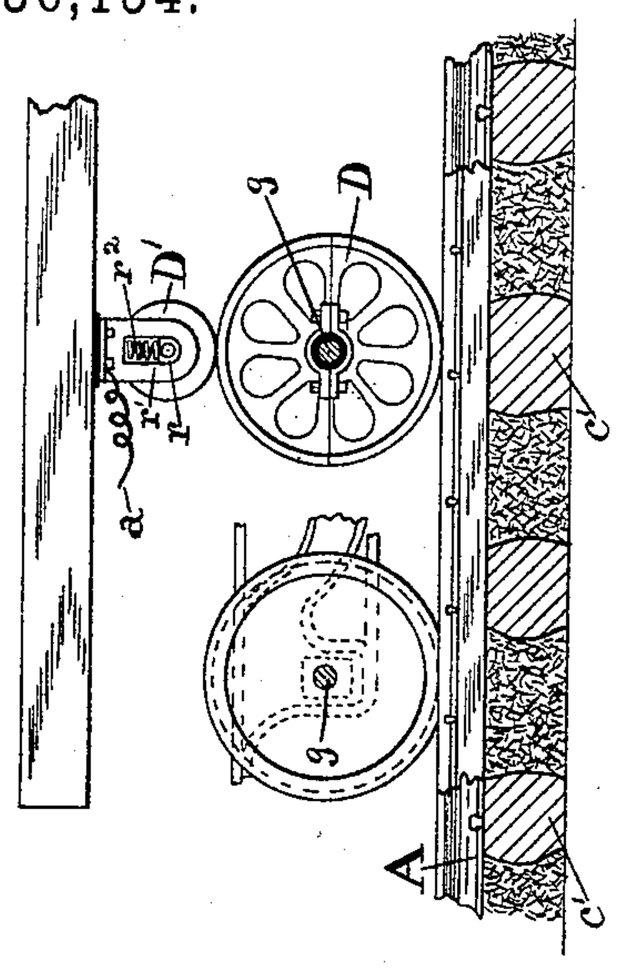

Fig. 11.

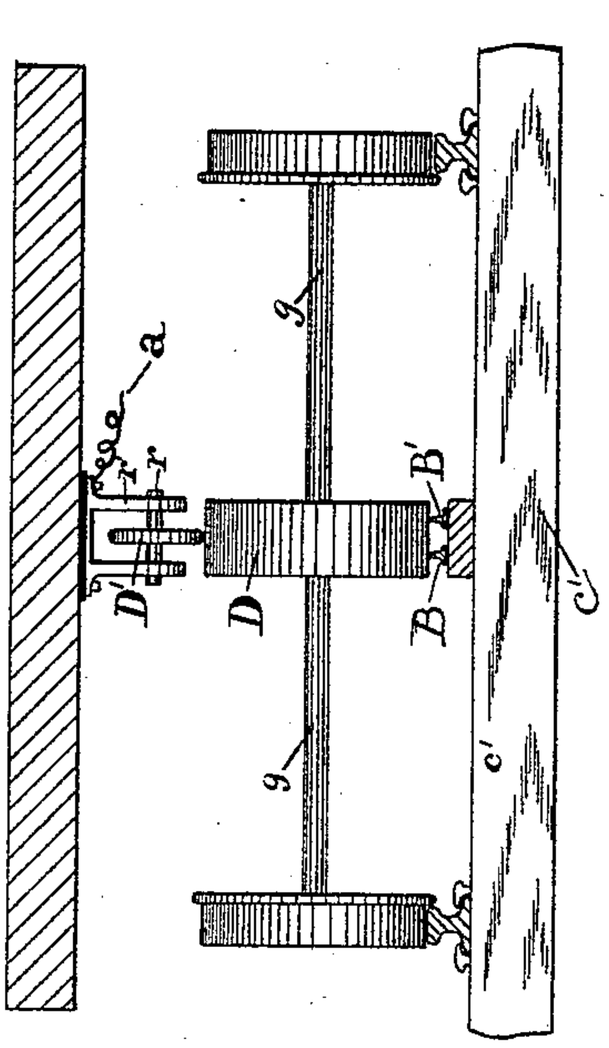

Fig. 10.

