

(No Model.)

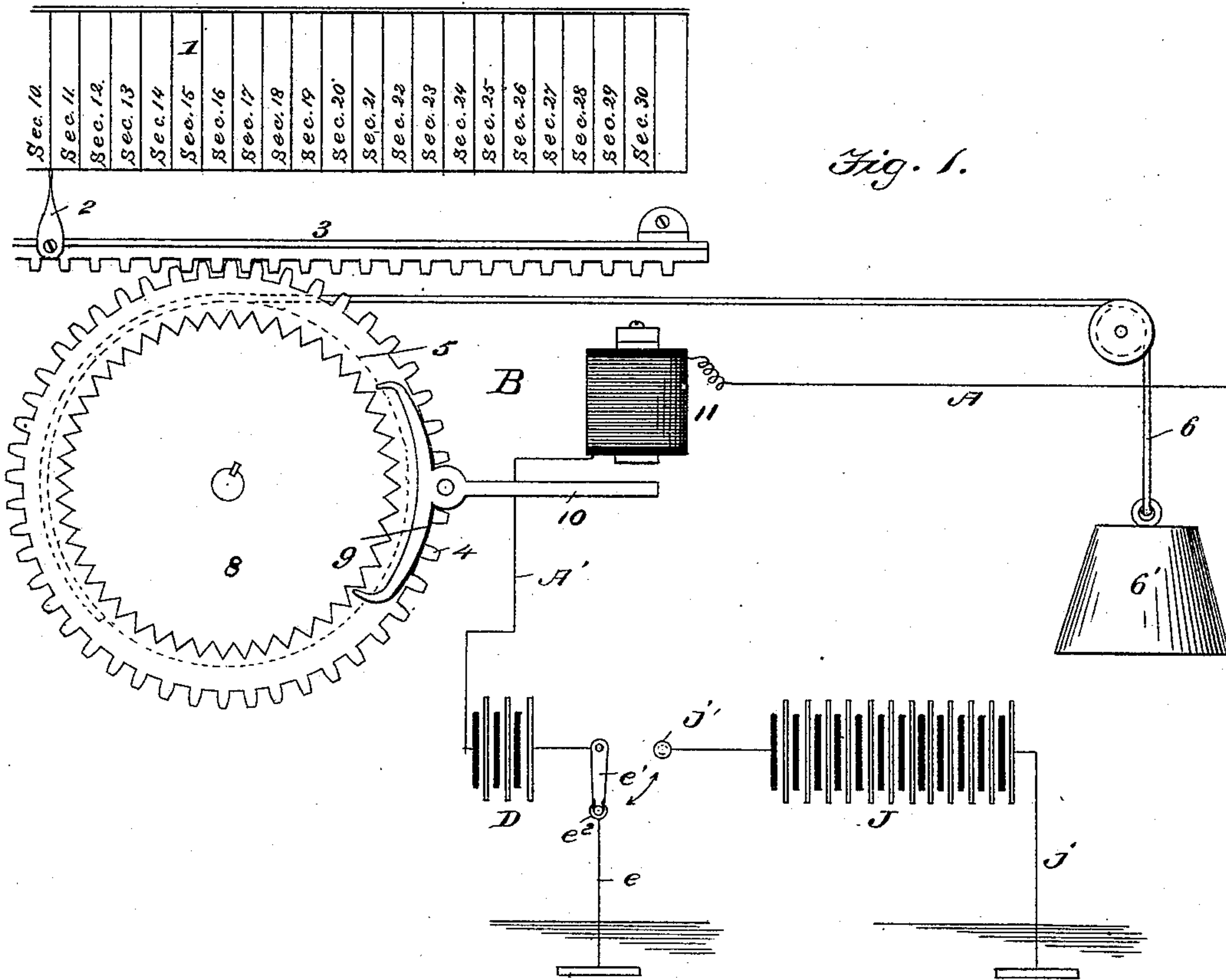
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F. H. BROWN.

