(No Model.) 2 Sheets—Sheet 1.

S. DE JAGER & A. ZOUTMAN.

SYSTEM OF ELECTRICAL SIGNALING FOR RAILROADS.

No. 460,779. Patented Oct. 6, 1891.

Fig. 2.

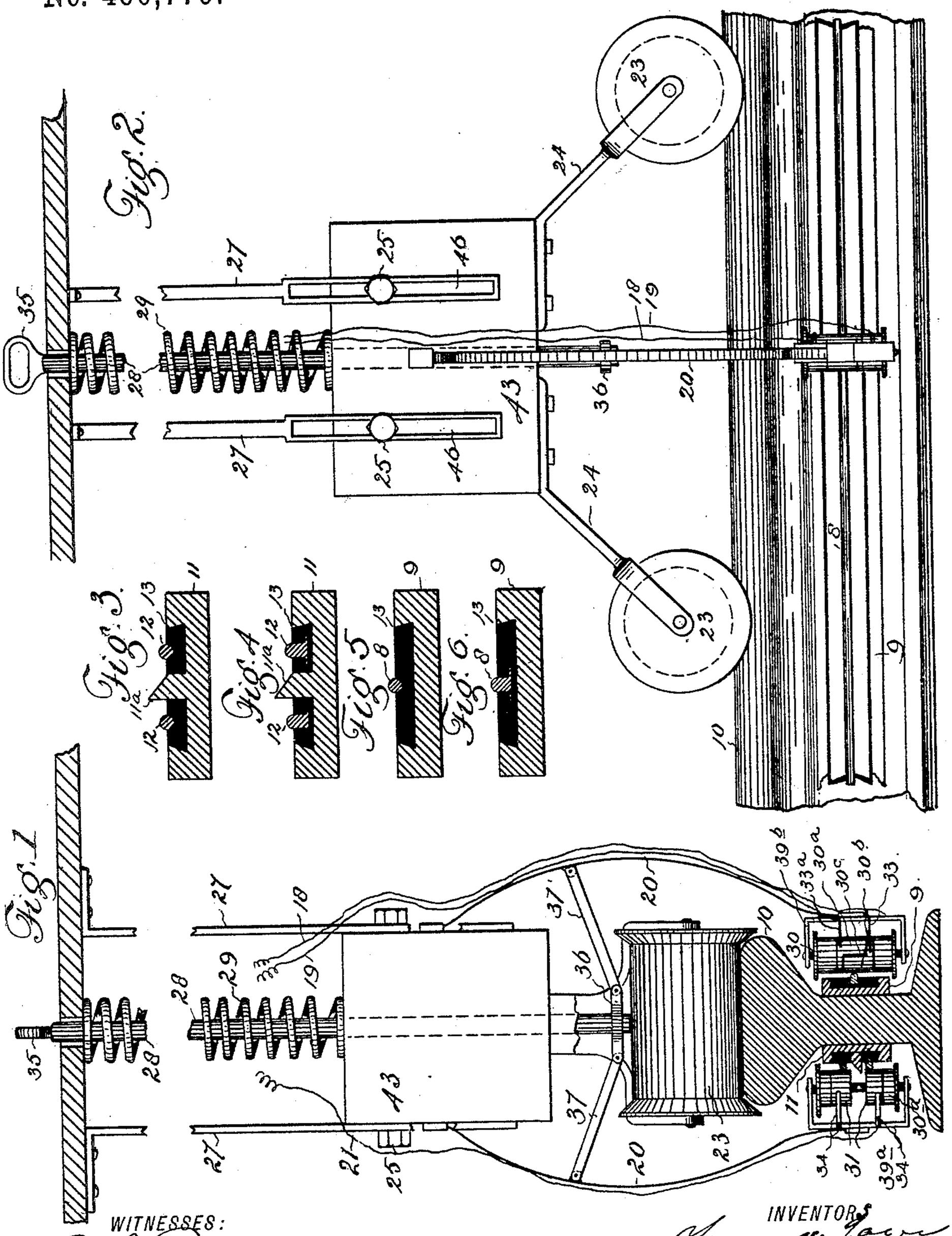

Fig. 3.

Fig. 4

Fig. 5

Fig. 6.

Fig. 1

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 7.