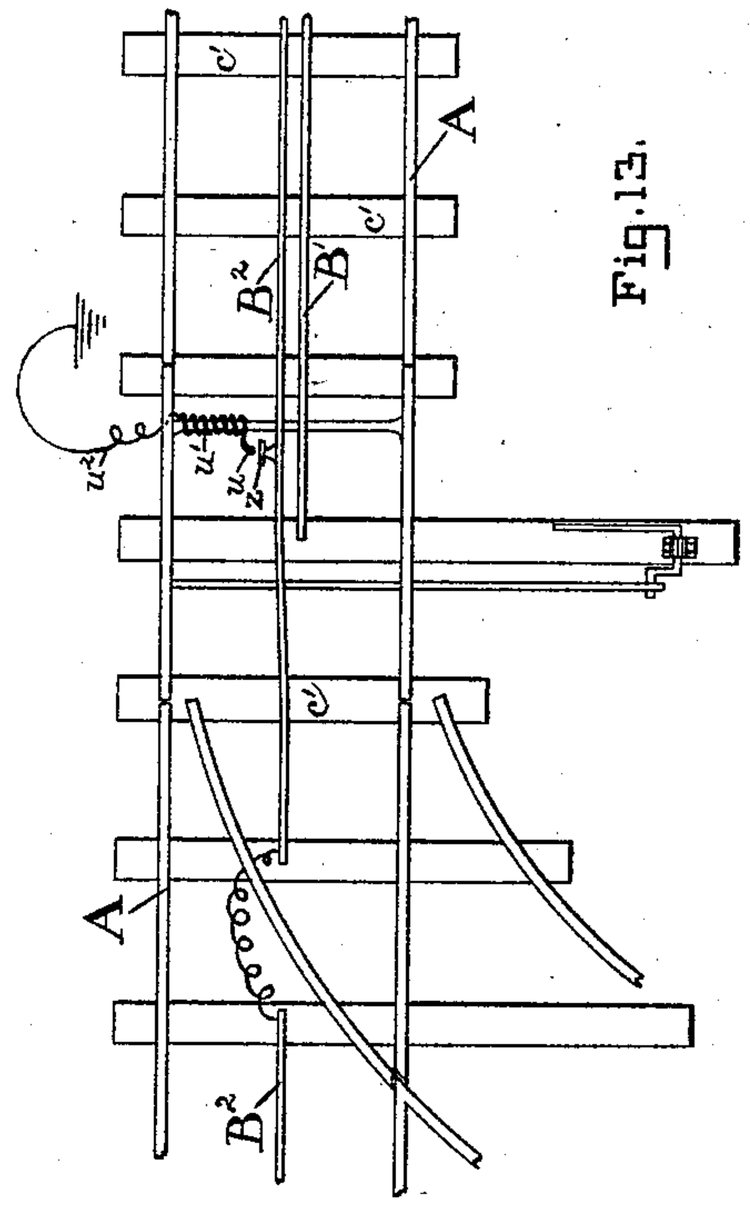

Fig. 13.

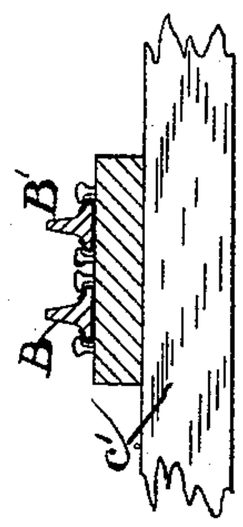

Fig. 12.

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UNITED STATES PATENT OFFICE.

FRANK C. SCHROEN, OF BALTIMORE, MARYLAND.

ELECTRIC SIGNAL FOR RAILROADS.

SPECIFICATION forming part of Letters Patent No. 436,154, dated September 9, 1890.

Application filed May 13, 1890. Serial No. 351,630. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. SCHROEN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Electric Signals for Railroads, of which the following is a specification.

