(No Model.) 3 Sheets—Sheet 1.

J. IRWIN.

ELECTRIC RAILWAY SIGNALING SYSTEM.

No. 389,226. Patented Sept. 11, 1888.

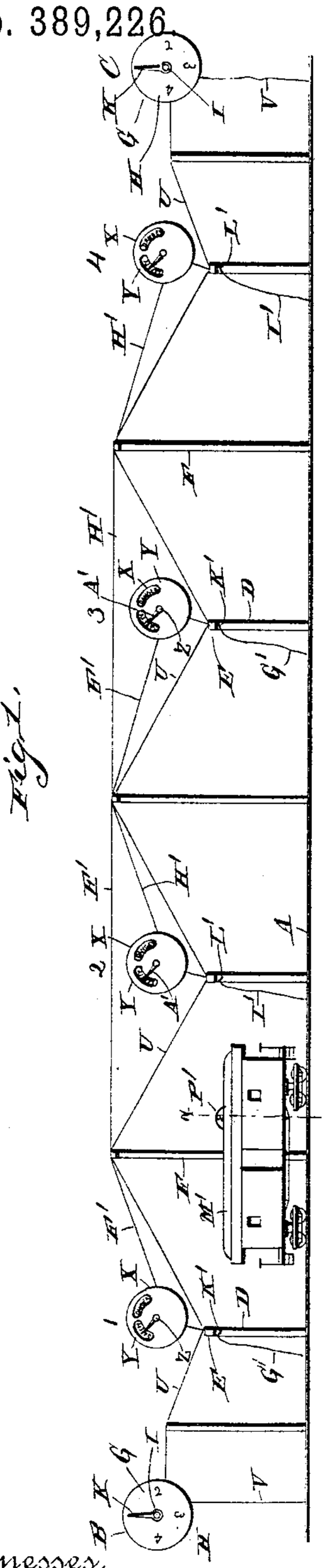

Fig. 1.

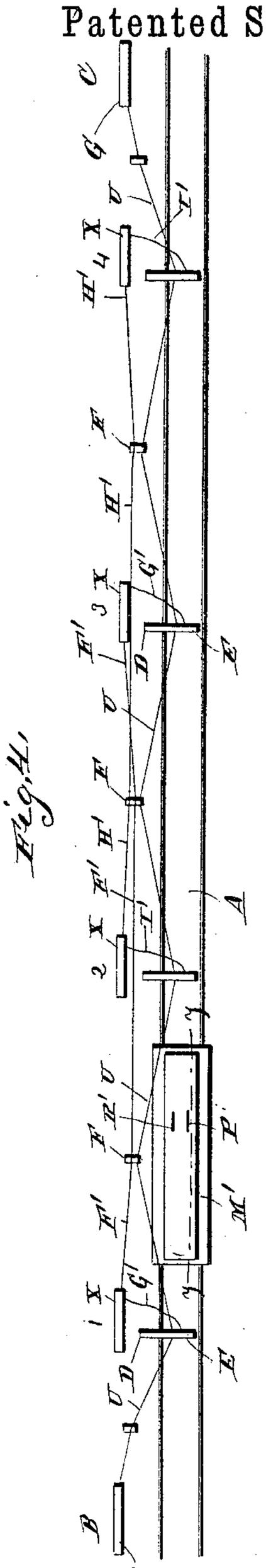

Fig. 4.