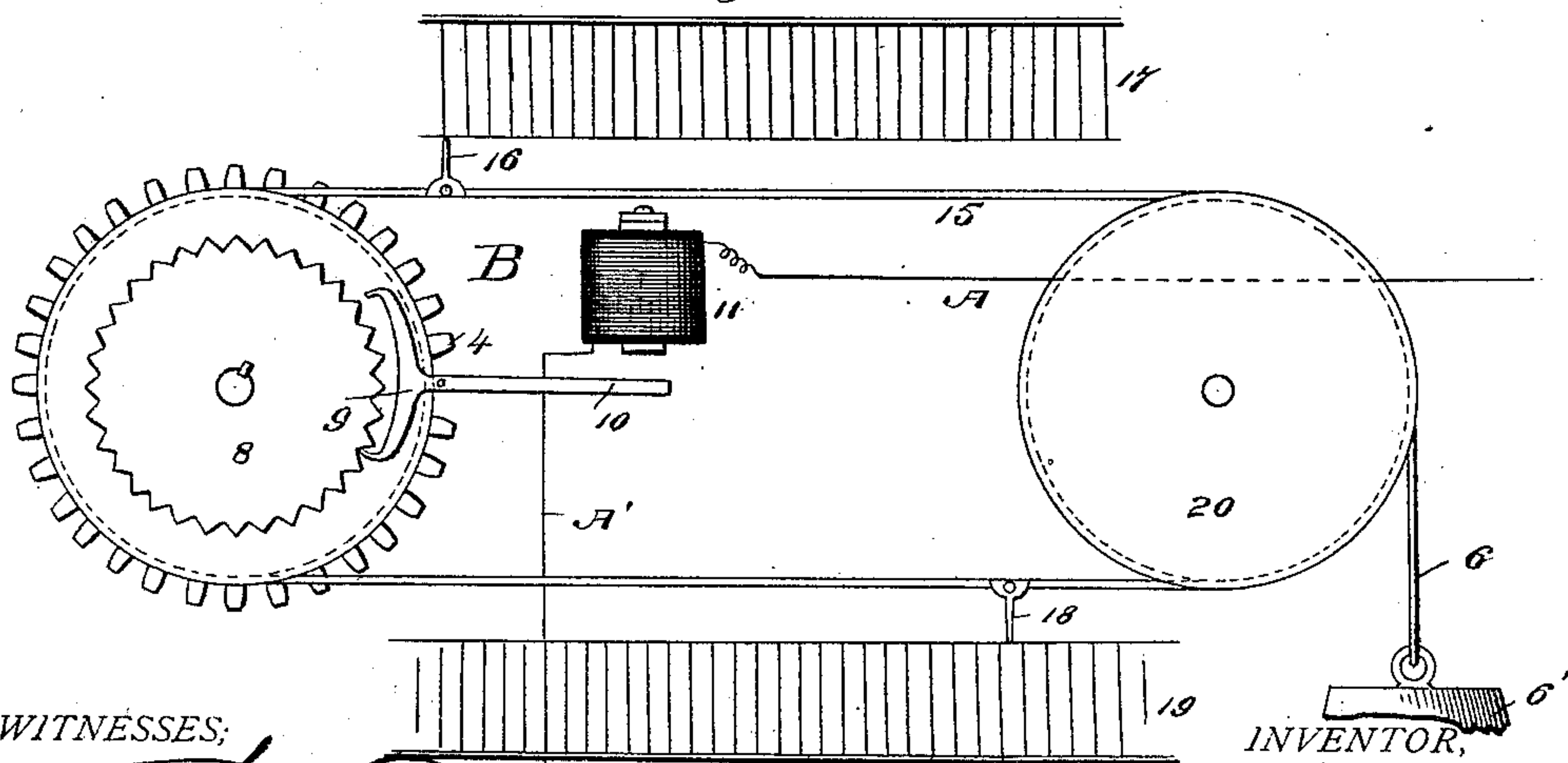
ELECTRIC RAILWAY TRAIN SIGNAL AND RECORDER.

No. 452,515.