This invention relates to improved means for establishing and maintaining electrical connection between moving railroad-trains within certain limits.

The object of this invention is to automatically sound an alarm or signal on the locomotive when two trains occupy adjacent sections or blocks and to maintain electrical communication between the locomotives or trains when in such relation, and also to automatically sound an alarm in the engineer's cab when the locomotive is nearing an open switch.

In the accompanying drawings, illustrating my invention, Figure 1 shows a railway-track divided into sections by electric conductors as used in this invention. Fig. 2 shows the connecting of the electric conductors where a siding connects with the main track. Fig. 3 shows the same at a sharp curve. Fig. 4 is a front view of the instruments placed in the engineer's cab. Fig. 5 is a detail view of the alternate-pole connecting device, being part of the instruments in the engineer's cab. Fig. 6 shows a detail view of some of the mechanism of said instruments. Fig. 7 shows a bottom view of the revoluble disk for alternating the battery-connections. Fig. 8 is a vertical cross-section of automatic stop device, contact-points, and revoluble disk for alternating the battery-connections. Fig. 9 is a diagrammatic view showing the electrical connections of the signal-instruments and the device for alternating the battery-connections and pole-closing device. Fig. 10 is a view of the means on the tender for maintaining the electric-alarm circuit. Fig. 11 shows a part-sectional side view of one of the tender-trucks and the means thereon for making contact with the electric conductors. Fig. 12 is a view of a cross-tie equipped with the electric-current conductors. Fig. 13 shows a plan detail of the switch mechanism which enables the sounding of an alarm in the locomotive-cab when the switch is open.

The letter A designates the track, and B B' B^2 B^3 the insulated electric conductors placed on the cross-ties c'.

Upon the cross-ties c', between the track-rails, are placed the insulated conductors B B', which are made up in disconnected sections of suitable lengths 1 2 3, &c.—as, for instance, one or two miles. These sectional conductors comprise two series B B' of parallel lengths of insulated rails, the lengths 1 2 3 of each series being disconnected, as at d, and each length of one series having its center opposite the said disconnected part d between two lengths of the other series.

Attached to the locomotive or tender is a contact-wheel D, which traverses and makes contact with the parallel conductors. This wheel has a rim broad enough to overlap the two series of parallel conductors B B'.

In the cab of each locomotive is placed an engineer's signaling device, consisting of a signal-sending and a signal-receiving instrument J J', respectively, an automatic alarm-bell k, an electric switch l, for cutting the alarm-bell k out of the circuit and bringing into the circuit the signal sending and receiving instruments, and a device for connecting the fixed point n of the switch l and the contact-wheel D alternately with the poles of a battery m on the locomotive. The signal-sending and signal-receiving instruments here used are similar to those of the ordinary dial-telegraph systems, the only difference being the use of signals on the dials in place of the letters of the alphabet. The free end of the switch l is adapted to make contact with fixed points n' n^2, one of which is the terminal of a wire o, leading to one binding-post of the alarm-bell. The other point n^2 is the terminal of a wire o', which has two branches p p'. One leads to one binding-post of the signal-sending instrument, and the other branch wire p' leads to the corresponding binding-post of the signal-receiving instrument. Thus it will be seen either the alarm-bell or the signal device can be thrown out of the circuit by the switch. A wire v has at one end three branches o^2 p^2 p^3, which lead to the other binding-post of the alarm-bell, the signal-sending, and the signal-receiving instruments, respectively. The other end of this wire v has a ground-connection.

The device for connecting the fixed point n of the switch and the contact-wheel D alternately with the poles of the battery m has five fixed contact-points insulated from each other and arranged or spaced apart equidistant, except the first q and last q^4, and form an arc of a circle. Two of these contact-points q q^4—the left and right top ones—are respectively connected by wires to the fixed point n of the electric switch l. The next two points q' q^3—the left and right, respectively—are connected by wires with the two respective poles of the battery m. The last and lowest contact-point q^2 is connected by a wire a to a metal wheel D′, having its journals in adjusting-boxes r, placed in vertical slideways r', supported from the bottom of the tender and insulated therefrom. A spring r^2 in each of the slideways presses down the boxes and thereby forces the said wheel D′ down upon the contact-wheel D, previously referred to. This contact-wheel is made in halves (see Fig. 11) and mounted on one of the axles g of the tender-trucks, but is insulated therefrom. Thus it will be seen that the above arrangement allows for the yielding of the truck-springs, and also insures that the two wheels D′ and D will maintain contact.