Witnesses.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

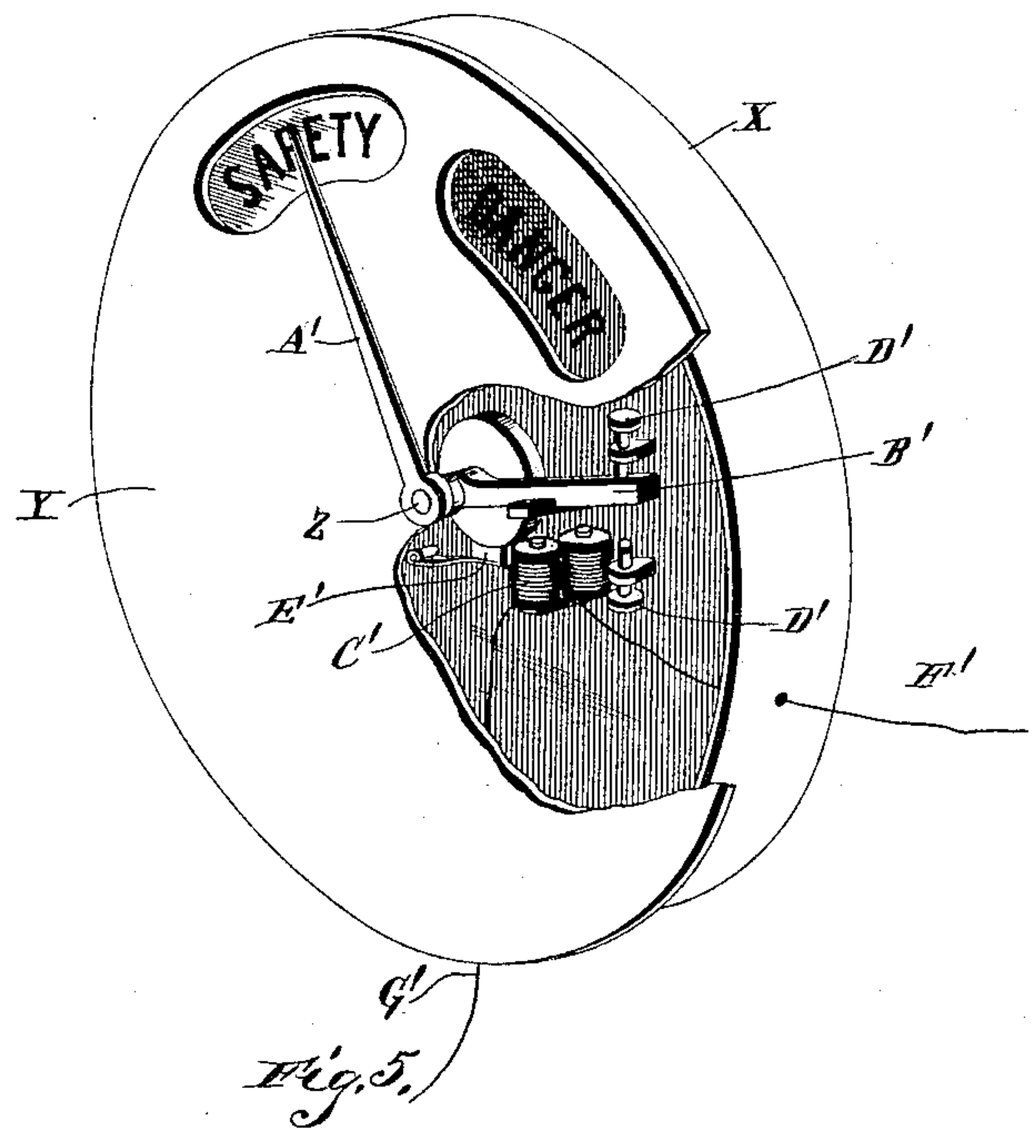
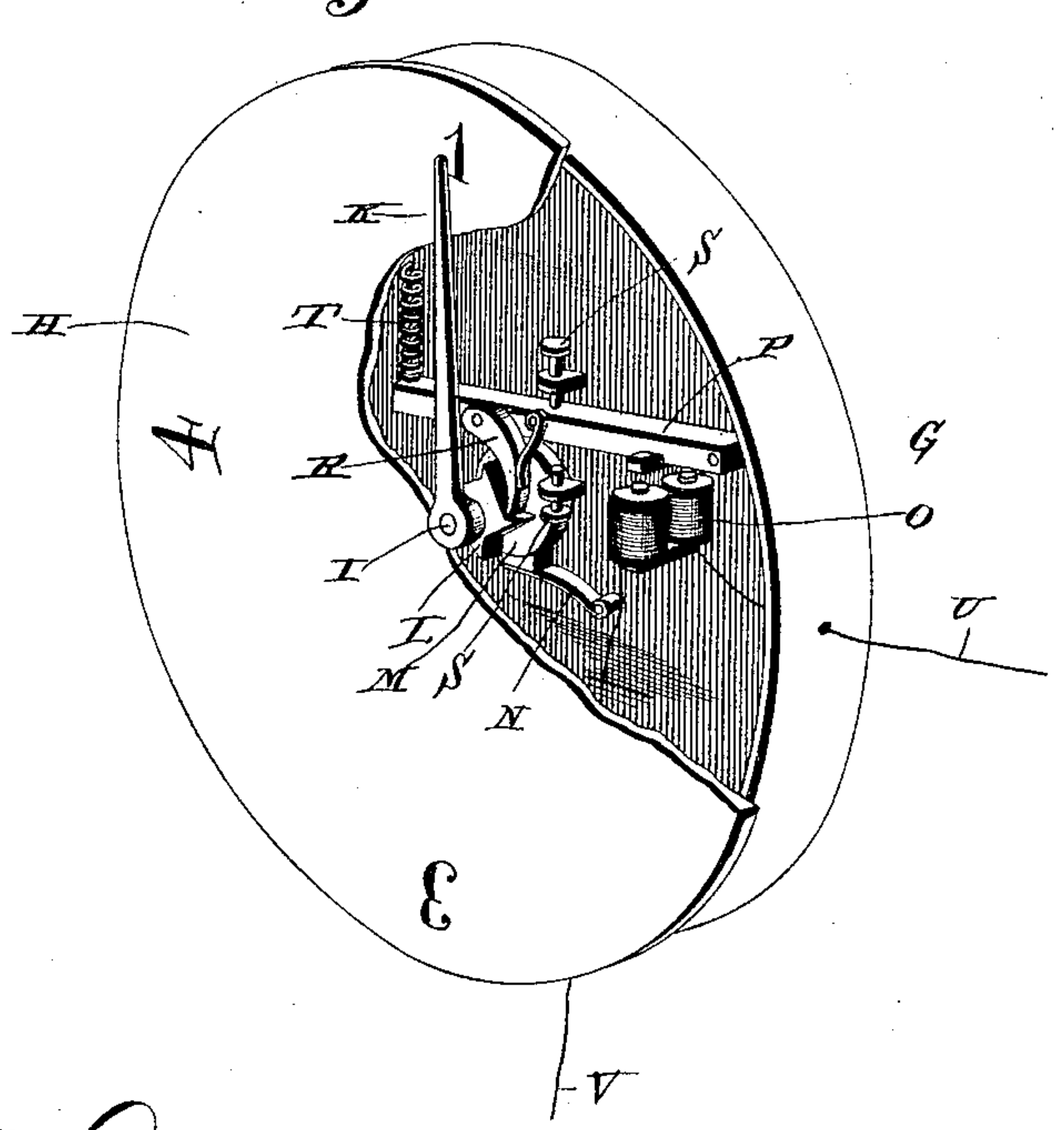


