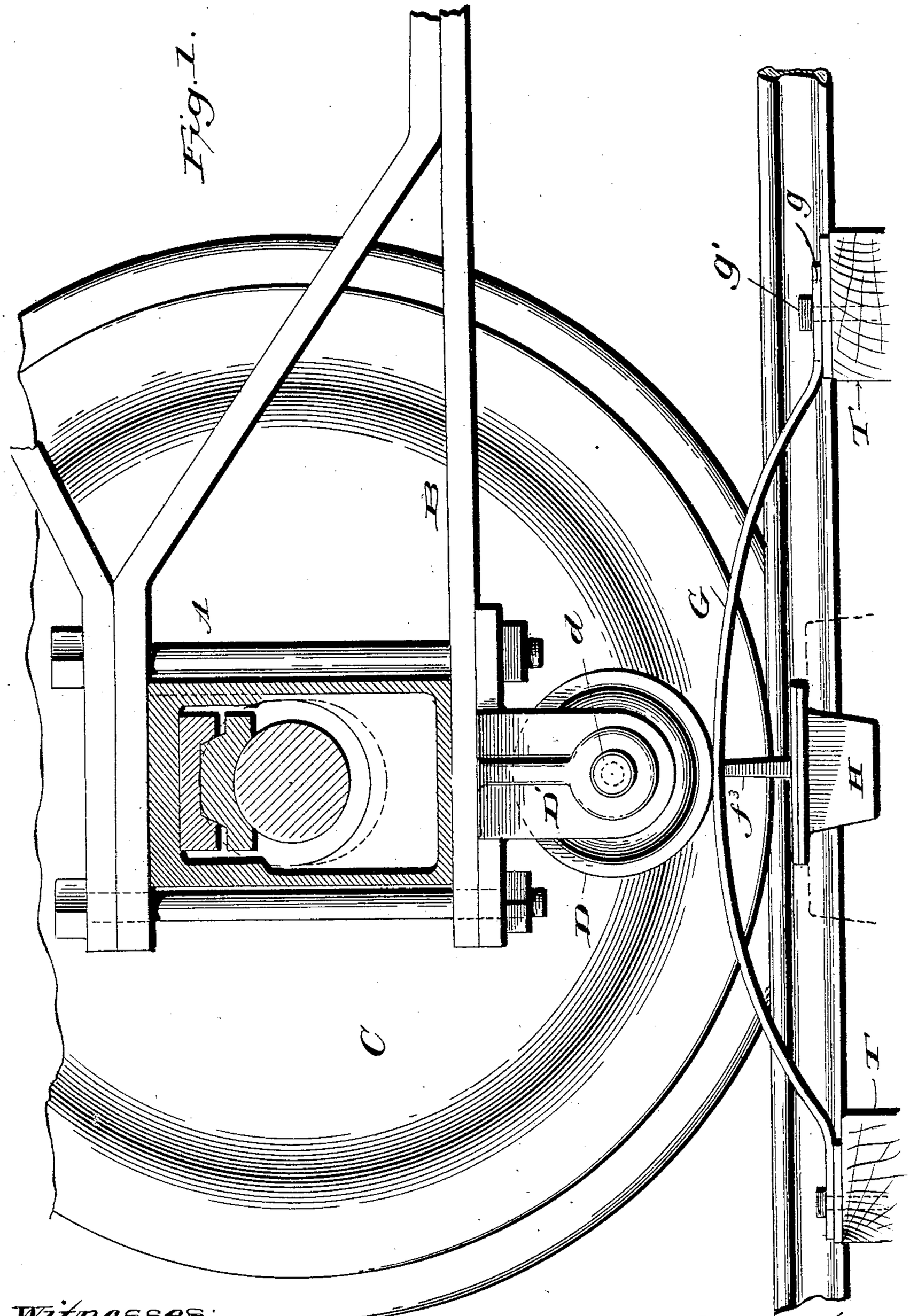
(No Model.) 3 Sheets—Sheet 1.