The revoluble disk S of the device for alternating the battery-connections is made of insulating material and has five segmental metal plates s s' s^2 s^3 s^4 on its back surface. These metal plates are long enough to overlap any two of the five contact-points q q' q^2 q^3 q^4, with the exception of the first q and the last q^4, and thus establish electric communication between any two overlapped contact-points. The revoluble disk S is mounted on a shaft t, located equidistant from each of said contact-points. To this shaft t is geared any suitable clock-work or spring-motor mechanism to impart to it and to the disk a rotary motion. Thus it will be seen that when the said disk S revolves any one of the metal plates s s' s^2 s^3 s^4 will alternately establish communication between the switch l, the contact-wheel D, and the poles of the battery. The front surface of the revoluble disk S is divided into ten equal parts i i' i^2, &c., radiating from the center, the alternate divisions being of one color and the remainder of another color. (See Fig. 5.) The said divisions are placed so that the alternate dividing-lines will be opposite the center of the respective segmental metal plates s s' s^2 s^3 s^4. This disk S, which is mounted on the shaft t, revolves back of or inside of the front wall E of the mechanism-inclosing case, and can be seen through a slot w, cut in the said front wall and so placed that as long as one pole of the battery is in connection with the contact-wheel D the one color will be seen; but when the opposite pole comes in connection with the contact-wheel the other color on the front surface of the disk is seen. By this arrangement the engineer can easily see whether he is to be the first one to signal when an alarm is sounded by the alarm-bell—that is, when the plus or positive pole is in connection with the contact-wheel he is to signal first; but if the minus or negative pole of his battery is in connection with the contact-wheel he must wait until he receives a signal.

The purpose of alternating the battery-connections referred to is to avoid the possibility of two locomotives having the same pole of the battery in connection with the wheel, in which instance the force of the battery on one locomotive will counteract the force of the battery on the other.

In order to automatically stop the clock-work on the engines when an alarm is sounded and thereby retain electrical communication between the two locomotives in which the alarm has been sounded, I pivot below the alarm-bell a right-angled lever, which has two arms x x', respectively. One of the said arms x passes up and forward through a slot in the casing against the alarm-bell hammer x^2. The other arm x' of this lever has a hook near its end, which engages with a similar hook at one end of an arm y of a bent lever pivoted at y^2. The other arm y' of this lever is so made that it will engage with the teeth of one of the clock-work pinion-wheels. When the alarm-bell hammer starts to vibrate, it will hit against the arm x of the right-angled lever, and thereby cause the hook on the arm x' to disengage from the arm y of the bent lever, which will be operated by a spring y^3, causing the arm y' of said lever to engage with the teeth of one of the clock-work pinion-wheels, thereby causing the clock-work to stop, and so retain the electric communication between the two trains. After the engineers are through signaling they again start off their clock-work by moving a button y^4, which is attached to the arm y of the bent lever, to the left. The said arm y will then again engage itself with the arm x' of the right-angled lever. This button y^4 projects through a slot and beyond the front plate E.

In order to notify an engineer that he is nearing an open switch, a contact-point u is fastened to an insulated spiral spring u', which is wound around one of the tie-rods of the switch-rails. This spring also affords electrical connection between the above contact-point u and a wire u^2, having a ground-connection. A contact-plate z is connected to one of the electrical conductors B B′ B² B³, and is so placed that when the switch is open the contact-point u of the rod will press against it, and if there be a locomotive in the section in which the above switch is located a circuit will be closed through the alarm-bell k of the locomotive-signal device and an alarm given.