Fig. 5.



Witnesses.
C. L. Taylor,
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(No Model:)

3 Sheets—Sheet 3.

J. IRWIN.

ELECTRIC RAILWAY SIGNALING SYSTEM.

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Fig. 3.

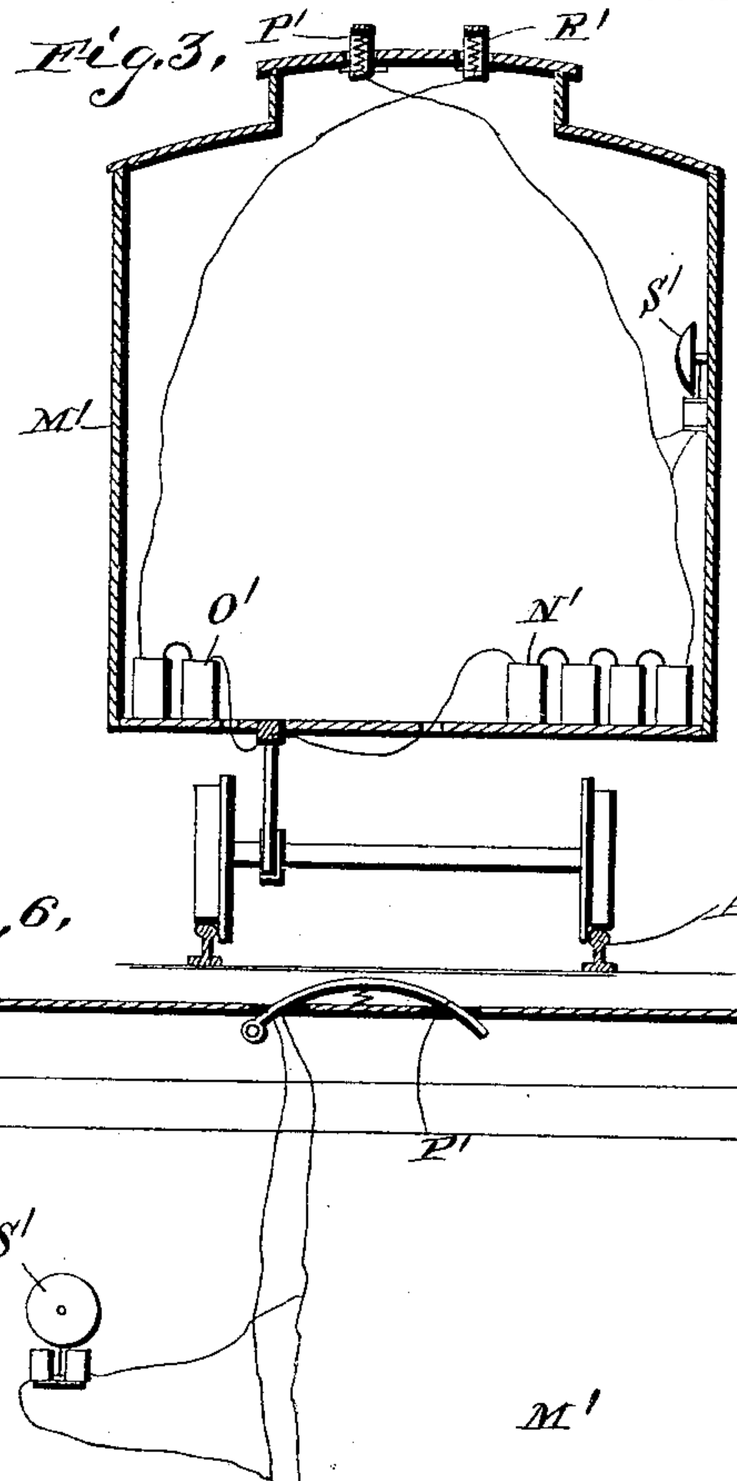


Fig. 6.