M. B. LEONARD.

DEVICE FOR RAILWAY SIGNALING OR OTHER PURPOSES.

No. 560,359. Patented May 19, 1896.



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Michael Barry Leonard,
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his Atty.

(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

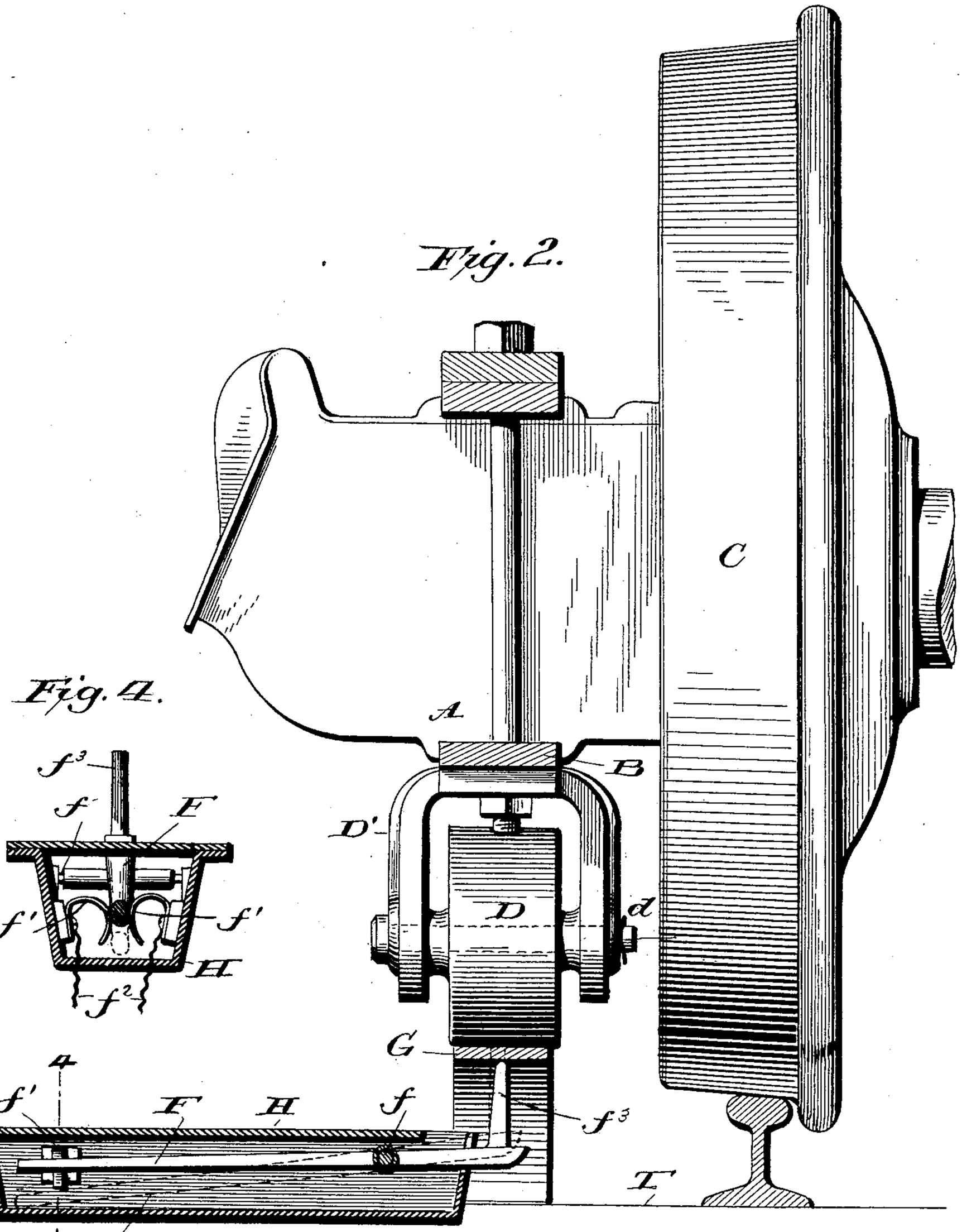
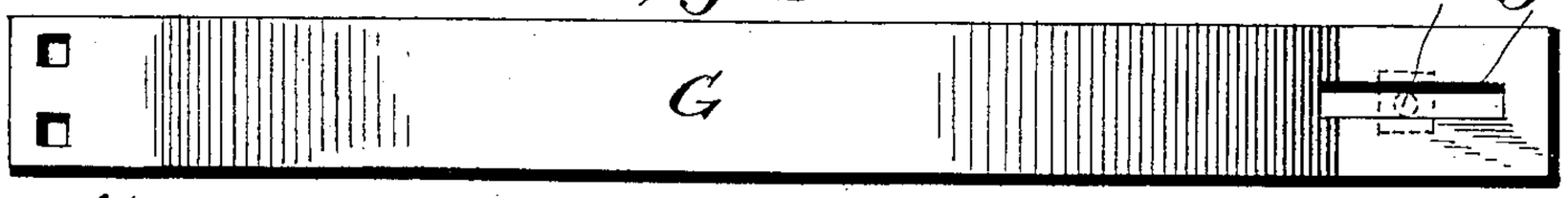


