No. 788,440. PATENTED APR. 25, 1905.

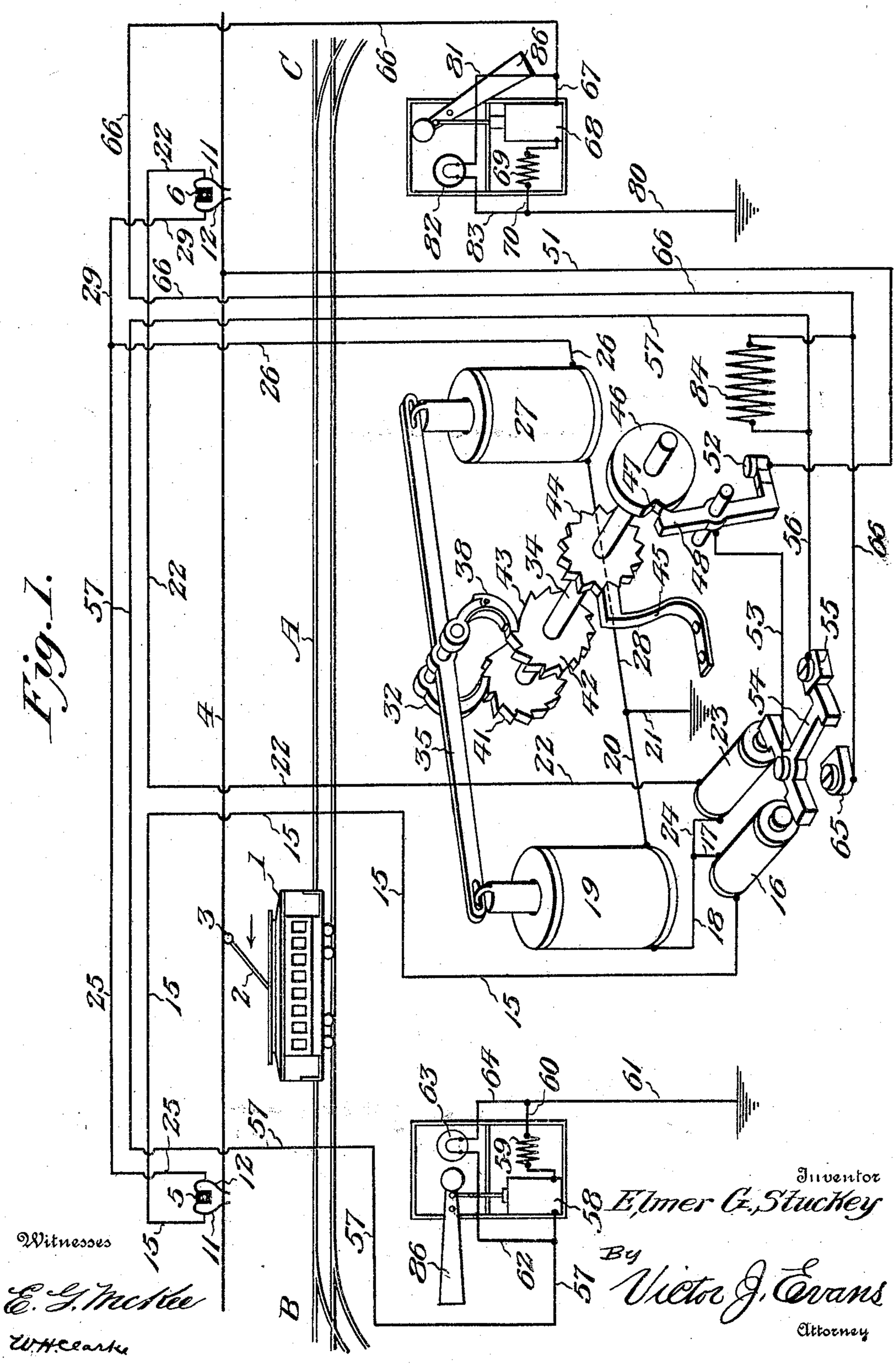
E. G. STUCKEY.

BLOCK SIGNALING SYSTEM.