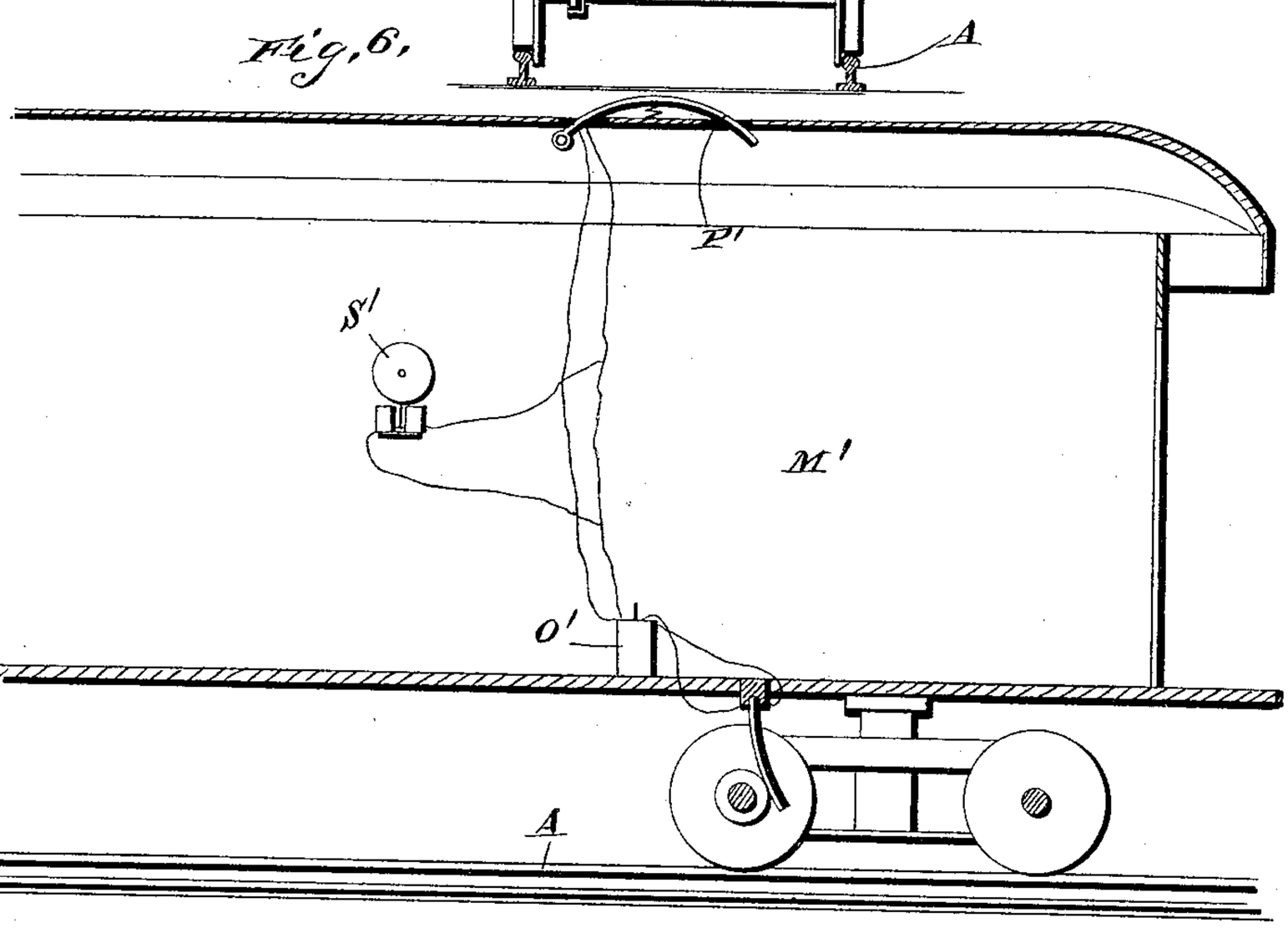
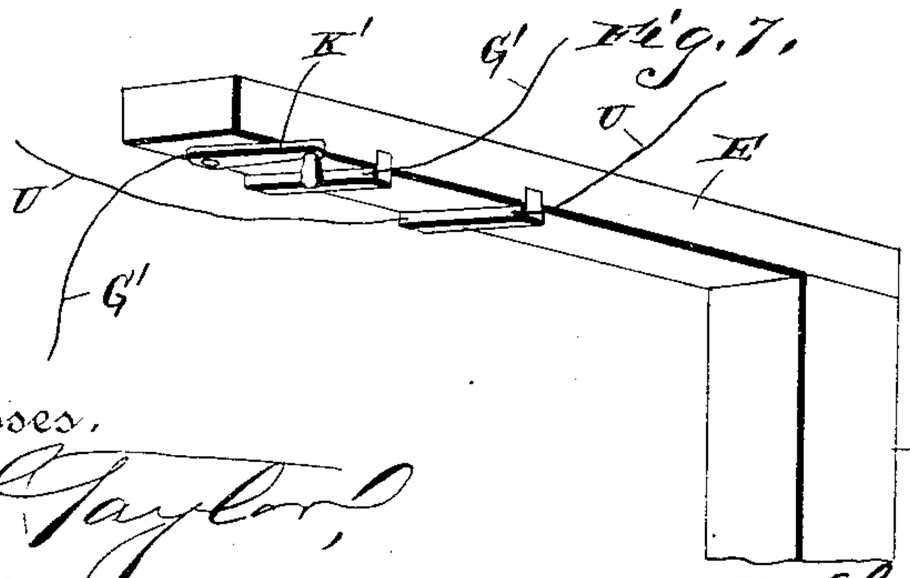


Fig. 7.



Witnesses.

C. L. Taylor,

J. V. Garner.

Inventor.

Joseph Irwin.

By his Attorneys.

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

JOSEPH IRWIN, OF TOPEKA, KANSAS.

ELECTRIC RAILWAY SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 389,226, dated September 11, 1888.

Application filed November 26, 1887. Serial No. 256,254. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH IRWIN, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented a new and useful Improvement in Electric Railway Signaling Systems, of which the following is a specification.

My invention relates to an improvement in electric railroad signaling systems; and it consists in the peculiar construction and combination of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

The object of my invention is to provide an electric apparatus whereby a moving train will transmit signals back to the starting-station as it reaches each intermediate station, to indicate its position on the road, and whereby the train will also transmit signals ahead of it from station to station as it advances, and thereby prevent collisions.