Fig. 4.

Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

M. B. LEONARD.

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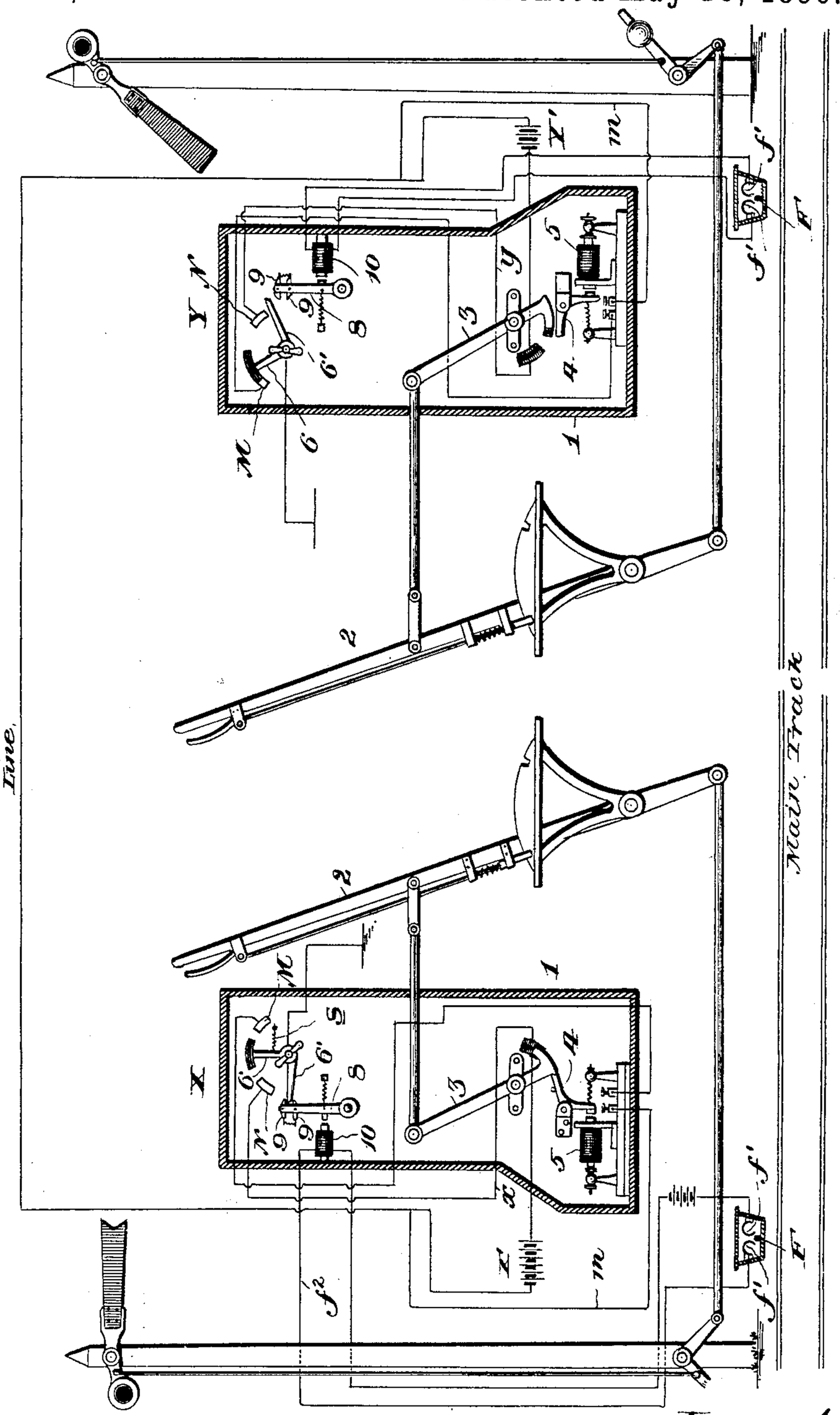