APPLICATION FILED DEC. 13, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

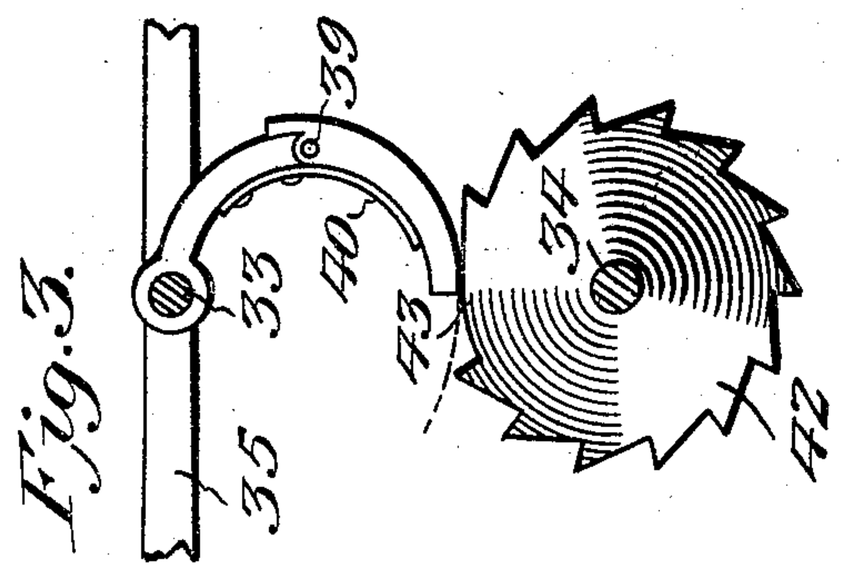

Fig. 3.