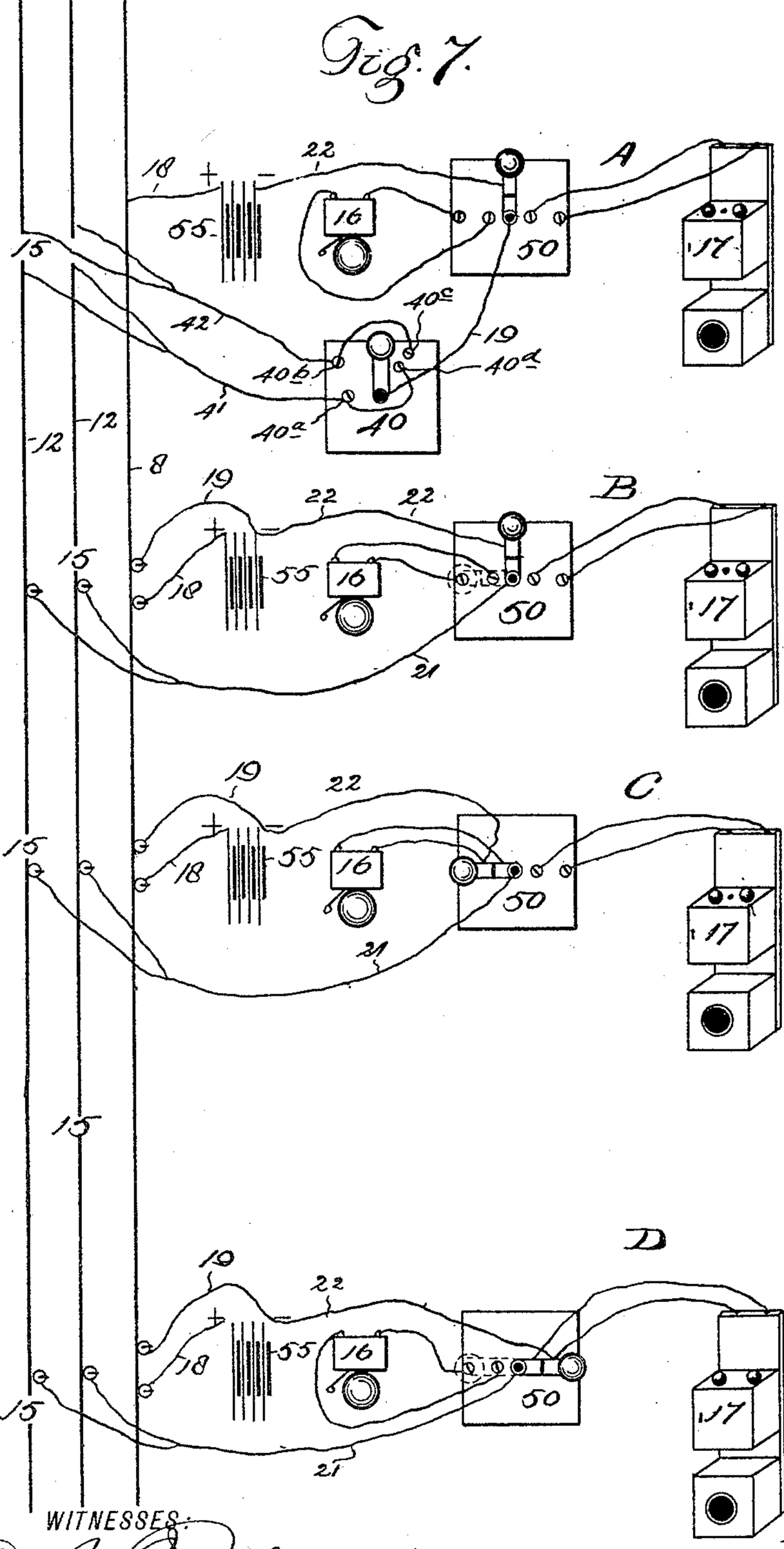


Fig. 10.

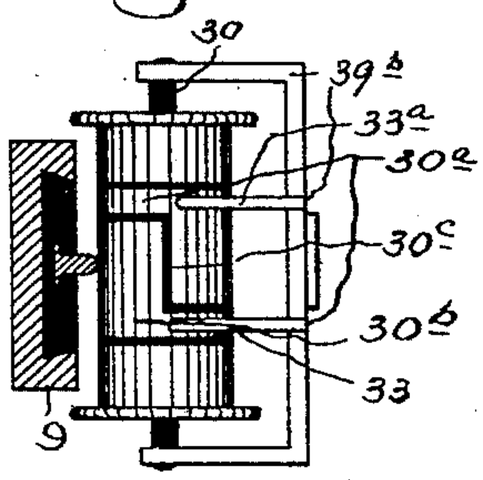


Fig. 8.

