(No Model.)

3 Sheets—Sheet 1.

W. L. DOYLE.

RAILROAD SIGNAL.

No. 285,589. Patented Sept. 25, 1883.

Fig. 1

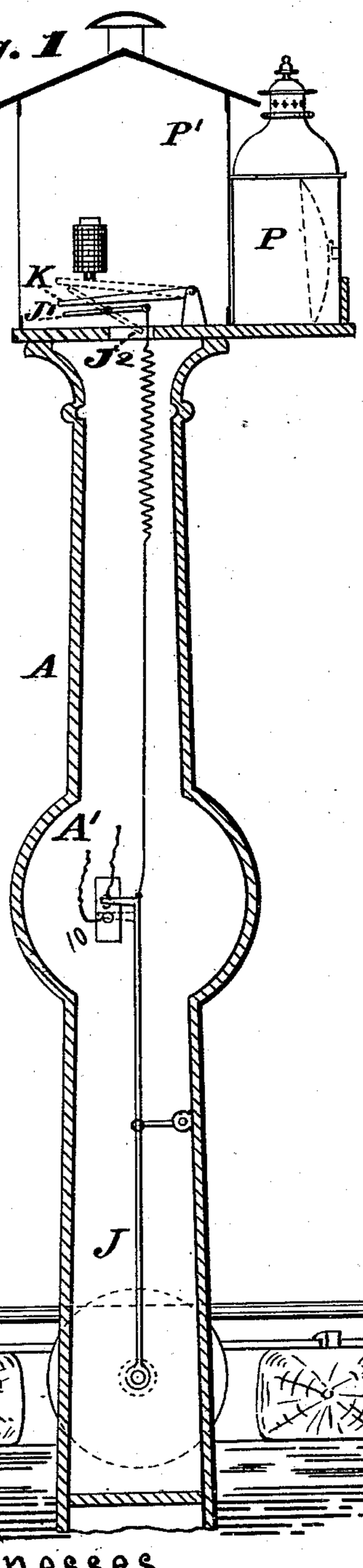


Fig. 2

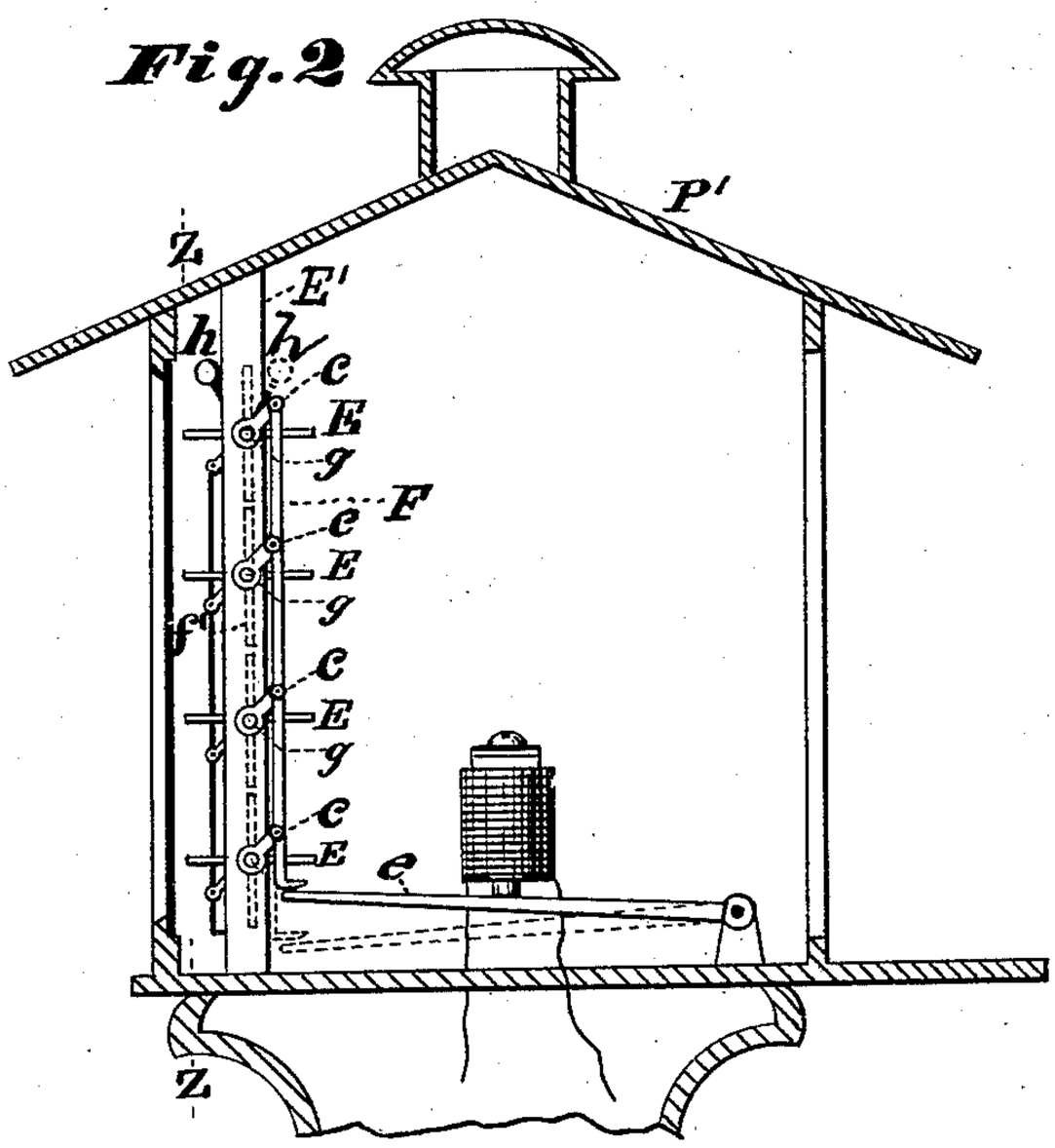
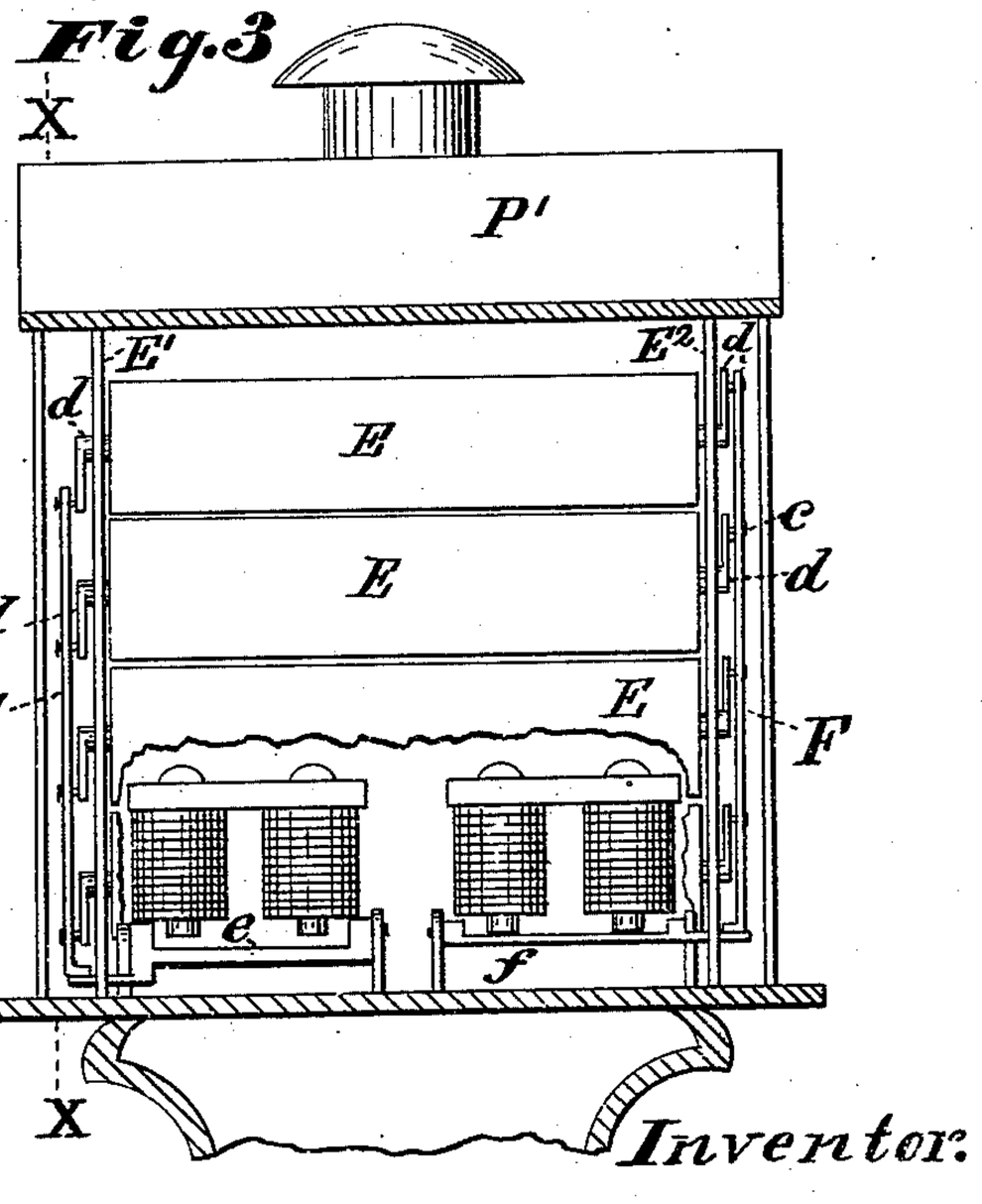