Patented May 19, 1891.



*Fig. 2.*



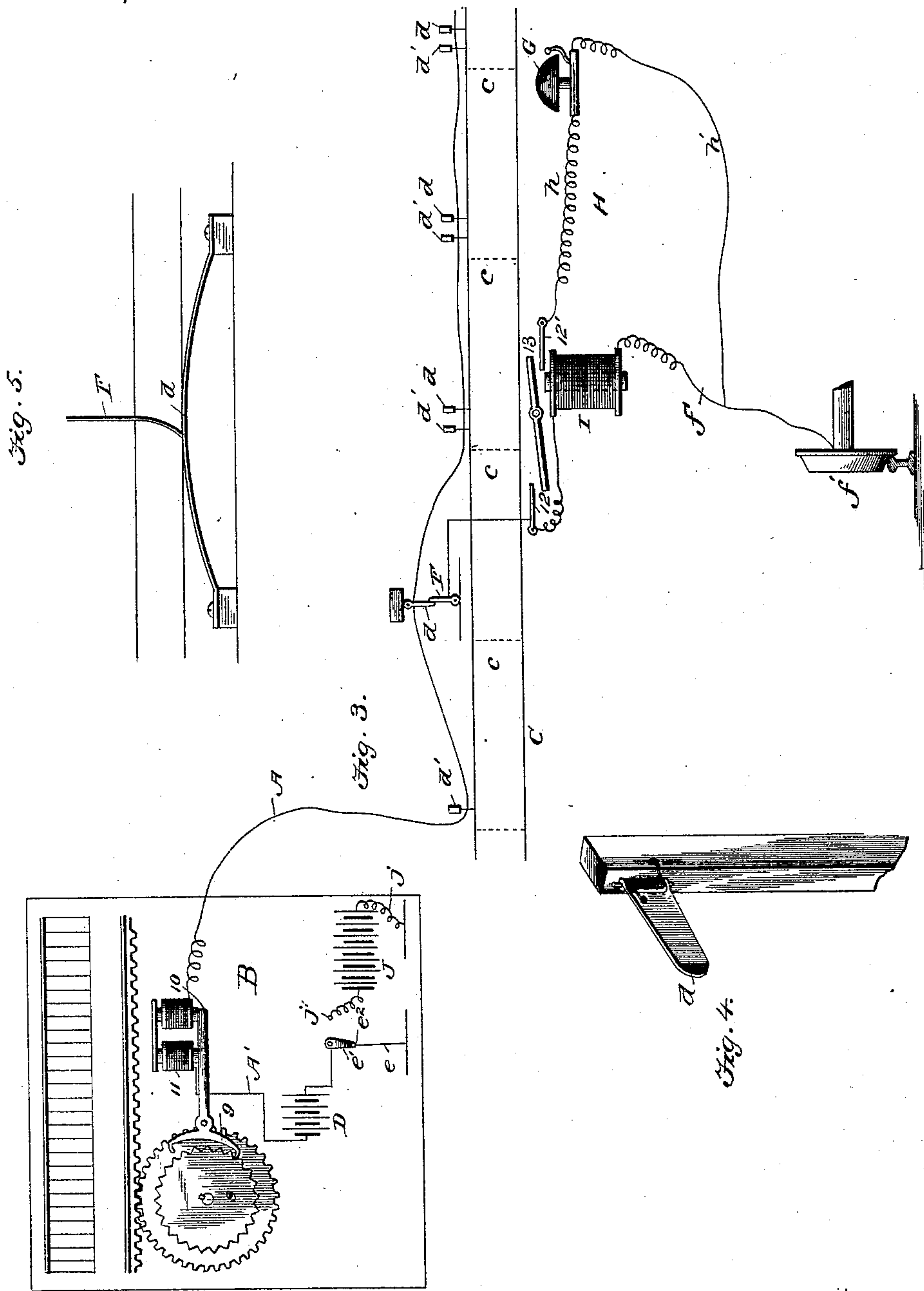
WITNESSES;

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Witnesses:

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# UNITED STATES PATENT OFFICE.