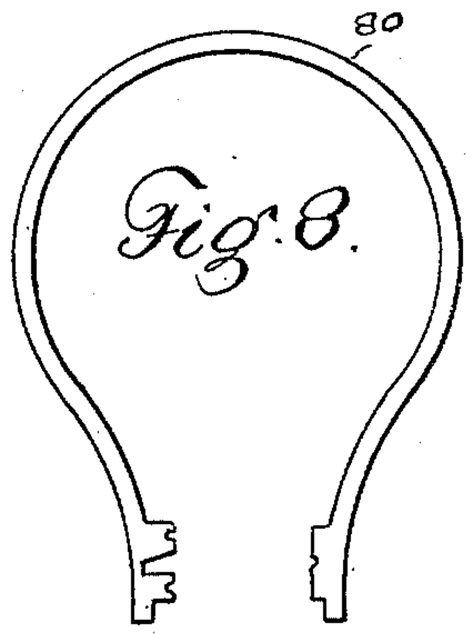
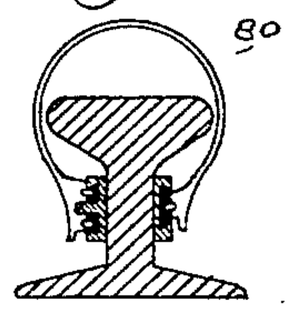


Fig. 9.



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SIMON DE JAGER AND ALBERTUS ZOUTMAN, OF DENVER, COLORADO.

SYSTEM OF ELECTRICAL SIGNALING FOR RAILROADS.

SPECIFICATION forming part of Letters Patent No. 460,779, dated October 6, 1891.

Application filed April 25, 1891. Serial No. 390,478. (No model.)

To all whom it may concern:

Be it known that we, SIMON DE JAGER and ALBERTUS ZOUTMAN, both citizens of Holland, the said SIMON DE JAGER having declared his intention of becoming a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Systems of Electrical Signaling for Railroads; and we do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in systems of electrical signaling for use on railroads; and the object of our invention is to prevent collisions between trains, whether going in the same or in opposite directions.

Our improved system will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment of the invention.

In the drawings, Figure 1 is an end view of our mechanism, showing the means of attaching the same to one of the track-rails. Fig. 2 is a side elevation of the same. Figs. 3, 4, 5, and 6 are detail views of our electrical conductors, in connection with suitable mechanism for securing them to the track-rails. Fig. 7 is a diagrammatic view illustrating the means of forming electrical communication between trains upon the same track and between stations and trains. This mechanism consists of electrical conductors secured to the track and a source of electricity located on the train, circuit-wires leading therefrom to the track-conductors, alarm mechanism, and a telephone also located on the train and connected with the source of electricity. Fig. 8 illustrates a spring-clasp engaging the conductors on opposite sides of the rail, and thus establishing connection between them, so as to alarm a single train without the intervention of another train. Fig. 9 is a view showing said clasp in position. Fig. 10 is an enlarged detail view of one of the hereinafter-described rollers.

In the views, wherein similar reference characters indicate corresponding parts of the mechanism, let the numeral 10 designate one of the track-rails, to the web of which, on one side, is secured a strip 11 of wood or other suitable material, provided with grooves, in which are embedded suitable electrical conductors 12 12, which, however, protrude or extend out of said grooves sufficiently to engage contact-rollers, hereinafter described. The web of the rail on the opposite side is provided with another wooden strip 9, similar to that just described, except that the last-named strip is provided with a single conductor 8 instead of two separate conductors.

The portion of conductors 8 and 12 received within the recesses formed in strips 11 and 9 is surrounded or secured in place by some suitable insulating material 13. This insulating material may extend the entire length of the conductor, but is preferably, for the sake of convenience, placed at intervals along strips 9 and 11. In the case last mentioned the portions of the conductors between the isolated insulation-bearings would of course be raised from their corresponding strips, and thus as completely insulated as if the insulating material formed continuous bearings.

The conductors 12 and 8 may be of any desired shape in cross-section, the circular cross-sectional shape being shown in Figs. 3 and 5, while the shape somewhat elongated in cross-section is shown in Figs. 4 and 6. The conductors shown in the last-named figures are T-shaped at the bottom for convenience in retaining them in position.