In the accompanying drawings, Figure 1 is a diagram of an electric railroad signaling system embodying my improvements. Fig. 2 is a detailed perspective view of one of the intermediate-station indicators. Fig. 3 is a vertical transverse sectional view taken on the line *x x* of Fig. 1. Fig. 4 is a top plan view. Fig. 5 is a detailed perspective view of one of the terminal-station indicators. Fig. 6 is a longitudinal section of the car. Fig. 7 is a detail view of the post D, showing the switch K.

A represents a railroad-track.

B C represent the terminal stations at opposite ends of the track, and 1 2 3 4 represent intermediate stations at suitable regular distances apart along the railway. Near each intermediate station is a vertical post, D, having a horizontal arm, E, at its upper end, which extends over the track at a suitable height therefrom. Between the posts D are wire-supporting poles, F, which are similar to the ordinary telegraph-poles.

At each terminal station is an indicator, G, the construction of which is as follows:

H represents an indicating disk or dial, which has numbers from one up on its face, according to the number of intermediate stations on the track. In the present instance, there being four of such intermediate stations, there are four numbers on the face of the dial.

I represents an arbor or shaft, which is journaled in bearings in the center of the dial, and is provided with an indicating hand or pointer, K, that is adapted to sweep over the dial. To the said shaft is also attached a ratchet-wheel, L, having as many teeth as there are numbers on the dial. Formed with the said ratchet-wheel (or formed separately therefrom and secured to the shaft, as may be preferred) is a friction-disk, M.

N represents a retarding or brake spring, which bears against the disk and is adapted to prevent the shaft from turning idly in its bearings.

O represents an electro-magnet, which is adapted to attract an armature, P, that is provided near its free end with a spring-actuated pawl, R, which engages the ratchet-wheel. The movement of the armature is regulated by adjusting stop-screws S so that when the armature is attracted by the magnet the pawl, by being in engagement with one tooth of the ratchet-wheel, will turn the latter, and consequently the shaft, and the hand or pointer a distance equal to the space between two of the numbers on the disk.

T represents a retracting-spring with which the armature is provided, and the office of which is to return the armature to its initial position when the magnet is demagnetized.

U represents the main-line wire, which extends from one terminal station to the other. The ends of the said wire are connected to the coils of the electro-magnets O, and from the other ends of the said coils extend ground-wires V, which have an earth-connection. The wire U is attached to the arms E of posts D at the intermediate stations.

At each intermediate station is an indicator, X, which is constructed as follows:

Y represents a disk having two points thereon at a suitable distance apart marked "Safety" and "Danger," respectively. At the center of the disk is a rock-shaft, Z, having a hand or pointer, A′, adapted to play between the safety and danger points on the disk. An armature, B′, is secured to the rock-shaft and projects therefrom, and is adapted to be attracted by an electro-magnet, C′.

D′ represents adjusting stop-screws, the function of which is to limit the movement of the

armature, and E′ represents a spring-brake, which presses against a friction-disk on the rock-shaft, and thereby prevents the rock-shaft from turning idly and moving the hand or pointer.

The electro-magnet at station 1 is connected to the electro-magnet at station 3 by a wire, F′, having ground-wires G′, and the electro-magnet at station 2 is connected to the electro-magnet at station 4 by a wire, H′, having ground-wires I′, each intermediate indicator being thereby connected in circuit with the indicator which is two stations in advance of it, or, in other words, the alternate intermediate indicators are connected in circuit together. Each indicator 1 and 3 has a switch, K′, adapted to short-circuit the wire F′ to the ground, and each indicator 2 and 4 has a similar switch, L′, adapted to short-circuit the wire H′ to the ground, and these local signal or intermediate wires, F′ and H′, are also attached to the arms E of posts D.

In one car, M′, of each train which runs over the road are located two batteries, N′ and O′, each of which has one of its poles connected to one of the axles of the car, and thereby connects it through the car-wheels and the track to the ground. In the roof of the car M′, on one side thereof, are two spring contact-plates, P′ and R′, which are connected to the remaining poles of the batteries N′ and O′, respectively, and are adapted to come in contact with the wires on the arms E as the car passes under them. Included in the wire which connects the pole of the battery N′ to its spring-plate P′ is the electro-magnet of an annunciator or electric gong, S′. The said gong is here shown arranged in the car; but the same should, preferably, be located in the engineer's cab on the locomotive.