Fig. 3



Witnesses

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 4

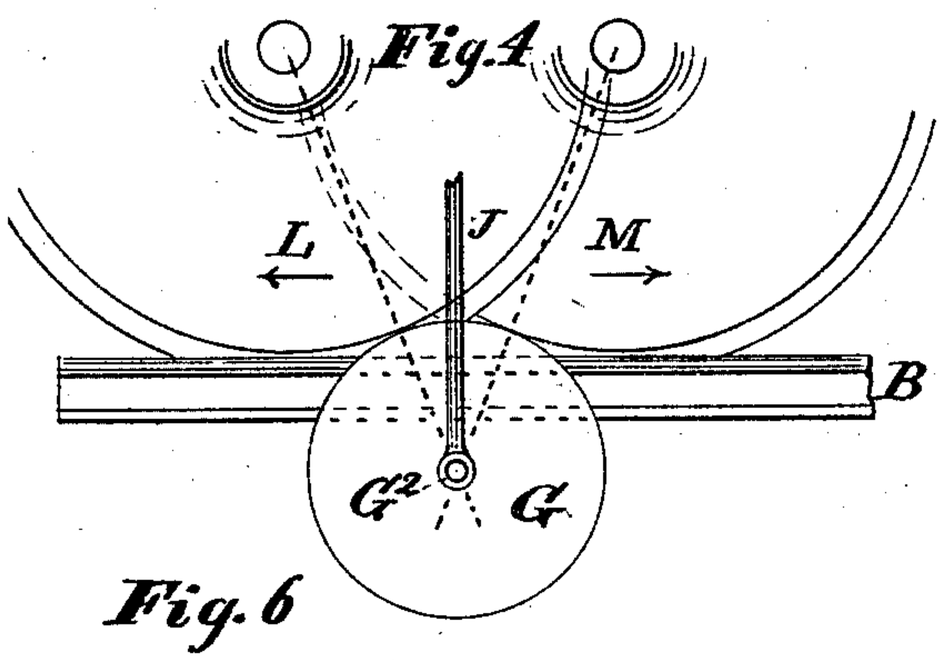

Fig. 6

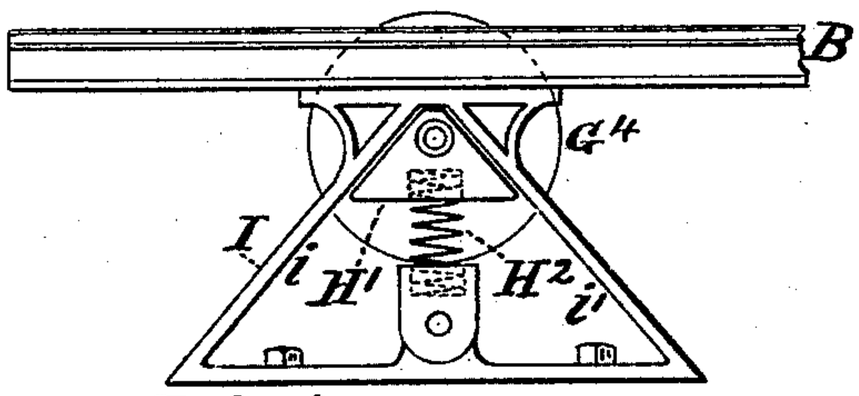

Fig. 7

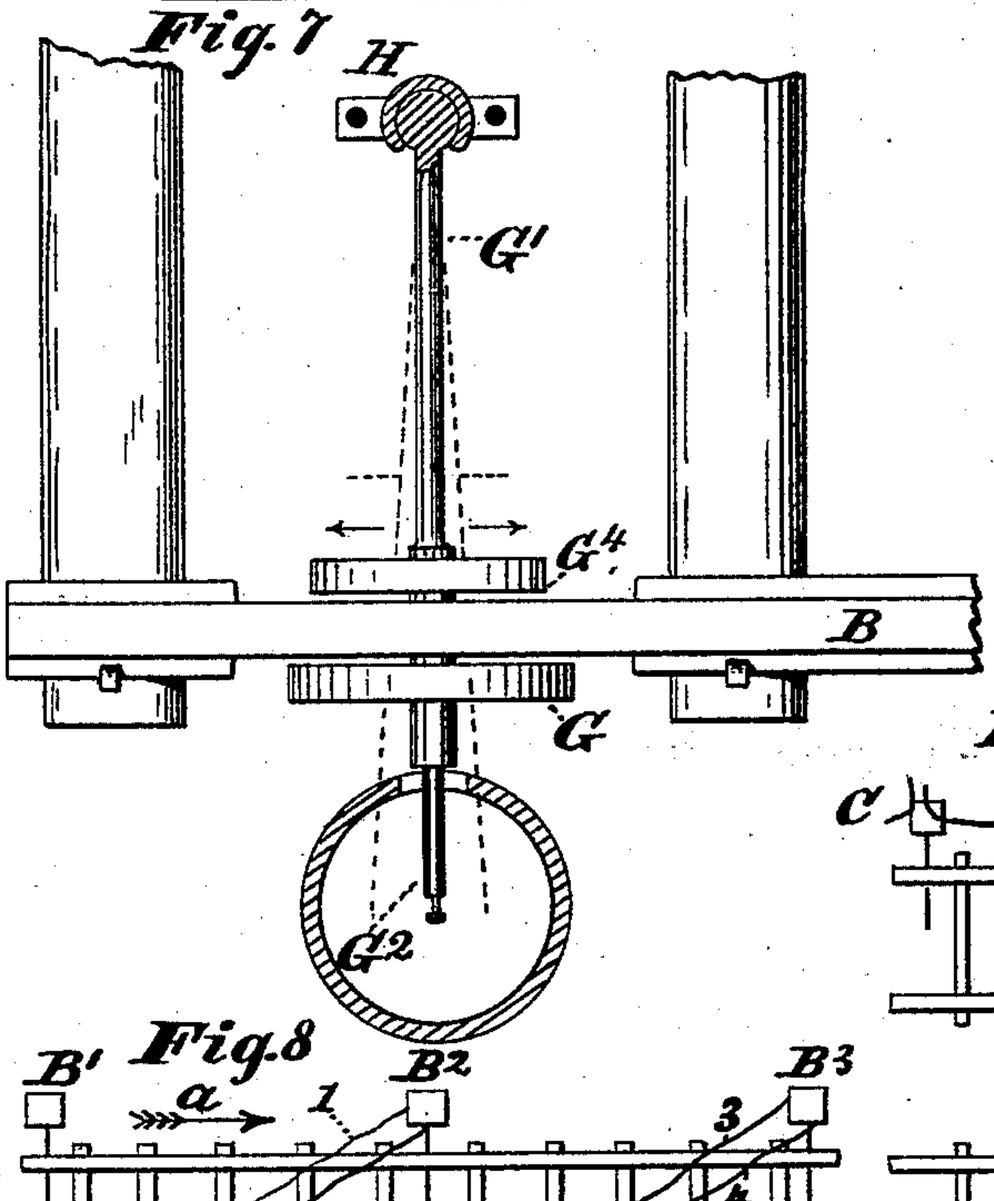

Fig. 8

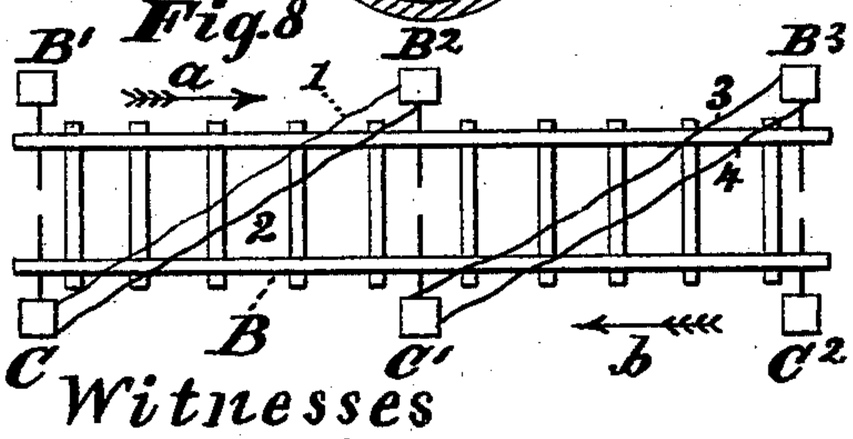

Fig. 5

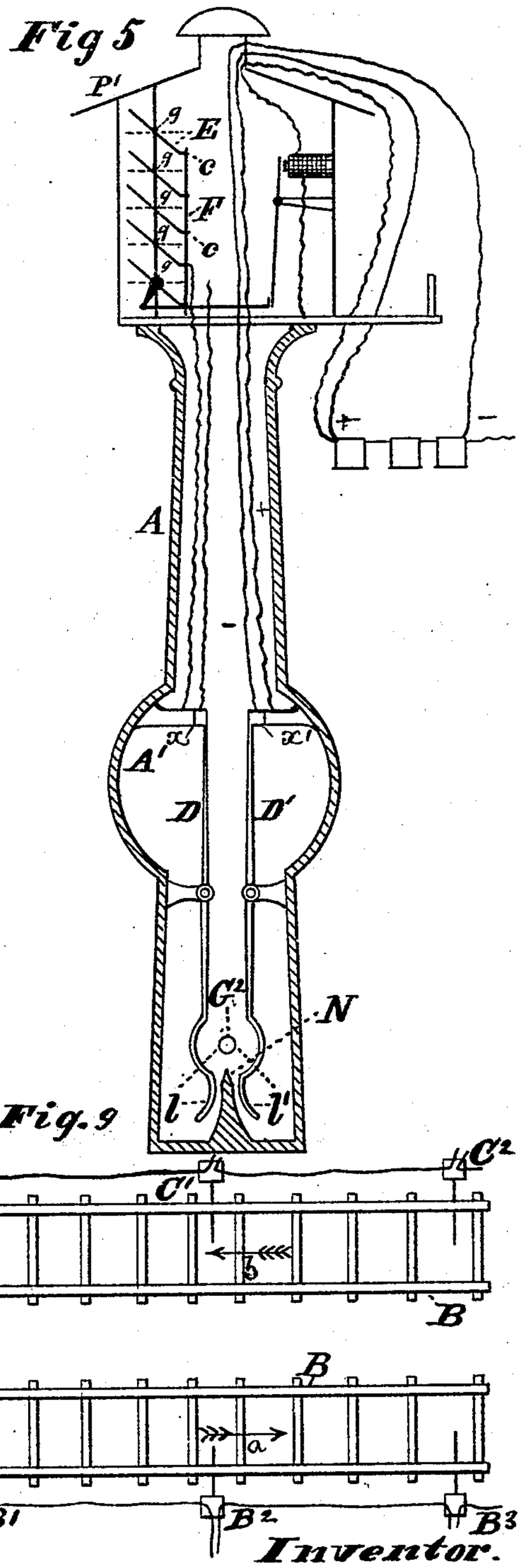

Fig. 9

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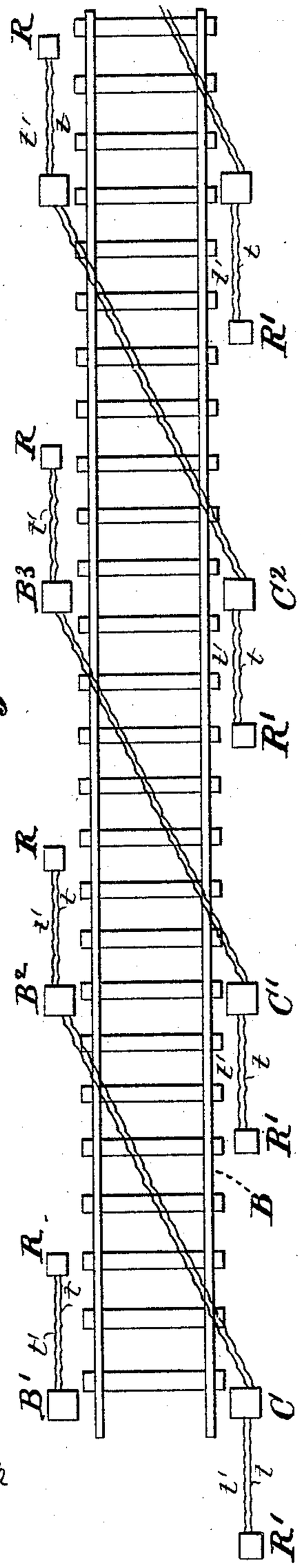

Fig. 10

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UNITED STATES PATENT OFFICE.

WILLIAM L. DOYLE, OF BUFFALO, NEW YORK.

RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 285,589, dated September 25, 1883.

Application filed December 14, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. DOYLE, a citizen of the United States, residing in the city of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Railroad-Signals, of which the following is a specification.

My invention consists of certain improved means whereby to inform the engineer of a locomotive of his right to enter a section of track which he may be approaching, and upon his entering such section of track to automatically set signals of danger, both at the