Fig. 5.

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UNITED STATES PATENT OFFICE.

MICHAEL BARRY LEONARD, OF RICHMOND, VIRGINIA.

DEVICE FOR RAILWAY SIGNALING OR OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 560,359, dated May 19, 1896.

Application filed February 5, 1895. Serial No. 537,412. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL BARRY LEONARD, a citizen of the United States, and a resident of Richmond, county of Henrico, and State of Virginia, have invented certain new and useful Improvements in Devices for Railway Signaling or other Purposes, of which the following is a specification.

My invention has relation to block-signaling apparatus or systems in which the signal is controlled by a ground or hand switch in the manner set forth in my Patent No. 517,419, of March 27, 1894.

My present apparatus differs from that of the patent in that provision is made for automatically locking the ground-switch during its return movement in a position in which it is impossible for either of two contiguous stations to unlock the signal of the other until the ground-switch is released by the action of an unlocking-magnet included in a normally open circuit completed through contacts controlled by a circuit-closer located adjacent to the railroad-tracks, but independent of the rails, said circuit-closer being operated to close the contacts by actuating means attached to the last car or other selected car of the train passing over the track, whereby the passage of the selected car, and that car only, will operate the circuit-closer to close the circuit of the unlocking-magnet, and thus release the ground-switch. In this way it is feasible to so arrange things that should a train—a freight-train, for example—break in two and the front end only of the train pass off from the block the ground-switch will still remain locked, thus rendering it impossible to signal another train to enter the block so long as any part of the train in advance remains on it.

In the accompanying drawings, to which I shall now refer for a more complete understanding of my invention, Figure 1 is a side elevation, partly in section, of a portion of a railroad track and car equipped with a circuit-closer adapted to be used in carrying out the invention. Fig. 2 is an end elevation of the same with the track instrument in longitudinal vertical section. Fig. 3 is a plan of the spring-bar. Fig. 4 is a cross-section on line 4 4 of Fig. 3. Fig. 5 is a diagrammatic representation of two connected stations and electric circuits therefor embodying my invention.

I shall first describe the preferred construction of the circuit-closer itself, and will then describe the system in which it is included and of which it forms part.