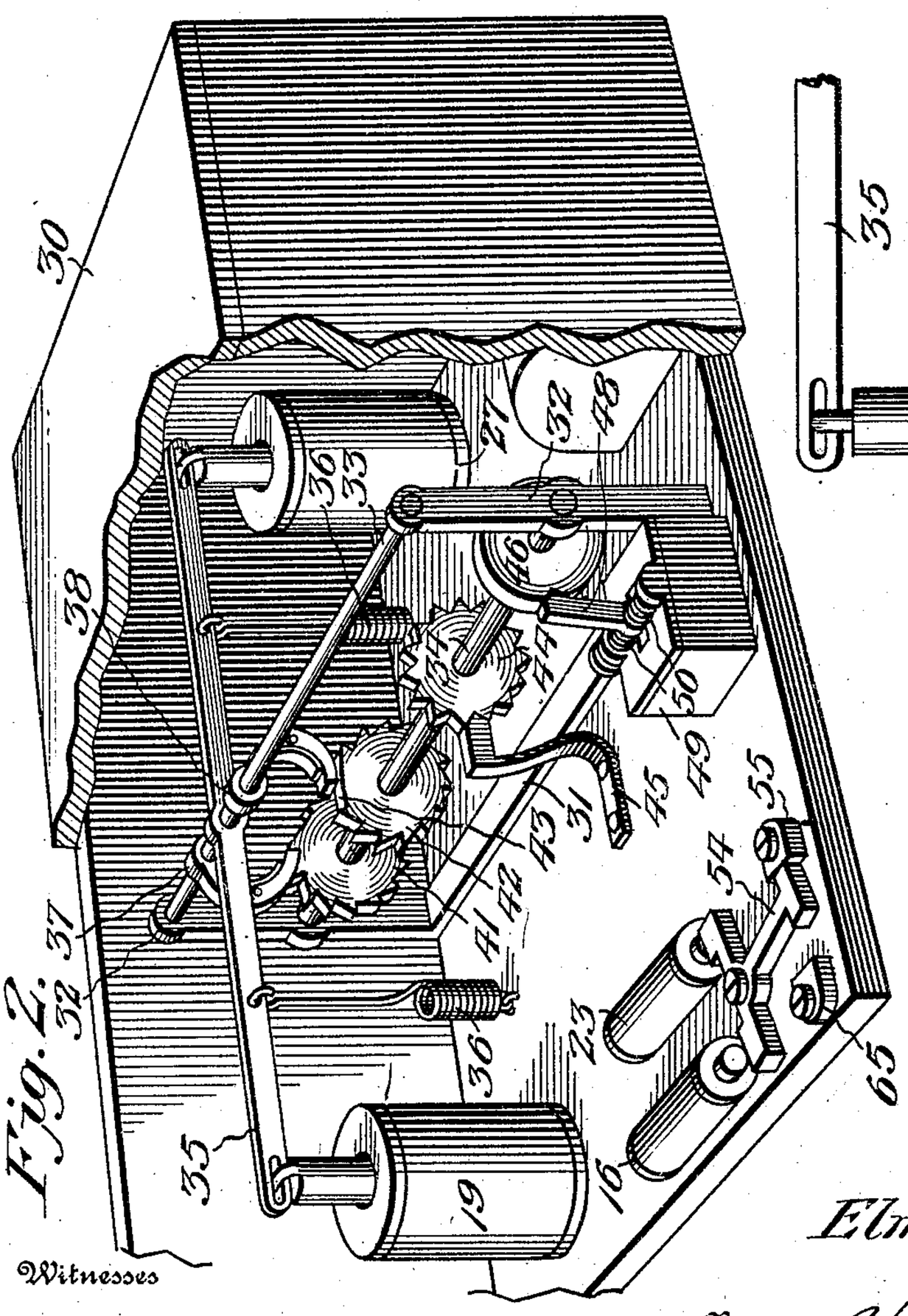

Fig. 2.

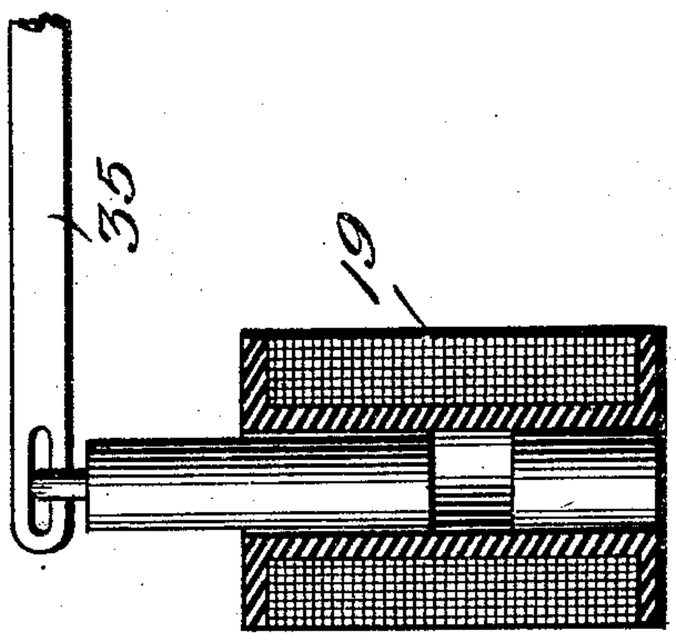

Fig. 4.

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3 SHEETS—SHEET 3.

Fig. 6.