entering-point and at the farther end of said section in the direction in which he is moving, and also at the same time to automatically change from "danger" to "safety" the signals of the section he has passed at both ends of said section of track, thereby giving the right to any following train to enter the sections showing safety-signals, so as to prevent any train moving in either direction from entering a section over which another train is passing, the object being to prevent collisions from either direction.

The first part of my invention consists in the combination of a series of colored glass slats and their operating mechanism, the slats being arranged so as to be connected together and move on central pivots all at once, thereby providing the means whereby the whole face of a signal may be changed in color by a slight movement, so as to adapt it to be easily operated by an electro-magnet or other means, the arrangement being such that it can be used either as a day or night signal.

The second part of my invention consists in a wheel or a portion of a wheel arranged near the side of the track upon a shaft supported by a spring, and by a universal joint at the inner end, so that the wheel is capable of moving both vertically and longitudinally (or at an angle to the direction of the track) in the direction of the moving train, in combination with suitable circuit-breakers and the necessary connecting-wires, electro-magnets, batteries, and signal apparatus. The circuit-breakers are arranged at a point within the signal-posts and elevated out of the reach of water or snow, and so that the apparatus cannot be tampered with, as will be more clearly hereinafter shown by reference to the drawings, in which—

Figure 1 represents a vertical central section through a complete lamp-post and signal-box, and a side elevation of a suitable lamp, and it also represents a means used in double-track systems for setting the signal one way direct without the intervention of the electric current or lifting the armature to the magnet automatically, and at the same time, by means of the electric current, changing the signal at the opposite end of the section the other way. Fig. 2 is a sectional elevation, showing the arrangement of the signal-slats and one of the connecting-magnets and connections for operating them; and Fig. 3 is a section through line *z z*, Fig. 2, the slats being in a different position. Fig. 4 is a side elevation of a portion of the device for forming and breaking the circuit, according to the direction the train is moving. Fig. 5 represents a vertical section through a lamp-post and signal-box, showing a modified arrangement of the wires for connecting with the battery, wherein the opening of the circuit by the train breaks the short circuit of battery around the magnets, and a modified arrangement of the electro-magnets. Fig. 6 is a side elevation, showing a portion of the rail and the arrangement of the box and spring for supporting the wheels for forming or breaking the circuit. Fig. 7 is a plan or top view of the wheels and connections for forming or breaking the circuit, showing the signal-post in section. Fig. 8 is a plan view, showing the arrangement of the signals on a single track; and Fig. 9 is a similar view, showing the arrangement of the signals on a double track. Fig. 10 represents a plan showing the arrangement of auxiliary signals to give timely notice to the engineer of the position in which he may find the main signals before he reaches them.

