(No Model.) 2 Sheets—Sheet 1.

J. IRWIN.

ELECTRIC RAILWAY SIGNAL SYSTEM.

No. 555,167. Patented Feb. 25, 1896.

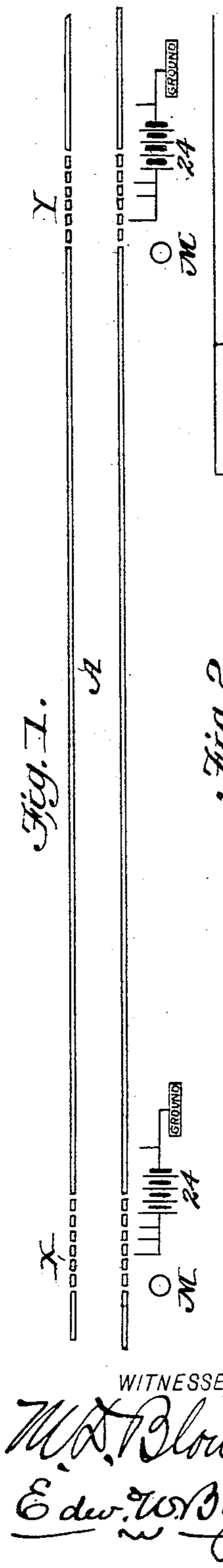

Fig. 1.