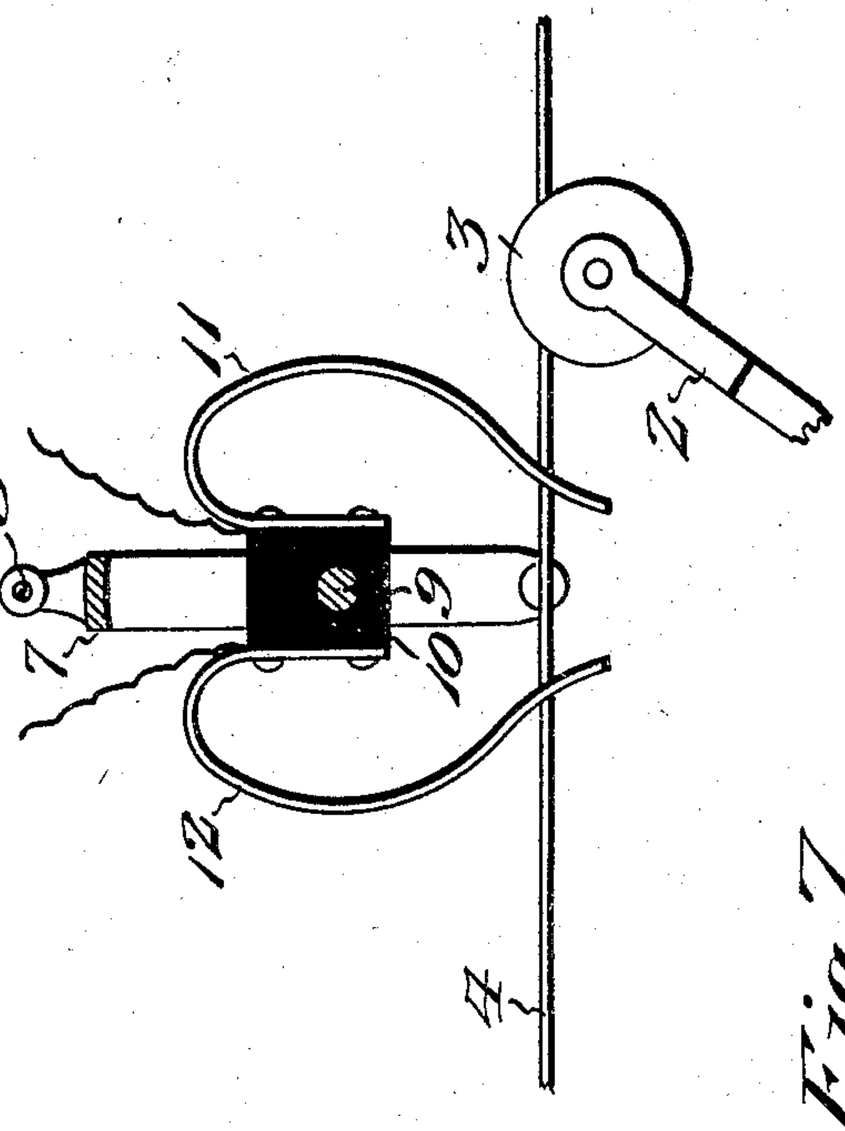


Fig. 5.

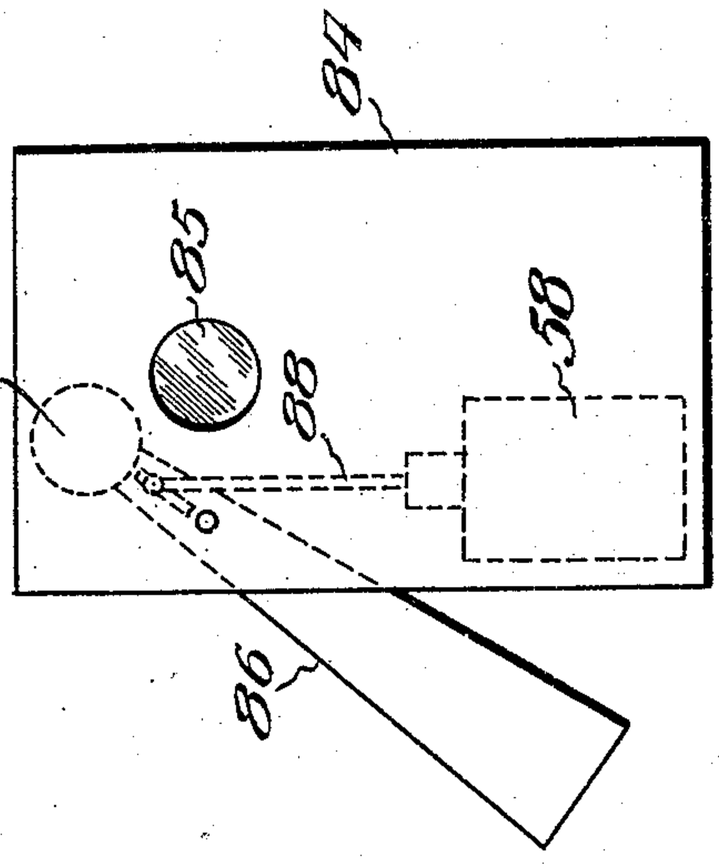
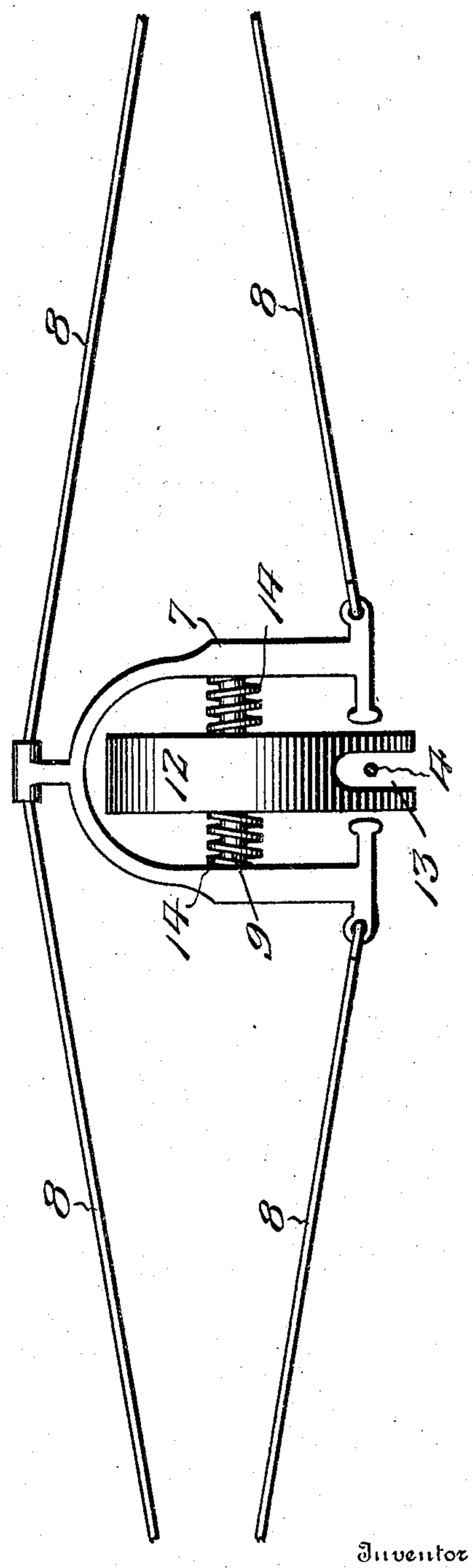