A represents one of the lamp-signal posts, made of cast-iron in the usual way, except an enlarged chamber, A′, for the purpose of giving room for the circuit-breakers. It may be provided with a suitable door and lock, made in the ordinary way, so that it can be locked securely. These signal-posts and signals are arranged for single-track service in pairs, located at each end of a section, and on opposite sides

of the track, and connected by diagonal wires, so that they will always be seen by the engineer from the foot-board or right-hand side of a locomotive and within a few feet from him as the locomotive passes the signal-point. (See Fig. 8, in which B represents the track, B′ B² B³ a series of signals on one side, and C C′ C² a series of signals on the other side, one series carrying its signals in the direction of the arrow *a* and the other in the direction of the arrow *b*.) The arrangement is such that a train passing the signals B² and C′ in the direction of arrow *a*, for instance, will at B² strike the hammer or other circuit-breaker, which will throw on the battery and charge the magnets on its wires, thereby changing signals of danger to signals of safety at this point and at the point C. At the same time, by the striking of the apparatus at C′, which connects with the hammer or circuit-breaker located at or in the post at this point C′, the battery is also thrown upon the circuit which reaches to B³, and the signals are thereby set to "danger" both at C′ and B³, thus signaling to the front and rear, and also adjusting the signals on opposite sides at the point occupied by the train.

The wires are arranged diagonally, so that a circuit connected on wires Nos. 1 and 3 will at all times set signals of danger, and on wires Nos. 2 and 4 will change such signals of danger to safety, so that as a locomotive passes in the direction of the arrow *a* it will strike at B², the hammer connecting wire No. 2 and set signals of safety at C and at C′, the hammer connecting with the wire No. 3, which will set signals of danger at B³. A locomotive passing in the direction of the arrow *b* will change the signals in the same manner, but in reverse order.

The arrangement for a double track is shown in Fig. 9, the posts and signals being arranged substantially as in Fig. 8, except that they are placed on one side only of the tracks, or on the right-hand side of the direction of the movement of the trains. In each case the operation of the circuits for the signals is the same and may be used with open or closed circuits, the batteries to be located at any convenient point or points.

Auxiliary signal-posts and signals may be placed at a suitable distance in the rear of the main signal-posts, whereby a different-colored signal—green, for instance—may be used to give timely notice to the engineer of the position in which he may find the main signal before he reaches it. (See Fig. 10, in which said signals are represented by the letters R R′.) These signals may be constructed like the signals A, and connected to the circuits in a similar manner. I have not shown them in detail, as their construction will be understood by those skilled in the art, especially by reference to the description of the main or primary signals shown and described herein.

The construction of the signal apparatus will be understood by reference to Figs. 2, 3, and 5. E represents the slats, provided with pivots *g*, which slats may be arranged either vertically or horizontally, as shown. They are pivoted in a frame or supports, E′ E², and connected together on one side by a bar or rod, F, at the joints *c*, so that a movement of the bar F will move all the slats at once. The slats are also moved in a contrary direction by a similar means on the other side. The cranks *d* at the opposite ends of the slats are set opposite each other, so that a movement of the armature *e* up to the magnet (see Fig. 2) will open the slats, and thereby show a white light at night or the absence of red in the day-time, which in either case would indicate "safety." By a movement of the opposite armature, *f*, up to the magnet the slats E would be moved to the position shown in Fig. 3 and by the dotted lines *f′* in Fig. 2, thereby showing the color or colored light, which would indicate "danger." A counter-balance, *h*, may be used to hold the signal firmly in position.

In this connection it may be remarked that the slats of the signal will remain in either the position of "danger" or "safety," when once set, until positively moved to the other position, the counter-weight *h* operating to hold the slats in either position. Thus it will be seen that it is only necessary to close or open the circuit, as the case may be, for an instant, in order to move the signal.

The ordinary electro-magnets, their armatures, and connecting-wires and batteries being used for operating the signals and being well known, a further description of them is not required here.

The mechanism by which the locomotive as it moves along the track operates the signals by moving the armature either direct or by the electric current, or by both, will be understood by reference to Figs. 1, 4, 5, 6, and 7.