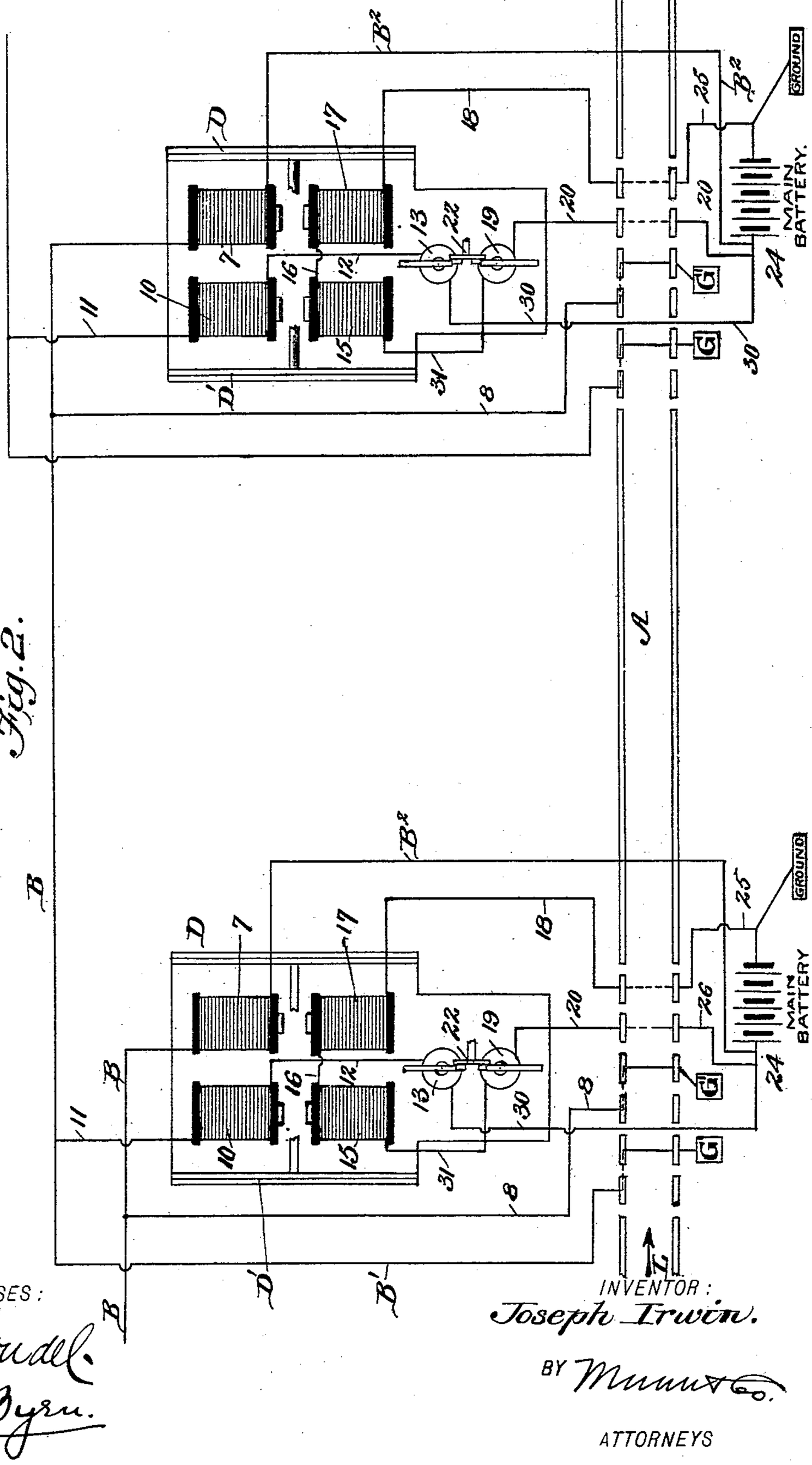

Fig. 2.