In order to enable the indicators to be visible at night, I propose to make the disks or dials thereof transparent or semi-transparent and place lights behind the same, so as to illuminate the figures or signals thereon.

The operation of my invention is as follows: When a train running in the direction indicated by the arrow in Fig. 1 leaves the station B at one end of the line, the operators at the intermediate stations 1 2 move the switches at said stations so as to break the connections between the local signal-lines and the ground, and the operators at the stations 3 and 4 move their switches so as to make connection between their ends of the local signal-lines and the ground. The hand of the indicator at station B will point to 1, and the hands of the indicators at the intermediate stations will be turned and caused to point to "Safety." This arrangement of the switches and indicators is shown in Fig. 1. When the train reaches the first intermediate station, the plate P′ of battery N′ will come in contact with the wire U, and thereby connect the said wire to the ground, when a current of electricity will be caused to flow momentarily in short circuit through the wire U to the station B, influence the electro-magnet there, so as to cause it to attract the armature, and thereby turn the shaft of the indicator to make the hand or pointer point to 1 on the dial, and thereby indicate to the train-dispatcher that the train has reached station No. 1. At the same instant the plate R′ comes in contact with the local signal-wire F′ and connects the same to the earth, and causes a current from the battery O′ to flow momentarily through the wire F′, and thereby cause the electro-magnets in the indicators 1 and 3 to attract their armatures, and thereby move the hands in said indicators to the danger-point, thus sending the signal that the train is coming two blocks or stations ahead. The brake-springs hereinbefore described keep the hands pointing to "Danger," and prevent them from swinging idly therefrom. When the train reaches station 2, the plate R′ comes momentarily in contact with the wire H′, and the current from battery O′ charges the electro-magnets at stations 2 and 4, and thereby causes the hands of their indicators to move to "Danger," thereby again telegraphing two blocks or stations ahead of the train, as before. The plate P′ comes in contact with wire U as the train passes each station, thereby causing the hand of the indicator at station B to move from figure to figure on the dial, and consequently indicate, by pointing to its appropriate number, when the train passes each station, and consequently keeps the train-dispatcher acquainted with the position of the train at all times during the entire trip and enables him to keep a record of the same. As the train passes each intermediate station, the current from the battery O′, at the same instant that it moves the hands of the alternate indicators, also sounds the gong, thereby assuring the engineer that the switches are properly set and the signaling apparatus is in order; but in the event that the operator at one of the stations should neglect to set his switch properly, so as to disarrange the signaling apparatus, the local signal-circuit would not be completed when the train reached that station, and hence the gong would not be sounded, and the engineer would know at once that the signals were not in working order.

When the train is running from C to B, the switches will be set in the reverse positions from those hereinbefore described, and shown in Fig. 1, as will be readily understood. At a suitable interval of time after the train passes each station the operator stationed there will move back the hand of his indicator to its initial safety-point.

I do not desire to limit myself to the precise construction and arrangement of devices hereinbefore described, as it is evident that modifications may be made therein without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. In electric railway signaling systems, the

combination of the intermediate indicators connected together alternately in local circuit, the switches to open either end of each local circuit, and the moving car having the battery and devices to include the same momentarily with the indicator-circuits, for the purpose set forth, substantially as described.

2. In electric railway signaling systems, the combination of the line having the indicating device at the starting-station included in its circuit, the intermediate indicators connected together alternately in local open circuit, the switches to open either end of each local signal-circuit, and the moving car having the batteries and devices to include the same momentarily with the line and local circuits, and thereby operate each alternate pair of intermediate indicators in succession, and also operate the indicator at the starting-station as the car passes each intermediate indicator, substantially as described.

3. In electric railway signaling systems, the combination of the constantly-closed main line, the electric magnetically-operated indicators included in circuit therewith at the starting and terminal stations, the local signal-circuits having the intermediate electric magnetically-operated indicators, the ground or return wires, and the switches to open either end of each local circuit, and the moving car having the main and local batteries and devices to connect the poles thereof momentarily with the main and local lines, respectively, at intermediate stations, for the purpose set forth, substantially as described.

4. In electric railway-signals, the local signal circuits having the intermediate indicators, the return or ground wires, and the switches to open either end of each local signal-circuit, in combination with the moving car having the battery and devices to connect the same with the local signal-circuits successively, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOSEPH IRWIN.

Witnesses:

E. G. SIGGERS,

JOHN H. SIGGERS.