FRED. H. BROWN, OF CHICAGO, ILLINOIS.

## ELECTRIC RAILWAY-TRAIN SIGNAL AND RECORDER.

SPECIFICATION forming part of Letters Patent No. 452,515, dated May 19, 1891.

Application filed December 3, 1890. Serial No. 373,467. (No model.)

*To all whom it may concern:*

Be it known that I, FRED. H. BROWN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Railway-Train Signals and Recorders; and I do hereby 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.

The present invention relates to an electric railway-train signal and recorder; and the object of the invention is to automatically indicate to the operator in the train-dispatcher's office the position and progress of a railway-train and to enable the attendant to signal or communicate with the engineer on such train and notify him to stop the train, or impart such other signal or message as may be previously arranged.

With these ends in view my invention consists in the combination of devices and novel construction and arrangement of parts, as will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the same in the accompanying drawings, in which—

Figure 1 is a view of a recorder to be located in the train-dispatcher's office. Fig. 2 is a view of another form of the recorder. Fig. 3 represents a general view of the system and the electric circuit in which the recording and signaling devices are included. Figs. 4 and 5 represent two forms of circuit-closers by which the electric circuit can be closed by the rapidly-moving train.

Like letters and numerals of reference denote corresponding parts in all the figures of the drawings, referring to which—

A A' designate the conductors of the electric circuit, and B the train-dispatcher's office or other station at which the position and progress of a railway-train is to be recorded and from which the operator can signal the train.

The railway-track on which the train is moving is divided off into a series of sections, each of suitable length, under a system similar to that known as the "block-signal" system, and I have provided an improved recording mechanism whereby the position and

progress of the train is instantaneously and automatically transmitted to the train-dispatchers office.

In each section or "block" *c* of the system or track C (indicated in Fig. 3) I provide two post-contacts or rail-contacts *d d'* of the form shown in either Figs. 4 or 5, and this contact is in the circuit formed by the conductors A A'. This electric circuit also includes the primary battery D for energizing the circuit when it is closed, said battery having a ground-wire *e* and a switch *e'*, which normally bears on the contact *e''*, by which the ground connection from said primary battery is completed through the wire *e*. This primary battery and the switch are located at the train-dispatcher's office B, and at this office or station is provided the recording device. (Shown in Fig. 1 of the drawings.) This recording device comprises, essentially, a scale or chart 1, divided similarly to the tracks or sections *c* of the track, a traveling pointer or index 2, and electrically-controlled devices operating in synchronism with the contacts *d d'* and the circuit-closer on the moving train as it is carried past the series of contacts alongside of the track.

In the preferred embodiment of the recording mechanism the index or pointer is carried by a sliding toothed bar or rack 3, which is arranged in juxtaposition to the scale, and is guided by suitable means to move in a line parallel with the same, and with this toothed rack-bar meshes a gear-wheel 4, which is rigid with a drum 5. To this drum is connected a cord or chain 6, having a drop-weight 6' attached thereto, which weight operates to exert a constant pull or strain on the drum, and a ratchet or pallet wheel 8 is also fixed to this drum, with which engages the pallet 9 of an armature-lever 10. This lever is fulcrumed at a point intermediate of its length, and one end of the lever is extended or arranged in such juxtaposition to the core of an electromagnet 11 as to serve as the armature thereof, said magnet being included in the electric circuit, as indicated. The pallet of the armature-lever normally has one arm or end in engagement with the pallet-wheel to restrain the drum and drop-weight against movement; but as the circuit is closed through the contact *c* and the circuit-closer the electro-mag-



net is energized and the armature-lever is attracted thereby, thus operating the pallet and allowing the drop-weight to move the drum one step or notch, whereby the rack or toothed bar is fed one step to cause the index to register a point in advance on the chart or scale, and thus indicate to the operator the position and progress of a train.