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Fig. 3

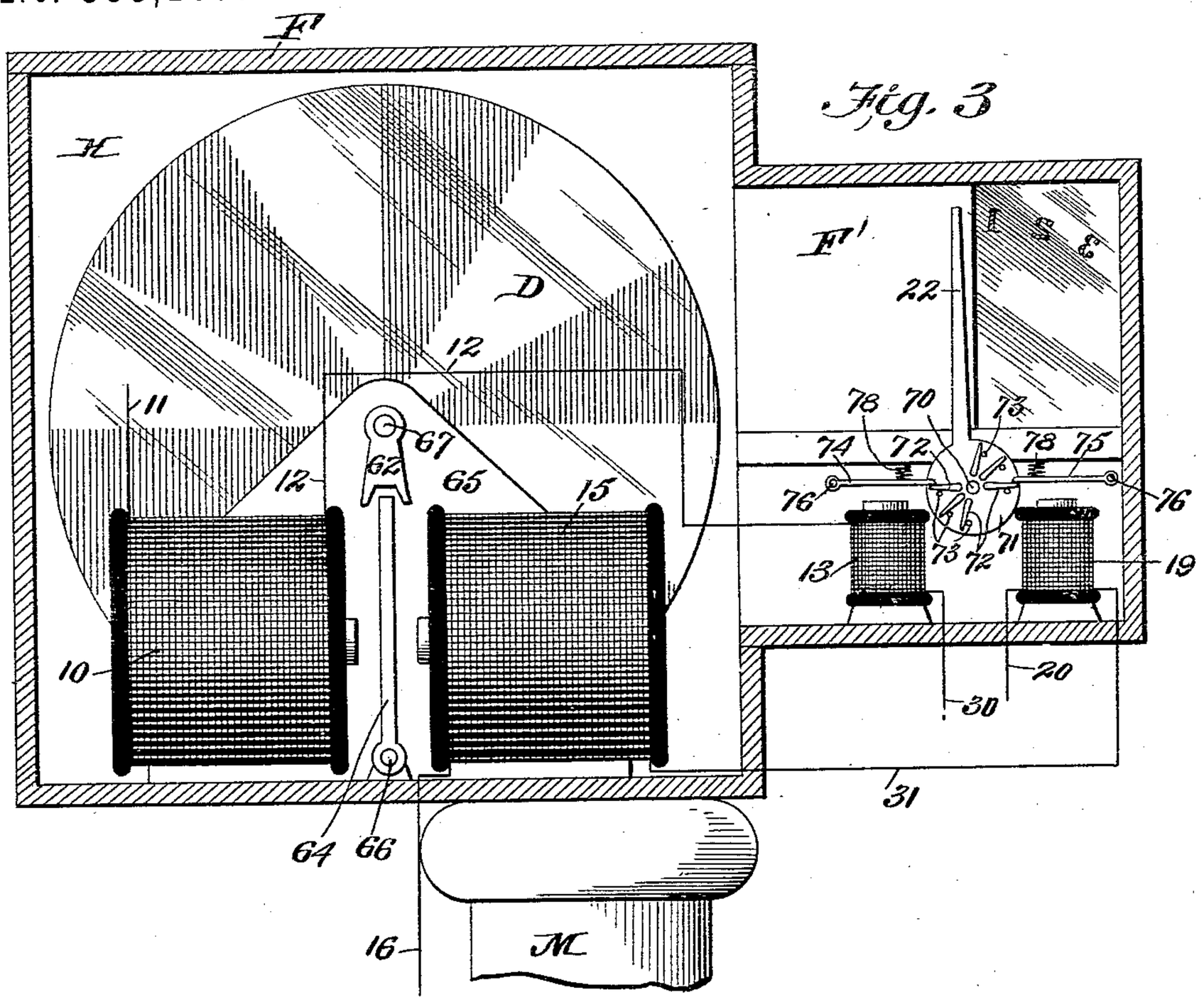


Fig. 5

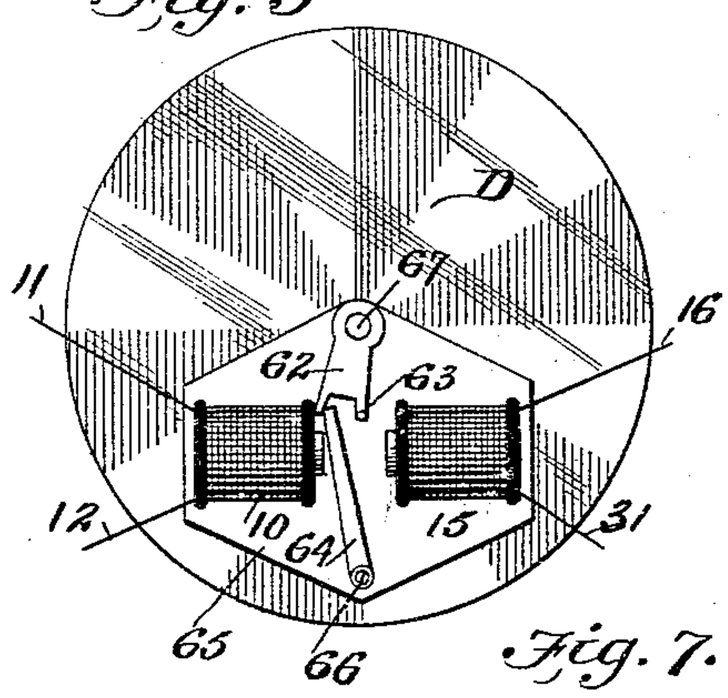


Fig. 6.

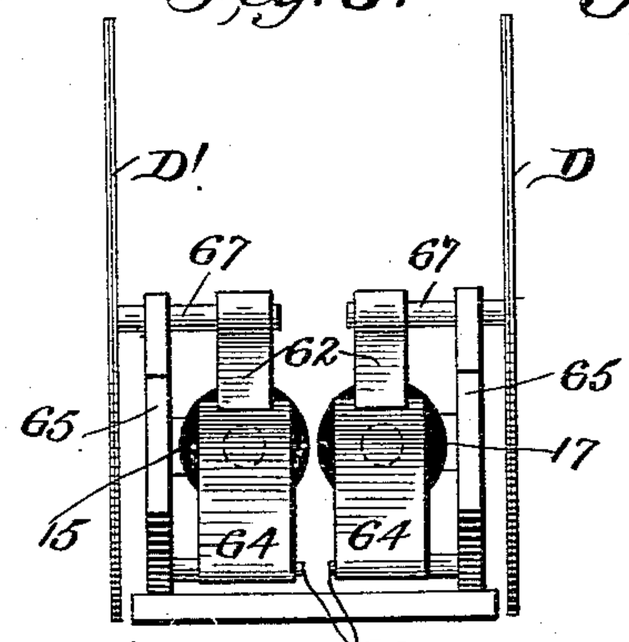


Fig. 4.