The circuit-closer box or case H is similar to that of the ordinary track instrument used in railway-crossing alarms, and it is located between the ties T of the railway-track. The circuit-closing lever F is pivoted at f in the box, and its shorter outer end projects through a slot in the box of sufficient length to permit the needed play. The contacts controlled by the lever F are shown at f', and f^2 are the circuit-wires extending therefrom. In the arrangement shown these contacts are normally open, and are closed by the depression of the outer end of the lever, this movement lifting the inner end of the lever, (which is armed with conducting material,) so that it will enter between the contacts f' and electrically connect them, thus completing the circuit f^2 at this point. The outer end of the circuit-closing lever F is turned upward, as at f^3, so as to extend up to and about in contact with the under and concave side of a curved spring-bar G, attached to the ties T. One end of this bar is rigidly attached to the tie on which it rests. The other end of the bar is connected to its tie by a slot-and-headed-pin connection $g\,g'$, which will permit this end to slide upon the tie when the bar is depressed. The depression of the bar will, through the extension f^3, correspondingly depress the outer end of the circuit-closing lever F. When the spring-bar is relieved from pressure and rises, the contact end of the lever F will drop by gravity, or, if desired, this dropping action can be insured by the employment of a retractile spring.

A is the portion of the truck or running-gear of a car supposed to be passing over the track at the point where the circuit-closing instrument is located. B is one of the tie-bars of the truck. C is the wheel. To the part A, which in this instance is the axle-box, is attached the housing D' of a roller D, the housing being attached to the under side of the box. The roller D being upon the axle-box is of course upon the outside of the car-wheel C, and it is so located as to be directly over the spring-bar G and to act to depress the same. The spring-bar may be of steel, say five feet long, four inches wide, and of any

desired thickness. It is located along the railroad-ties, preferably about three inches outside of the rail, and parallel therewith. The bar is longitudinally curved, and is spring-set in this form, and is placed convex face uppermost. At the center or highest part of the curve it should be some distance—say three inches—above the level of the tread of the rail. The bar should have sufficient strength and stiffness to require a pressure to depress it of, say, two hundred pounds or more, or, in other words, sufficient strength and stiffness to prevent its being operated by persons stepping upon it. The roller D is preferably attached to the particular portion of the car-truck shown for the reason that this is the most rigid part of the car, has little, if any, vertical motion, and is always practically at the same distance from the rails and ground; and in this way I further insure that the weight of the car shall assist in the depression of the latter. The roller D under these conditions would usually have a diameter of about seven inches. It is preferable to mount the roller upon a removable axle-pin *d* in order to permit the roller to be removed when not wanted or to allow it to be replaced by a smaller or larger roller according to the varying size of the wheels of the car upon which it may be placed.

In Fig. 5 I have diagrammatically represented two contiguous stations of a railway block-signaling system equipped and connected in accordance with my invention.

The apparatus at both stations are the same, so that a description of one will answer for both.

1 is the box containing the apparatus.

2 is the pivoted signal-operating lever joined by a connecting rod or link to the pivoted vibrating locking bar or lever 3. A bell-crank armature-lever 4 acts as a stop to engage the heel of lever 3 when the signal-operating lever is in normal or danger position, as at station X, thus locking it against movement. 5 is an electromagnet which, when energized, attracts armature 4 and thus draws the horizontal limb of the armature down out of the path of the heel of lever 3.

6 is the pivoted manually-operated ground-switch, having a ground connection and adapted to play between two contact-plates M N, as described in my Patent No. 517,419 hereinbefore referred to. It normally rests upon the contact M and is there held by a spring *s*. At each station there is a line-battery, (marked, respectively, X′ for station X and Y′ for station Y.) Between the two stations extends the line-wire 7, having one of its terminals connected to one pole of X′ battery and its other terminal connected to one pole of Y′ battery. The opposite pole of X′ battery is connected by wire *x* to contact N at X station. The opposite pole of Y′ battery is connected by wire *y* to contact N at Y station. The terminals of the releasing-magnet 5 at each station are connected, respectively, to the contact M at that station and by wire *m* to line 7.