It will be observed that in the drawings two conductors are shown on one side of the rail and but one on the other side. Three conductors are essential to the successful operation of our signaling system. The continuity of these conductors 12 12 is broken at intervals, as shown at 15 in Fig. 7. These breaks or interruptions should be the same distance apart, so that the sections of each conductor shall be of the same length; but the breaks or interruptions of each conductor should be opposite the middle of the other sections, except at stations, for reasons hereinafter set forth. Strip 11 is provided with a projection 11^a, lying between conductors 12 12. Part 11^a projects farther out than the conductors, between which it lies, and forms

a shield to prevent water from passing from one conductor to the other. This feature is quite important, since if water were allowed to pass from one conductor to the other their individuality would be destroyed and they would become practically, for the time being, a single conductor. The third conductor 8 is continuous and located on the opposite side of the rail from conductors 12 12.

Let the numeral 55 designate a source of electricity, 16 an electric bell typical of any suitable alarm mechanism, 50 a switch, and 17 a telephone. These elements are located on a suitable part of the train. Two wires 18 and 19, each leading from one pole of the battery or electrical source, pass downward to the parts of the roller 30 39^b, as will be described hereinafter. The other wire 21, leading from the switch 50, passes downward also and goes to the roller 39^a. These wires 18, 19, and 21 as they pass downward from the train are supported by the leaf-springs 20 20, which springs are attached at their upper extremities to a vertically-movable block 43, supported by the wheels 23 23, which are connected with said block by means of arms 24 24. Wheels 23 rest upon one of the track-rails. Block 43 is provided with projections or wrists 25, secured to its sides and adapted to move vertically in slots 46, formed in suitable supports 27, which are secured to a suitable part of the train. Two of these supports should be on each side of block 43, so that the block in its movements may be guided in a vertical line. Centrally secured to block 43 and extending both above and below the same is a rod 28, surrounded by a heavy coil-spring 29, the upper extremity of said spring engaging the bottom of the locomotive or other suitable stop, while the lower extremity engages the top of block 43 and bears upon the same sufficiently to hold it in proper position. To the lower extremity of the springs 20 are secured frames 39^a and 39^b, respectively, in which are pivoted the rollers 30 and 30^d. One of these rollers 30^d is provided with two parts 31 31, insulated from the frame. These parts 31 31 engage conductors 12 12, respectively. The other roller 30 is provided with a central portion insulated from the frame and divided by insulating material on the zigzag or broken line 30^c into two parts 30^a and 30^b, which alternately engage conductors 8 as the roller rotates. By means of this peculiar division between these parts 30^a and 30^b it will be observed that the outer portion of each is circular in cross-section, while the inner portion is semicircular. Suitably supported by frame 39^b, but insulated therefrom, are two metal contacts or brushes 33 and 33^a, which engage the outer or circular portions of 30^b and 30^a, respectively, and are also respectively connected with the wires 18 and 19, leading from the electrical source. It will thus be seen that conductor 8 is alternately electrically connected with the positive and negative poles of the battery. Frame 39^a on the opposite side of the rail is provided with contacts 34 34, each connected with wire 21 and a part of 31, thus establishing a connection between the switch 50 and each conductor 12. Rod 28 is provided at its top with a handle 35, while at its lower extremity is secured a short link 36. To the extremities of this link are pivotally secured the inner extremities of two spreading-arms 37 37, the outer extremities of these arms being pivotally connected with the springs 20.

It might be necessary to detach the attachments for engaging the conductors. In order to do this the frames 39 and their rollers must be detached from the rail, which is done by drawing rod 28 upward, which action spreads springs 20 through the medium of link 36 and arms 37 37. These parts spread the springs sufficiently to allow frames 39^a and 39^b and their attachments to pass over the top of the track-rail. The entire mechanism connected with springs 20 may then be removed from the track-rail by pulling the handle 35 farther upward.

From the foregoing description the operation of our improved system will be fully understood by reference to Fig. 7, in which A designates a station along the line of the road, and B, C, and D engines or trains upon the same track. The wires leading from the roller 39^a are connected with each other to form one wire 21, which runs up to the engine or any other suitable part of the train where can be placed the above-mentioned electrical source 55, a suitable electric alarm 16, a suitable switch 50, and a telephone 17. The wire 21 goes to the switch 50. From the switch goes a wire to the electric alarm 16, then from here a wire back to the switch, and from the switch the wire 22 goes to the negative pole of the electric source 55. The wires 18 and 19, running, respectively, from the two parts 30^b and 30^a of the roller 30, run also up to the same place where the electrical source is placed, and one of these wires 18 is connected with the positive, the other 19 with the negative, pole of the electrical source. It will be observed that the negative pole has two wires—one 19 to a part 30^a of the roller 30, the other 22 to the switch 50—while the positive pole has only one wire 18, going to the other part 30^b of the roller 30.