Fig. 7.

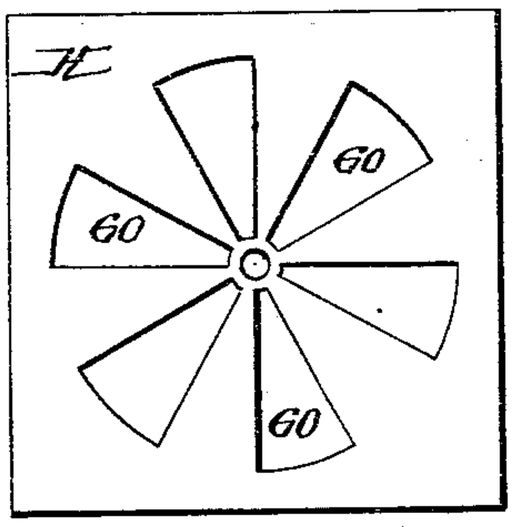
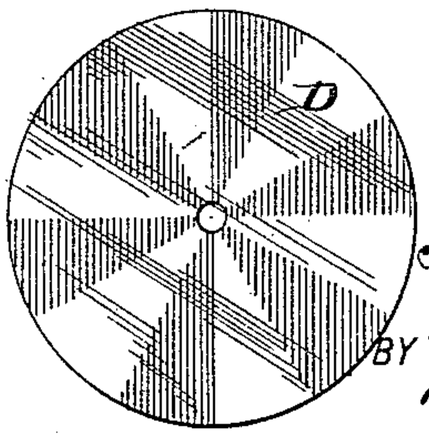


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOSEPH IRWIN, OF OMAHA, NEBRASKA.

ELECTRIC RAILWAY-SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 555,167, dated February 25, 1896.

Application filed February 18, 1895. Serial No. 538,890. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH IRWIN, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain useful Improvements in Electric Railway-Signal Systems; and I do hereby declare that the following is 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, which form a part of this specification.

This invention has relation to a novel improvement in electric railway-signal systems, the object of the invention being to provide a sectional signal system that shall enable any engineer having a train upon one of said sections to instantly determine when a train enters his section.

In the accompanying drawings, forming part of my invention, Figure 1 shows two stations on a railroad-track, the track at each station being divided into a number of sub-sections and each station being equipped with my improved signal system. Fig. 2 shows a diagram view in which the various electric connections between two stations are disclosed. Fig. 3 is an enlarged side view, partly in section, showing the arrangement of my disk signal in conjunction with an indicator, the latter being adapted to disclose the number of trains within the connected sections. Fig. 4 shows a detached detail of one of the swinging arms used in operating my disk signal. Fig. 5 shows in side view the arrangement of a set of magnets controlling one of said disk signals. Fig. 6 is an end view showing the position of two sets of disk signals and their operating-magnets. Fig. 7 shows a side view of one of the perforated face-plates of the casing, and Fig. 8 shows a face view of one of the signal-disks.

Before undertaking to describe my circuits I will first describe the mechanical construction of the signals, referring more especially to Figs. 3, 4, 5, 6, 7, and 8.

In Fig. 3 I have shown an ordinary housing F, which is provided with the auxiliary housing F′, all mounted upon a mast or pole M. Upon two sides, so as to be seen from the track going and coming, the face H of this housing F is provided with the openings 60, as is shown in Fig. 7, and behind these faces H is positioned a disk D, (shown in detail in Fig. 8,) which disk is divided into red and white segments which are adapted to be alternately brought to the rear of the openings 60 in giving the different signals. The disks D, Fig. 6, are rigidly attached to short rock-shafts 67, having on their inner ends swinging notched arms 62. Normally each disk D is held in a closed or locked position by means of arm 62, (see Fig. 5,) the notch 63 of which is adapted to receive an armature-bar 64, which is pivoted to the frame-plate 65 by means of a pin 66. One of the magnets—as 15, for instance—will act in drawing this bar to actuate the disk to display the safety-signal, while an electromagnet 10, for instance, will be arranged to actuate this bar 64 to disclose the danger-signal of this disk. As these disks are used in pairs, two sets of magnets are necessary, being arranged as is shown in Fig. 6.