Single conductors B² B³ are used at sidings and sharp curves, respectively, and extend the entire length of the siding or curve and half-way into the adjacent section at either

end of the siding or curve, as may be, thus allowing communication between locomotives in that half of the section adjacent to the said siding or curve.

Having described the several parts of this invention, the operation is as follows: Should two trains be moving toward each other and be in adjacent sections, an alarm will be given in the engine-cab of each train, the electric circuit through the alarm-bells being complete, the current passing from one side of the alarm-bell on one engine to the contact-wheel D, thence along one of the insulated conductors B B′ to the contact-wheel D on the other engine, thence to the alarm-bell in this latter engine, from which it passes along the wire *v* to the ground, then to the ground-connection of the wire *v* of the first engine and to the alarm-bell thereof, thus having made a complete circuit. It will now readily be seen that the engineers can cut the alarm-bells out of the circuit and bring in their signaling-instruments, and thereby exchange signals by means of the circuit, which has remained closed or complete. The engineers, after having exchanged signals, act according to the signals received. When an engineer is nearing an open switch, the alarm will be sounded in the locomotive by the contact-point *u*, connecting with the plate *z*, so that the engine can complete the circuit through the grounded wire *u*, the spiral conducting-spring *u′*, the conductors, the contact-wheel D on the tender of the locomotive, then to the alarm-bell connections, from which it passes to the grounded wire *v*, and thence through the ground, thus completing the circuit and sounding the alarm.

Having described my invention, I claim—

1. In an electric block-signal system for railways, the combination, with a battery, of conductors for making connections therewith, mechanism for alternating the connections, a signal, and means for automatically stopping the alternating mechanism when the signal is sounded.

2. In an electric block-signal system for railways, the combination of a contact-wheel D on an axle of one of the tender-trucks, but insulated therefrom, an adjustable wheel D′, suspended from the bottom of the tender in vertical slideways to make connection with the contact-wheel, and a switch for making connection with a bell or signal on the locomotive.

3. In an electric block-signal system for railways, the combination, with a battery, of conductors for making connections therewith, means for alternating the connections, a movable variegated indicator for designating the battery-connection, and a casing for the same provided with a slot for disclosing only a portion of the indicator, substantially as described.

4. In an electric block-signal system for railways, the combination, with a car or tender, of vertical slideways supported from the bottom, a contact-wheel D, mounted on the axle, but insulated therefrom, a metal wheel D′, with its rim upon the rim of said contact-wheel and having its journals in boxes which are movable in said slideways to allow for the yielding of the truck-springs, and a spring to keep said metal wheel D′ upon the rim of the said contact-wheel D, for the purpose set forth.

5. In an electric block-signal system for railways, the combination of the following elements on the locomotive: an alarm-bell, connections with the electric conductors, a battery, a ground-connection, and a device operating independently of the locomotive to alternately make connection between the alarm-bell, the connections of the electric conductors, and the battery, for the purpose set forth.

6. In an electric block-signal system for railways, the combination of an alarm-bell, signal-instruments, a switch *l*, to connect with the alarm-bell or signal-instruments, a contact device, as a wheel D, to make connection with the electric conductors, a battery, and a device operating independently of the locomotive to alternately make electric connection between the switch *l*, the said contact device D, and the poles of the battery.

7. In an electric block-signal system for railways, the combination of the following elements on the locomotive: an alarm-bell, a battery, a contact device to make connection with the electric conductors, a ground-connection, a device to alternately make electric connection between the alarm-bell, the contact device, and the poles of the battery, and an automatic stop device to retain the device for alternating the battery-connections when the circuit is completed through the alarm-bell and the hammer of the same starts to vibrate.

8. In an electric block-signal system for railways, the combination, with a battery, of electrical connections for the same having five insulated contact-points arranged in the arc of a circle, and a revoluble disk having insulated metallic plates secured thereto, each of said plates being of such length as to engage with two adjacent points, except those at the ends of the arc.

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

FRANK C. SCHROEN.

Witnesses:

JOHN E. MORRIS,

JNO. T. MADDOX.