Fig. 7.



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UNITED STATES PATENT OFFICE.

ELMER G. STUCKEY, OF LEAVENWORTH, KANSAS.

BLOCK-SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 788,440, dated April 25, 1905.

Application filed December 13, 1904. Serial No. 236,705.

To all whom it may concern:

Be it known that I, ELMER G. STUCKEY, a citizen of the United States, residing at Leavenworth, in the county of Leavenworth and State of Kansas, have invented new and useful Improvements in Block-Signaling Systems, of which the following is a specification.

This invention relates to block-signaling systems such as are employed in connection with electric railways.

The objects of the invention are to improve and simplify signaling systems of this character, as well as to increase their efficiency in operation.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in a block-signaling system embodying improved means to actuate a signal at one end of a block when a car enters the opposite end thereof.

The improved system of this invention also embodies improved means for maintaining the signal in operation when a number of cars enter the block and for discontinuing the actuation of the signal when the last car leaves the block. Furthermore, when the block includes a car-shed or repair-shop improved means are provided whereby a car may leave the block without actuating the signal.

One practical embodiment of the present invention is illustrated in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic view of the improved block-signaling system. Fig. 2 is a perspective view, partly broken away, of electromechanical devices adapted to be used in connection with the invention. Fig. 3 is a detail view of an improved step-by-step device suitable for use in connection with the invention. Fig. 4 is a detail sectional view of an electromagnet. Fig. 5 is an elevation of one of the block-signals. Fig. 6 is a sectional view, partly in elevation, of a circuit-closing device. Fig. 7 is a view at right angles to Fig. 6.

Like reference characters indicate corresponding parts in the different views.

The improved signaling system of this invention is particularly adapted for use in connection with a single-track electric railway having switches or side tracks at suitable intervals for permitting the cars to pass each other. It will be understood, however, that the ideas of invention herein disclosed can be utilized, if desired, in connection with railways having a plurality of tracks.

In the embodiment of invention illustrated the reference-letter A indicates a block, and B C indicate switches or side tracks.

The car 1 is provided with the usual trolley-pole 2 and trolley-wheel 3, contacting with the overhead trolley 4.