The indicator within the housing F′ comprises two magnets 13 and 19 in proper electric connection with the magnets 10 and 15, as will be shown in another view. Each magnet 13 and 19 is adapted to actuate one of two armature-bars 74 and 75, which bars are preferably above the magnets and are held by springs 78. Mounted between the two magnets 13 and 19 is a shaft 70, supporting a disk 71, from which extends an indicator-hand 22, as is shown in Fig. 3. This disk 70 is provided with a series of loosely-pivoted latches 72, which are each made to rest upon a pin 73. Each of the armature-bars 74 and 75 is adapted to actuate an equal number of these latches, which are so arranged that as bar 75 (referring to Fig. 3) would be drawn down by the magnet 19 the latch below said bar would rest upon its pin, so that the disk and indicator-hand 22 would be carried forward to register with the numeral 1. The second latch in the meantime would have been encountered by this bar 75, but the bar would easily have ridden over this latch, by virtue of its being pivoted, until the latch had escaped the bar 75 and fallen upon its stop-pin, as shown. This is intended to indicate that one train is upon the rail-section connected. Now as soon as the train leaves that section the magnet 13 is actuated pre-

cisely as was magnet 19, so that the bar 74 carries back indicator-hand 22 just as it had been carried forward by the other magnet and bar. If, however, a second train enters the section before the first is off, magnet 19 is again actuated and the index-hand moves progressively to figure 2, showing two trains on that section.

I will now proceed to describe the arrangement of the track, referring especially to Fig. 1.

X and Y represent two stations, which may be any distance apart sufficient to give either train space enough to stop in. At each station the rails A are broken up into a series of six short insulated lengths—say of thirty feet length each. These short lengths are shown at 1, 2, 3, 4, 5, and 6 at each station, and they co-operate with the passing trains and the main batteries 24, of which there is one at each station. At each station there is a mast or pole M, (see Figs. 2 and 3,) upon which are mounted the signal devices, and from which there extend the necessary number of circuit-wires to each battery 24, the ground connections and track-sections, and the line B, which extends from station to station.

Referring now to Fig. 2, which shows a diagram of the circuits formed between two stations and their connection with the line, the signaling devices, the batteries, and the track-sections, I would state that all of the short track-sections 1 2 3 4 5 6 at each station are insulated from each other and the main rails, but the section 2 has a ground connection G and the section 4 has a ground connection G′. When a train at L passes in the direction of the arrow, the locomotive bridges longitudinally the sections 1 and 2, connecting them electrically to produce one result, hereinafter described. As it passes over 2 to 3 it has no effect, but when it bridges 3 and 4 longitudinally it produces another result, hereinafter described. From 4 to 5 no effect is produced, but from 5 to 6 the sections of rails are bridged, not longitudinally as before, but transversely by the axles of the cars to produce still another result, all of which results will be hereinafter separately described.

The bridging of sections 1 and 2 on the left hand is intended to set the danger-signal at the next station in front. (Shown on the right hand of Fig. 2.) This is accomplished as follows: Starting with the ground connection G on the left the current passes to section 2, to section 1, wire B′, to line-wire B, to the next station in advance, thence to magnet 7 of the signal-instrument, (turning the signal-disk D to "danger,") thence to wire B^2 to the actuating-battery 24 of that station, to ground, and back to the starting-point at the station on the left.