For the purpose of locking the ground-switch in intermediate neutral position, out of contact with either of its contacts, after it has been operated by hand and is returning from its N position to its normal position of rest, I employ a switch-locking armature-lever 8, provided with pivoted spring-controlled dogs or jaws 9 9, between which the detent-arm 6′ of the switch 6 will at this time be held. This armature-lever is held up to its work by a spring, and is drawn (against the stress of its spring) in a direction to release the switch by an electromagnet 10. This magnet is included in the normally open circuit f^2, completed through the contacts f' of the track instrument hereinbefore described, the lever F of which is located in proximity to the track, as shown. Assuming both ground-switches to be in normal position, resting upon their contacts M, then if X operator, in response to call to that effect from Y station, moves his switch from M to N (in which operation the detent-arm of the switch wipes past the jaws 9 9 of the locking armature-lever 8) the circuit will be from X's ground, through X's ground-switch, contact N, wire *x*, battery X′, to line to Y station, and then through wire *m*, magnet 5, contact M, ground-switch, to Y's ground. Thus the magnet 5 at Y station will be energized, with the effect of unlocking Y's signal-lever and allowing the Y signal to be pulled to "safety," in which position the parts are shown in Fig. 5. The X operator, after releasing Y's lever, permits his ground-switch to return from N to its normal position at M; but in so returning, its detent-arm 6′, at the time the switch reaches intermediate position between and out of connection with either contact N or M, engages the dogs 9 of the locking armature-lever 8 and is locked fast in that position, as shown in Fig. 5, so as to be incapable of movement in either direction, and it will thus remain until released by the action of the unlocking-magnet 10. The circuit f^2 of this magnet is open and will remain open until the last or other selected car of the train admitted to the block by the Y operator passes, and then, and not until then, will the circuit-closing lever F be actuated in the manner hereinbefore described to close the contacts f', thus completing the circuit f^2 and consequently energizing the unlocking-magnet 10, which thereupon will attract the locking armature-lever 8, with the effect of moving it in a direction to release the ground-switch. In this way I am enabled to guard effectually against rear-end collisions which might occur by a portion of the admitted train being left upon the block.

Inasmuch as practically all passenger-trains are now equipped with air-brakes which immediately stop the whole train should it break in two, the provision above described for guarding against rear-end collisions probably is not so essential on this class of trains

as on long freight-trains not thus equipped. The roller D therefore could be applied to all caboose or freight or conductors' cars and could be permanently fixed to such of these cars as do not pass off onto other roads; but it can equally well be made removable and portable, and passenger-cars can be fitted to receive it when desired, the brakeman placing the roller-housing with its roller on either of the trucks of the last car of his train. In actual practice, however, about the same result would be obtained by attaching the device to the trucks of the locomotive-tender on passenger-trains instead of the last car, thus obviating the necessity of shifting the device at junctions and terminal points where cars are added to or taken off from the passenger-train, and this would also be the case where engines are run light—*i. e.*, without a train or caboose-car.

The system hereinbefore described and illustrated is similar in a general way to that shown and described in my companion application, bearing Serial No. 528,382, on which Letters Patent will issue of even date herewith, in which application I have broadly claimed the combination, with the ground-switch and its contacts, of a locking mechanism for arresting and holding the ground-switch in intermediate neutral position during its return movement to "normal" and means called into operation by a passing train for releasing said switch from control of said locking mechanism. Said broad subject-matter therefore is not claimed by me in the present application; but

What I here claim, and desire to secure by Letters Patent, is—

In a block-signaling system substantially such as described, the combination of the ground-switch; its two contact-plates; a locking armature-lever by which said switch after having been moved from that plate with which it is normally in contact to the other plate is, when returning to "normal," automatically arrested, and locked in neutral position out of contact with either plate; a spring for drawing said armature into locking position; an unlocking-magnet for influencing the armature against the stress of its spring included in an electric circuit; a circuit-closer controlling normally open contacts in said circuit and located adjacent to but electrically independent of the track-rails; and actuating means attached to the last or other selected car of a train passing over said track, whereby the passage of the selected car and that car only will operate the circuit-closer to close the circuit of the unlocking-magnet, substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 31st day of January, 1895.

MICHAEL BARRY LEONARD.

Witnesses:

J. M. POWERS,

W. W. TALLEY.