A circuit-controlling device, such as 5, is arranged at one end of the block, a similar circuit-controlling device 6 being arranged at the other end of the block. While any suitable form of circuit-controlling devices 5 6 may be employed in carrying out the present invention, the preferred form of circuit-controller is illustrated in Figs. 6 and 7 of the drawings as comprising a yoke 7, which is suspended above the trolley 4 by means of supporting-wires 8, which are connected with suitable poles on opposite sides of the track. Mounted in the yoke 7 is an axle or shaft 9, on which is rotatably mounted a block of insulating material 10, having connected to the opposite ends thereof downwardly-bent contacting members 11 and 12. Each of the contacting members 11 and 12 is formed in its lower end with a slot 13, which straddles the trolley-wire 4. The block of insulating material 10 is held normally in the position illustrated by Fig. 6 by means of coil-springs 14, which are connected at their outer ends to the yoke 7 and at their inner ends to the block 10. When the trolley-wheel 3 of a moving car strikes one or the other of the contacting members 11, the block 10 is rotated, thus permitting the trolley-wheel to pass beneath the circuit-controlling device without striking the other contacting member thereof. As soon as the trolley-wheel has passed the circuit-controlling device the coil-springs 14 restore it to normal position.

The improved signaling system of this invention comprises what I shall for convenience term an "incoming" circuit for each end of the block. The incoming circuit at the

end B of the block includes the contacting member 11 of the controlling device 5, the wire 15, an electromagnet 16, wires 17 and 18, electromagnet 19, wire 20, and wire 21 to ground. The incoming circuit for the end C of the block includes the contacting member 11 of the circuit-controlling device 6, the wire 22, electromagnet 23, wires 24 and 18, electromagnet 19, wire 20, and wire 21 to ground.

The improved system also includes what I shall for convenience term an "outgoing" circuit for each end of the block. The outgoing circuit for the end B of the block includes the contacting member 12 of the circuit-controlling device 5, wires 25 and 26, electromagnet 27, wire 28, and wire 21 to ground. The outgoing circuit for the end C of the block includes the contacting member 12 of the circuit-controlling device 6, wires 29 26, electromagnet 27, wire 28, and wire 21 to ground.

The electromechanical devices, which are operated by the two incoming and the two outgoing circuits in the manner hereinafter described, are placed, preferably, in a casing 30, which, as shown in Fig. 2, contains a bracket 31, having uprights 32, in which is journaled a pair of shafts 33 and 34. Mounted rigidly upon the shaft 33 is a lever 35, which is adapted to be actuated by one or the other of the electromagnets 19 and 27, the means for restoring the lever 30 to normal position after it has been actuated by one or the other of the magnets comprising a pair of coil-springs 36. Mounted rigidly upon the shaft 36 is a pair of pawls 37 38, each of which, as shown in Fig. 3, is hinged intermediate its ends at 39, a flat spring 40 being employed to hold the two members of the pawl in proper position with respect to each other. The pawls 37 and 38 are adapted to engage the peripheries of ratchets 41 42, mounted rigidly upon the shaft 33. One of the teeth of the ratchet 42 is removed, as shown at 43, to provide means for permitting a car to leave the block without actuating the signals when it has been placed in a car-shed or repair-shop, as will be set forth more fully hereinafter. A ratchet 44 is rigidly mounted upon the shaft 34, said ratchet being engaged by a spring member 45, which constitutes means to prevent accidental rotation of the shaft. Mounted rigidly upon the shaft 34 is a disk 46, which is formed in its periphery with a notch 47, adapted to be engaged by an armature 48, journaled upon a suitable support 49 and pressed against the disk 46 by means of coil-springs 50. In the following description and claims I shall for convenience term the armature 48 "a common circuit-controlling device" in view of the fact that it is common to two signal-actuating circuits, which will now be described.

Both of the signal-operating circuits include a wire 51, which leads from the trolley 4 to a contact 52, which is adapted to be engaged by the lower end of the common circuit-controlling device 48 when the disk 46 is rotated, so that the upper end of said circuit-controlling device leaves the notch 47, as indicated in Fig. 1. Leading from the common circuit-controlling device 48 the circuit which actuates the signal at the end B of the block includes the wire 53, common armature 54, which is adapted to be actuated by either of the electromagnets 16 and 23, contact 55, wires 56 57, electromagnet 58, resistance-coil 59, wire 60, and wire 61 to ground. The signal-actuating circuit at the end B of the block also connects with a parallel circuit, which includes wire 62, incandescent lamp 63, wire 64, and wire 61 to ground.