F is the circuit-closer on the cab of the locomotive and which projects beyond the side of the cab in such position as to contact with the contact  $d$  or  $d'$  alongside of the track. To this circuit-closer is connected a ground-wire  $f$ , which runs to an axle or wheel  $f'$  of the locomotive, so that the current is grounded through the wheel and a rail of the track.

In connection with the recording devices and circuit I provide means whereby the operator at the train-dispatcher's office is enabled to signal the engineer on the train.

In the cab of the locomotive I provide a visual or audible signal G, which may consist of an electric bell, as shown; or an incandescent lamp or explosive torpedo may be employed to attract the attention of the engineer, and this signal is included in a shunt-circuit II, formed by the wires  $h$   $h'$ .

In the working or primary circuit formed by the conductors  $A$   $A'$   $e$   $f$ , I provide a magnet of high resistance or a resistance-coil I, to which the ground-wire  $f$  of the working-circuit is connected, and this coil or magnet I is of such resistance that the current from the primary battery is insufficient to energize the core of such magnet or coil, but will pass through the coil thereof in order to ground the current at the locomotive.

Between the coil or magnet I and the circuit-closer F on the cab is a contact-spring 12, and the armature 13 and the contact 12 are arranged in juxtaposition to the core of the coil or magnet I, so as to be attracted by said core when the magnet and core are energized by a current of high tension or electro-motive force from a battery J of greater tension or force than the primary battery D of the circuit. This armature 13 is pivoted at an intermediate point of its length and arranged between the lower contact 12 and another upper contact 12', so that its opposite ends engage, respectively, with the two contacts. To the contact 12' is attached the wire  $h$ , which leads to the audible or visual signal G, and from the signal leads the wire  $h'$ , which is connected to the ground-wire  $f$  at a point inside of the connection between the ground-wire and the wheel or axle.

The battery J is of much greater strength or tension than the primary battery D, which is only employed under normal conditions to energize the circuit and operate the recording device at the train-dispatcher's office to indicate the position and progress of a train, the visual or audible signal G being shunted normally out of the primary circuit. This stronger battery J has a ground-wire  $j$  and a contact  $j'$ , which contact is close to the switch

$e'$ , and by moving the switch from the contact  $e^2$  of the ground-wire  $e$  of the primary battery D, so as to bear upon the contact  $j'$ , the stronger battery J is included in the primary circuit, whereby as the circuit-closer registers with one of the contacts  $d$  or  $d'$  along the track the current over the circuit will be sufficient to energize the resistance-coil or high-resistance magnet I and attract the armature thereof, so as to close the shunt-circuit II and operate the audible or visual signal, thereby notifying the engineer that the operator at headquarters has signaled him to stop the train, &c.

In Fig. 4 of the drawings I have illustrated one form of track-contact  $d$ , which is placed at a suitable elevation above the track and is pivoted to a post erected alongside of the track, such contact extending partly across the track in the path of a circuit-closer on the locomotive and being backed by a spiral or other spring to insure a quick return movement thereof after the train has passed.

In the other form of track-contact (shown in Fig. 5 of the drawings) a curved spring is arranged in a horizontal position close to one of the rails of the track, but it is suitably insulated from the track by posts of non-conducting material. In this horizontal low-down form of contact I employ a circuit-closer, which depends from the cab of the locomotive and which may be in the form of a bent spring; or it may have a roller or a brush on its lower end to ride upon the surface of the curved spring contact  $d$ , as preferred.

The operation of the invention may be briefly summarized as follows: The switch  $e'$  rests normally on the contact  $e^2$  of the ground-wire of the primary battery D, and the signal G is normally shunted out of the primary circuit. As the train passes from one section or block of the track to another section, the circuit-closer comes against the contact  $d$ , thus closing the circuit and causing the battery D to energize the magnet 11, which attracts the armature and operates the pallet 9 to release the pallet-wheel 8 and allow the drum 5 to rotate one tooth or notch and move the rack a corresponding distance and cause the index or pointer to indicate the position and progress of a train. The recording device at the train-dispatcher's office is thus operated in synchronism with the opening and closing of the circuit by the circuit-closer impinging on the rail-contact  $d$  or  $d'$ . If the operator desires to signal the train after it has passed the contact  $d$  of one section, and he has been notified of such fact and the position of the train by the operation of the register, it is only necessary for him to move the switch  $e'$  over to the contact  $j'$  and include the stronger battery J in the primary circuit, so that as the train approaches the contact  $d'$  of the same section or block of the track and the circuit-closer impinges on said contact  $d'$  the shunt-circuit II will be closed and the signal G operated, thus notifying the engineer that



the operator has signaled him to stop the train; or any other signal previously agreed upon may be conveyed to the engineer.