G represents a small wheel arranged near the track on a shaft, G′, which shaft extends inward toward the center of the track, and at that end is supported by a universal joint, H, and below the level of the track is supported in an angular box, H′, (see Fig. 6,) which is kept up by a strong spring, H², arranged either above or below the box, as shown. The box H′ is arranged within a frame, I, having inclined sides *i i′* or guideways for said box, so that as it is forced up by the spring H² it will be forced to a central point between the extremes of its movement either way from said point. When the device is arranged so that the locomotive operates the armature or signal direct at its passing-point, the outer end, G², of the shaft G′ is provided with a connecting-rod, J, for connecting with the lever J′. (See Fig. 1.) The arrangement being such that when the wheel G is forced down by the locomotive as it passes, the lever J′ is moved in the position shown by the dotted lines J², which operation throws the armature K up to the electric magnet, thus operating the con-

Doyle.

necting-link F and setting the signal, and at the same time closing contact at 10 and reversing the distant signal at the other end of the section. The signal set by armature K will remain set until released by the locomotive operating a circuit-closer at the other end of the section, thereby causing the other magnet in signal-box P to restore the signal to the position of "safety." A signal set by a current may be released by the locomotive operating one of the armatures directly as it leaves the section, at the same time operating another signal by changing the condition of the magnets at the signal-post.

In operating on a single track it is necessary that the signals should be worked according to the direction in which the train is going—*i. e.*, sending signals of danger in advance and signals of safety in the rear as the train advances—and for that reason the wheel G should have a movement forward in the direction the train is moving, in addition to the downward movement. (See Figs. 4, 6, and 7.)

In Fig. 4 it will be seen that when the train moves in the direction of the arrow L the locomotive-wheel in striking the wheel G at an angle, as shown, will have a tendency to move said wheel in the same direction, as well as downward, and when going in the opposite direction this movement will be reversed, the frame I, within which the box H′ is arranged, being adapted to allow all the necessary movements, while the spring H^2 forces the box H′ back to a central position after the train has passed. As an additional precaution the device shown in Fig. 5 is employed.

N represents an upwardly-projecting piece, on either side of which the end G^2 of shaft G′ is made to pass downward, according to the direction in which the wheel G is thrust. In the post are pivoted two circuit-breakers, D D′, Fig. 5, making or breaking the circuit at the contact-points *x x′*, and the lower ends of such circuit-breakers extend opposite the piece or stud N, so that as the end G^2 of the shaft passes between a circuit-breaker and the stud the circuit will be broken at the contact-point. When the shaft resumes its central position, the circuit-breakers will fall by gravity to the position shown. By this arrangement the movement of the train compels the circuit-breakers to take the proper course, and thereby give the required signals in accordance with the direction of the moving train.

The apparatus can be operated without the projection N; but it would not be so certain in its operation, as the recoil might carry the end G^2 back against the other circuit-breaker.

In Fig. 1 P represents an ordinary lamp adapted to set back of the signal-box P′, which box is provided with glass in the front and rear, so as to fully protect the mechanism inside from the elements.

In some cases a second wheel, G^4, may be arranged on the shaft G′ inside of the track.

When the supplementary signals R R′ are used, they are constructed in the same manner as the other signals described in detail, the wires *t t′* conducting the currents to the operating-magnets from the wires leading to the signal at the rear.

I claim as my invention—

1. The combination, with a railway-track, of electric signals arranged on different sides thereof, those on one side opposite those on the other, wires connecting each signal with the next distant signal on the opposite side, and circuit-breaking devices constructed to be operated by the train, and arranged, as described, that the train may operate them on opposite sides at the same point and at the same time to adjust simultaneously the signals ahead, at the rear, and on both sides, as and for the purpose set forth.

2. The combination, with the track and electric signals arranged on different sides thereof, those on one side opposite those on the other, and connected all as set forth, of supplemental signals R′ and circuit-breakers constructed to be operated from the train, substantially as specified.

3. In a railroad signal apparatus, a wheel, G, on a shaft, G′, set in bearings H H′, in combination with a spring, H^2, and frame I, the whole adapted to be operated by a passing train or locomotive, so as to move in the direction of the train, as well as downward, for the purposes set forth.

4. In a railroad signal apparatus, the combination of a series of colored transparent pivoted slats, E, a connecting rod or bar, F, and connecting-wires, magnets, and circuit-breakers, substantially as and for the purposes specified.

5. The circuit-breakers D D′, terminating in the ends *l l′*, in combination with the projecting piece N and the shaft G′, for the purposes specified.

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