It will be observed that two trains cannot approach nearer each other than the engines B and C without the engineer on each train being warned of the approach of the other train. In other words, a signal is automatically given on each train, warning the engineer of the approach of the other train as soon as only one interruption 15 of the interrupted conductors 12 is between the two trains, for as the roller 30 revolves parts 30^a and 30^b will be alternately in contact with the conductor 8 in both trains. If 30^b is in contact with the conductor 8 in train B and 30^b is also in contact with conductor 8 in train C, there will be no current, but a moment

afterward 30^a—in B, for instance—will be in contact with the conductor 8 and 30^b in train C and there will be a current. The result will be that when two trains run on the same track there will establish itself an interrupted current between the two trains as soon as they approach each other at the above-mentioned distance. This will happen because it will be in fact impossible that the parts 30^a and 30^b of the two trains should revolve exactly with equal speed and exactly in the same way, so that part 30^a of the roller of one train would constantly correspond with the part 30^a of the roller of the other train.

It is a matter of course that the switches 50 on the trains are turned so that the electric alarm 16 is in the circuit. As soon as the alarms sound and the trains consequently stop, the handle of the switch 50 is turned to the other side. Instead of the alarm the telephone is now in the circuit and the engineers of both trains can communicate with each other. Instead of a telephone any other suitable electrical signal apparatus by which both engineers can communicate can be used.

A station or any other desirable place along the road is provided with the same mechanism as the one located on the train; but in addition to this there is an extra switch. (Indicated in A, Fig. 7, by 40.) The conductors 12 12 have both an interruption at the station. From one end of both these conductors the combined wire 41 goes to the part 40^a of switch 40. From the other end the combined wire 42 goes to part 40^b of the switch 40. From the switch 40 the wire 19 goes to the switch 50, and wire 18 runs from the continuous conductor to the electrical source. Except this the whole mechanism is the same as the one on the train. If the station-agent in station A wants to warn a train coming from one or the other direction, he has only to put the handle of switch 40 accordingly. If he connects the handle with 40^a, a train coming from that direction will be warned as soon as there is only one interruption 15 between the station and the train. The alarms in the station and train will sound automatically and at the same time, and by turning switch 50 the station-agent and the engineer can have telephonic communication. In case the station-agent does not want to warn any train he has to put the handle of switch 40 on 40^c and 40^d and the handle of switch 50 in such a way that the switch is open, by which action the interruption 15 of the interrupted conductors at the station is practically taken away.

Let 80 designate the metal clasp illustrated in Fig. 8. This device is for use in case of an accident or wreck on the road, and is placed, as shown in Fig. 9, so as to engage the conductors 12 12 and 8 on opposite sides of the rail, so as to make connection between them upon the approach of a single train, and thus warn the engineer.

It will be observed that by the use of our improved system of electrical signaling collisions between approaching or nearing trains are impossible.

Our three conductors may be connected with a special wooden or metal rail located somewhere between the two track-rails. In this event the spring mechanism for the roller-contacts may occupy a corresponding position upon the train.

It may be well to state that instead of attaching the three conductors to one of the track-rails, as shown and described, the two interrupted conductors may be secured in the manner shown to the inside of one of the track-rails, while the continuous conductor may at the same time be secured to the inside of the other track-rail; or the interrupted conductors may be secured to the outside of one of the track-rails, while the continuous conductor is secured to the outside of the other track-rail. This arrangement would only slightly change the attachment for supporting the contacts engaging the conductors. Instead of one such attachment, two would have to be used, one provided with one roller and the other provided with the other roller.

Having thus described our invention, what we claim is—

1. A signaling system for use on railroads, said system consisting of two interrupted conductors and one continuous conductor secured to the track and insulated from the ground, a battery or other source of electricity located on the train, one pole of the battery being electrically conneected with both interrupted conductors and both poles with the continuous conductor, a rotary contact secured to the train and engaging the continuous conductor, said contact being divided into two parts insulated from each other, the line of division between these parts being such that the parts are alternately in contact with the conductor as the contact rotates, the poles of the battery being respectively and continuously in connection with said parts, whereby an interrupted current is established between trains upon the same track, and alarm mechanism located within the circuit, substantially as described.