The circuit which actuates the signal at the end C of the block includes wire 51, leading from the trolley, contact 52, common circuit-controlling device 48, wire 53, common armature 54, contact 65, wires 66 and 67, electromagnet 68, resistance-coil 69, wire 70, and wire 80 to ground. The last-mentioned circuit also connects with a parallel circuit including wire 81, incandescent lamp 82, wire 83, and wire 80 to ground.

As shown in Fig. 5, the signal at each end of the block preferably comprises a casing 84, having clear-glass windows 85 therein, and a signal-arm 86, having a red glass 87 and adapted to be actuated through a link 88 by the adjacent electromagnet 58 or 68, as the case may be.

The two signal-actuating circuits are connected by a resistance-coil 84.

Arranged as heretofore described, the operation of the improved signaling system is as follows: When a car enters the block at the end C thereof, the trolley-wheel strikes the contact member 11 of the circuit-controlling device 6 and closes the incoming circuit through the wire 22, electromagnet 23, wires 24 and 18, electromagnet 19, wire 20, and wire 21 to ground. The consequent energization of the magnets 23 and 19 causes the common armature 54 to be moved into engagement with the contact 55 and the lever 35 to be rocked, thus through the pawl 32 causing the shaft 34 to be rotated to the right. Upon the rotation of the shaft 34, with its disk 46, the common circuit-controlling device 48 is moved into engagement with the contact 52, thus closing the signal-actuating circuit for the end B of the block. Upon the closing of this signal-actuating circuit, which, as before explained, includes the wire 51, leading from the trolley, contact 52, common circuit-controlling device 48, wire 53, common armature 54, contact 55, wires 56 57, electromagnet 58, resistance-coil 59, wires 60 and 61 to ground, as well as the parallel circuit, including wire 62, incandescent lamp 63, and wires 64 and 65 to ground, the electromagnet 58 is

energized, and the signal-arm 86 is depressed, so that a red light or danger-signal is displayed at the end B of the block, thus indicating that a car has entered the block from the opposite end. Each time a car enters the block from the end C thereof the electromagnet 19 is actuated, thus causing the shaft 34 to be rotated toward the right in a step-by-step manner, said shaft of course moving one step for each car that enters the block. As the first car leaves the block at the end B thereof the trolley-wheel 3 strikes the contact member 12 of the circuit-controlling device 5, thus closing the outgoing circuit through the contact member 12, wires 25 26, electromagnet 27, and wires 28 and 21 to ground. Each time a car leaves the block at the end B the electromagnet 27 is energized, thus rocking the lever 35 and causing the shaft 34 to be rotated one step toward the left. It will be apparent that when the last car leaves the block the shaft 34 will be in the position it originally occupied, for which reason the common circuit-controlling device 48 will rest in the notch 47 of the disk 46 and the signal-actuating circuit will be broken. Each time, for example, the circuit which actuates the signal at the end B of the block is closed in the manner described a parallel circuit is formed through the wire 51, leading from the trolley, contact 52, common circuit-controlling device 48, wire 53, common armature 54, contact 55, wire 56, resistance-coil 84, wires 66 81, incandescent lamp 82, and wires 83 and 80 to ground. The function of the resistance-coil 84 is to weaken the last-mentioned circuit in such manner that its strength will be insufficient to energize the electromagnet 68 and to operate the adjacent signal-arm 86. For this reason the entrance of a car at the end C of the block will display a red light or danger-signal at the end B thereof and will show a white light at the end C, thus indicating to the motorman of the next car which enters the block that one car has previously entered.

The function of the resistance-coils 59 and 69 adjacent to the signal-actuating electromagnets 58 and 68 is to prevent said magnets from being burned out by the intensity or strength of the current passing therethrough from the trolley.

As previously indicated, the signaling system of this invention is adapted to be applied to a block which includes a car-shed or repair-shop. For this reason the ratchet 42 upon the shaft 34 has one of its teeth removed, as indicated at 43. For this reason when a car leaves the block without having previously entered the same from the opposite end the electromagnet 27 will be actuated; but as the pawl 38 will glide idly over the surface 43 the shaft 34 will not be rotated toward the left.

Changes in the precise embodiment of invention illustrated and described may be made within the scope of the following claims without departing from the spirit of the invention or sacrificing any of its advantages.