In Fig. 2 of the drawings I have illustrated a modified form of the recording device by which the position and progress of trains going in either direction along the track can be signaled to the operator at the train-dispatcher's office.

In lieu of a single rack with one pointer, I provide an endless band or tape 15, the one side of which has one pointer 16 to be used in connection with one chart 17, and the other side of said band has another pointer 18 to register on another chart 19. The endless band passes over the drum 5 and over an idler (or loosely mounted) pulley 20, said parts being grooved to receive the band and insure its retention and operation.

I am aware that changes in the form and proportion of parts and details of construction of the mechanisms herein shown and described as an embodiment of my invention can be made without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such modifications as fairly fall within the scope of my invention.

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

1. The combination of a primary electric circuit, a track-contact included in said circuit, a circuit-closer carried by a train or other moving body, a signal device included in a shunt-circuit, a resistance included in the ground connection of the primary circuit, and a battery of sufficient tension to overcome the resistance and shunt the signaling device into the primary circuit, substantially as and for the purpose described.

2. The combination of a primary electric circuit, a track-contact included in said circuit, a moving contact carried by a train or other moving body and adapted to engage with said track-contact, a signaling device included in a shunt-circuit and carried by a train or moving body, a resistance connected to the ground connection of the primary circuit on the train or moving body, a battery of sufficient tension to overcome the resistance and shunt the signaling device into the primary circuit, and a switch for shunting the battery in and out of the primary circuit, substantially as described.

3. The combination of a primary circuit, a track-contact, a moving contact or circuit-closer carried by a train or moving body and having a ground connection, an electrically-controlled recording device included in the

primary circuit to indicate the position of a train or moving body, a battery normally included in said circuit to operate the said recording device as the circuit is made and broken, a signaling device carried by a train or moving body and included in a shunt-circuit around the resistance, the resistance connected to the ground connection on the train of the primary circuit, and a battery adapted to be switched into the primary circuit and of sufficient force or tension to overcome the resistance and shunt the signaling device into the primary circuit, for the purpose described, substantially as set forth.

4. The combination of a primary circuit, a track divided into a series of sections, each having one or more stationary contacts, a moving contact or circuit-closer carried by a train or other moving body and having a ground connection through the wheel and track, an electrically-controlled recording device included in the primary circuit and operated as the circuit is made or broken to indicate the position and progress of a train or moving body, a battery normally included in said primary circuit to operate said recording device, a signaling device carried by the train or moving body and included in a shunt-circuit thereon, the resistance coil or magnet included in the ground connection of the moving contact or circuit-closer, another battery of sufficient tension or force to overcome said resistance coil or magnet and shunt the signaling device into the primary circuit, and a switch for shunting said last-mentioned battery into and out of the primary circuit, as and for the purpose described.

5. The combination of a primary circuit including a track-contact, a signaling device carried by a train or moving body and included in a shunt-circuit, the moving contact or circuit-closer also carried by said train or moving body and having a ground connection, the resistance-coil or high-resistance magnet included in said ground connection, the contacts connected, respectively, to the primary and shunt circuits, an armature arranged to be attracted by said high-resistance magnet and to engage said contacts, and a battery included in the primary circuit of sufficient tension to energize the resistance-coil and close the shunt-circuit to include the signaling device in the primary circuit, substantially as described.

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

FRED. H. BROWN.

Witnesses:

C. F. BROWN,  
H. T. BERNHARD.