2. In a signaling system for use on railroads, the combination, with a battery or other source of electricity located on the train, of two interrupted conductors secured to the web of the track-rail or other suitable support, said conductors being insulated from each other, a shield connected with the support for the conductors, lying between the same and projecting over the lower conductor, said conductors being both connected with one pole of the battery, a continuous conductor secured to the rail or other support and connected with both poles of the battery, a rotating contact engaging said conductor and divided into two parts insulated from each other, the division between these parts being such that the circuit-wires are continuously and respectively in contact with said

parts while the conductor is alternately connected therewith, the three conductors being insulated from the track-rails and also from the ground, whereby a complete metallic circuit is provided and an interrupted current established between approaching or nearing trains, and alarm mechanism lying in the circuit, substantially as and for the purpose set forth.

3. In a signaling system for railroads, the combination, with a source of electricity located at stations along the track and also upon the trains, of three conductors, two interrupted and one continuous, all insulated from the track-rails, from the ground, and from one another, both interrupted conductors being connected with the same pole of the battery on the trains and the continuous conductor alternately connected with both poles through the medium of a rotating contact, the battery at the station having one pole connected with the interrupted conductors and the other pole with the continuous conductor, alarm mechanism, and a telephone on the trains and at the station, and a suitable switch whereby the alarm mechanism and the telephone are alternately placed in the circuit both at the station and on the trains, substantially as described.

4. In a railroad signaling system, the combination, with a source of electricity located on a train, of two interrupted conductors secured to a suitable support and insulated from the ground and from each other, said conductors being both connected with one and the same pole of the electric source, a continuous conductor secured to a support in proximity to the interrupted conductors, but insulated therefrom and from the ground, a rotating contact engaging the continuous conductor and divided into two parts insulated from each other, said parts being alternately in contact with the conductor and continuously and respectively in electrical connection with the poles of the electric source, and a metallic connection between the interrupted and continuous conductors, adapted to complete the circuit by short-circuiting the current at any point along the track and sound the alarm upon one train without the interposition of another train, as set forth.

5. In a signaling system for use on railroads, the combination, with two interrupted conductors secured to one side of a track-rail or other suitable support, of a continuous conductor secured to the opposite side of said support, the three conductors being insulated from the track, from the ground, and from one another, depending springs attached to a movable support located upon the train, metal contacts secured to the lower extremities of the springs and insulated therefrom, one of said contacts consisting of two parts insulated from each other, each part being continuously in contact with one of the interrupted conductors, the other contact being divided into two parts insulated from each other and alternately in contact with the continuous conductor, a battery or other source of electricity located on the train, wires leading from one pole of the battery to each contact engaging the interrupted conductors, and two wires, one from each pole of the battery, leading, respectively, to the two parts of the divided contact engaging the continuous conductor, and an alarm mechanism located on the train and lying within the circuit, substantially as and for the purpose set forth.

6. In an electrical signaling system for use on railways, the combination, with a source of electricity and alarm mechanism located on each train, of three conductors secured to the rail and insulated therefrom, one of said conductors being secured to one side of the web of the rail and being continuous throughout its entire length and the other two being secured in pairs in the same vertical plane to the other side of the rail and provided with interruptions, the interruptions in the two conductors being so located that those of one conductor shall be midway between those of the other conductor, the continuous conductor being connected with one terminal of the battery and the interrupted conductors being each connected with the other terminal by means of a trolley depending from the car, consisting of two spring-pressed roller-contacts embracing the web of the rail and bearing on the conductors, the roller co-operating with the single conductor having a single conducting-roller and the roller co-operating with the pair of conductors having two separate conducting-rollers for engaging each conductor separately, all organized and operating substantially as described.

7. In a trolley, the combination of slotted supports depending from the car, a block mounted therein and adapted for vertical oscillation, having rollers for bearing on the rail, and a pair of springs mounted one on each side of the block and embracing the rail when in operative position, each carrying a roller for contacting with conductors laid along the web of the rail, substantially as described.

8. In a track conductor, a longitudinally-mortised insulating-molding extending along the web of a rail and secured thereto, said molding being wider at the bottom of its cutting than at the top and having a conductor laid therein of approximately T-shaped cross-section, and a filling of insulating material into the space between the conductor and the walls of the mortise.

In testimony whereof we affix our signatures in presence of two witnesses.

SIMON DE JAGER.
ALBERTUS ZOUTMAN.

Witnesses:
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