When the locomotive bridges rail-sections 3 and 4 of a station its effect is to expose the safety-signal of the station behind and restore the index-hand 22 of the indicator at that station to zero to show that the section of track between the stations is clear and that one train has passed out. If there were more than one train on that section of track the indicator-hand would not be restored to zero, but would only pass from 2 to 1 on the indicator, still showing the presence of the other train, as will be readily understood from Fig. 3. To show how this result is accomplished as the circuits travel backward it will be best to start reading them from the right-hand station. Thus as the locomotive bridges track-sections 3 and 4 the current flows from ground G′ (on the right) to section 4, to section 3, to wire 8, to line B, to the station in the rear, thence down wire 11 to electromagnet 10, (setting the signal-disk D′ to "safety,") thence passes by wire 12 to indicator-magnet 13, (setting indicator-hand 22 to zero or backward,) from magnet 13 by wire 30 to actuating-battery 24, and through this battery to ground, and then forward (to the station where the circuit was closed) to ground terminal G′, which was the starting-point.

When the train passes rail-sections 5 and 6 these are not connected or bridged longitudinally like the other sections, but they are bridged transversely—that is to say, the two rails of the section 5 are connected and the two rails of the section 6 are connected. The effect of this is local to that station and it serves to set the rear-facing signal D′ to "danger," to advance the indicator-hand 22 to indicate the presence of a train over the section of track in front and to set the forward-facing signal D of this station to "safety" as the train passes. When the car-axle connects transversely one rail 5 with the other rail 5 and one rail 6 with the other rail 6, the current from battery 24 flows to wire 26, to one rail 5, through car-axle to the other rail 5, wire 20, magnet 19, (setting index-hand 22 to indicate one train,) thence through wire 31 to magnet 15, (setting the rear-facing signal D′ to "danger,") thence through wire 16 and magnet 17, (setting the front-facing signal D to "safety,") thence by wire 18 to rail of section 6 through the car-axle (of another car) to other rail of section 6, thence by wire 25 to the other pole of the actuating-battery 24.

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

1. An electric railroad-signal consisting of two rotary disks, a set of magnets for rotating these disks in one direction, another set of magnets for rotating them in the other direction, an indicator-hand with a progressive or step-by-step motion, magnets for operating it in opposite directions and a battery with circuit-wires connected to said magnets substantially as shown and described.

2. An electric railroad-signal consisting of two rotary disks D D′ mounted upon separate rock-shafts which have on their inner ends crank-arms with notched ends, armatures playing in the notched ends of said arms, two

magnets for each disk arranged upon opposite sides of the said armatures, a casing F having an indicator extension F′, magnets 13 and 19 arranged in said indicator extension, a disk with a step-by-step latch mechanism arranged between said magnets, armatures with springs, arranged to be attracted by said magnets and to act upon the latch mechanism of the disk to move the indicator-hand back or forth substantially as and for the purpose described.

3. An electric railroad-signal system, comprising a track having its rails at each station divided into six insulated sections 1, 2, 3, 4, 5, 6 of which 2 and 4 are grounded, a visual signal comprising two signal-disks and four magnets operating them, a single circuit-wire between the stations, and a single battery at each station connected to the rail-sections, the magnets, the line, and the ground, substantially as shown and described.

4. An electric railroad-signal system, comprising a track having its rails at each station divided into six insulated sections 1, 2, 3, 4, 5, 6 of which 2 and 4 are grounded, a visual signal comprising two signal-disks and four magnets operating them, and also an indicator-hand for indicating the number of trains on each section, magnets for operating the indicator-hand in either direction, and an intermediate step-by-step actuating mechanism for said indicator-hand, a single circuit-wire between the stations, and a single battery at each station connected to the rail-sections, the magnets, the line, and the ground, substantially as shown and described.

5. In an electric railroad system, a track having its rails at each station divided into six insulated sections forming three pairs, two of the pairs having one of their members grounded and arranged to be connected by longitudinal bridging, and the third pair being arranged to be connected or bridged transversely; in combination with a signal device as described, the line-wire, and a battery connected to the same so as to form three separate circuits, one of which sets the danger-signal at the station in front, the other obliterates the danger-signal at the station in the rear, and the third sets the rearwardly-facing danger-signals of the intermediate station, and obliterates the front-facing danger-signal of that intermediate station substantially as shown and described.

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

JOSEPH IRWIN.

Witnesses:

H. C. PICULELL,

ALBERT SWARTZLANDER.