Having thus described the invention, what is claimed as new is—

1. An electric block-signaling system having an incoming circuit and an outgoing circuit for each end of the block, a common electromagnet for the two incoming circuits, a common electromagnet for the two outgoing circuits, a common circuit-controlling device operated by the two common electromagnets, a signal-actuating circuit for each end of the block, the two signal-actuating circuits being connected with the common circuit-controlling device, a common armature adapted simultaneously to open one of the signal-actuating circuits and to close the other, and an electromagnet in each of the incoming circuits adapted to actuate the common armature.

2. An electric block-signaling system having an incoming circuit and an outgoing circuit for each end of the block, a common electromagnet for the two incoming circuits, a common electromagnet for the two outgoing circuits, a step-by-step device adapted to be actuated by the two common electromagnets, a common circuit-controlling device adapted to be actuated by the step-by-step device, a signal-actuating circuit for each end of the block, the two signal-actuating circuits being connected with the common circuit-controlling device, a common armature adapted simultaneously to open one of the signal-actuating circuits and to close the other, and an electromagnet in each of the incoming circuits adapted to actuate the common armature.

3. An electric block-signaling system having an incoming circuit and an outgoing circuit for each end of the block, a common electromagnet for the two incoming circuits, a common electromagnet for the two outgoing circuits, a common circuit-controlling device adapted to be actuated by the two common electromagnets, a signal-actuating circuit for each end of the block, the two signal-actuating circuits being connected with the common circuit-controlling device, a common armature adapted simultaneously to open one of the signal-actuating circuits and to close the other, an electromagnet in each of the incoming circuits adapted to actuate the common armature, a resistance element connecting the two signal-actuating circuits, and signaling means actuated by the two signal-actuating circuits.

4. An electric block-signaling system comprising a step-by-step device, a circuit for actuating said step-by-step device each time a car enters or leaves the block, means for permitting a car within the block to leave the same without actuating the step-by-step device, and a signal-actuating circuit controlled by the step-by-step device.

5. An electric block-signaling system having a step-by-step device, a ratchet associated

with said step-by-step device and having one of its teeth removed, an incoming and an outgoing circuit for actuating said step-by-step device each time a car enters or leaves the block, and a signal-actuating circuit controlled by the step-by-step device.

6. An electric block-signaling system having an incoming circuit and an outgoing circuit for each end of the block, means actuated by an incoming car for closing each of the incoming circuits, means actuated by an outgoing car for closing each of the outgoing circuits, a common electromagnet for the two incoming circuits, a common electromagnet for the two outgoing circuits, a step-by-step device having a ratchet adapted to be actuated by the common electromagnet of the incoming circuits, and a ratchet adapted to be actuated by the common electromagnet of the outgoing circuits, said last-mentioned ratchet having one of its teeth removed, a common circuit-controlling device adapted to be actuated by the step-by-step device, a signal-actuating circuit for each end of the block, the two signal-actuating circuits being connected with the common circuit-controlling device, and signal means controlled by each signal-actuating circuit.

7. An electric block-signaling system having an incoming circuit and an outgoing circuit for each end of the block, a circuit-controlling device at each end of the block, each of the said circuit-controlling devices comprising a body of insulating material pivotally mounted adjacent to the trolley and having downwardly-extending contact members, one of the contact members of each body of insulating material being connected with one of the incoming circuits and the other contact member being connected with one of the outgoing circuits, a common electromagnet for the two incoming circuits, a common electromagnet for the two outgoing circuits, a lever adapted to be actuated by the two common electromagnets, a step-by-step device adapted to be actuated by the lever, a ratchet associated with said step-by-step device and having one of its teeth removed, a common circuit-controlling device adapted to be actuated by the step-by-step device, a signal-actuating circuit for each end of the block, the two signal-actuating circuits being connected with the common circuit-controlling device, a common armature adapted simultaneously to open one of the signal-actuating circuits and to close the other, an electromagnet in each of the incoming circuits adapted to actuate the common armature, a resistance element connecting the two signal-actuating circuits, an electromagnet in each of the signal-actuating circuits, a signal-arm adapted to be actuated by each of the last-mentioned electromagnets, a resistance-coil in each of the signal-actuating circuits adjacent to the electromagnet thereof, a parallel circuit connected with each of the signal-actuating circuits, and a lamp connected with each of the parallel circuits.

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

ELMER G. STUCKEY.

Witnesses:
W. H. FELLOWS,
J. N. JOEGER.