

No. 883,350.

A. L. RUTHVEN,

PATENTED MAR. 31, 1908.

COMBINATION SIGNAL AND TRAIN STOPPING APPARATUS.

APPLICATION FILED JUNE 15, 1907.

2 SHEETS—SHEET 1.

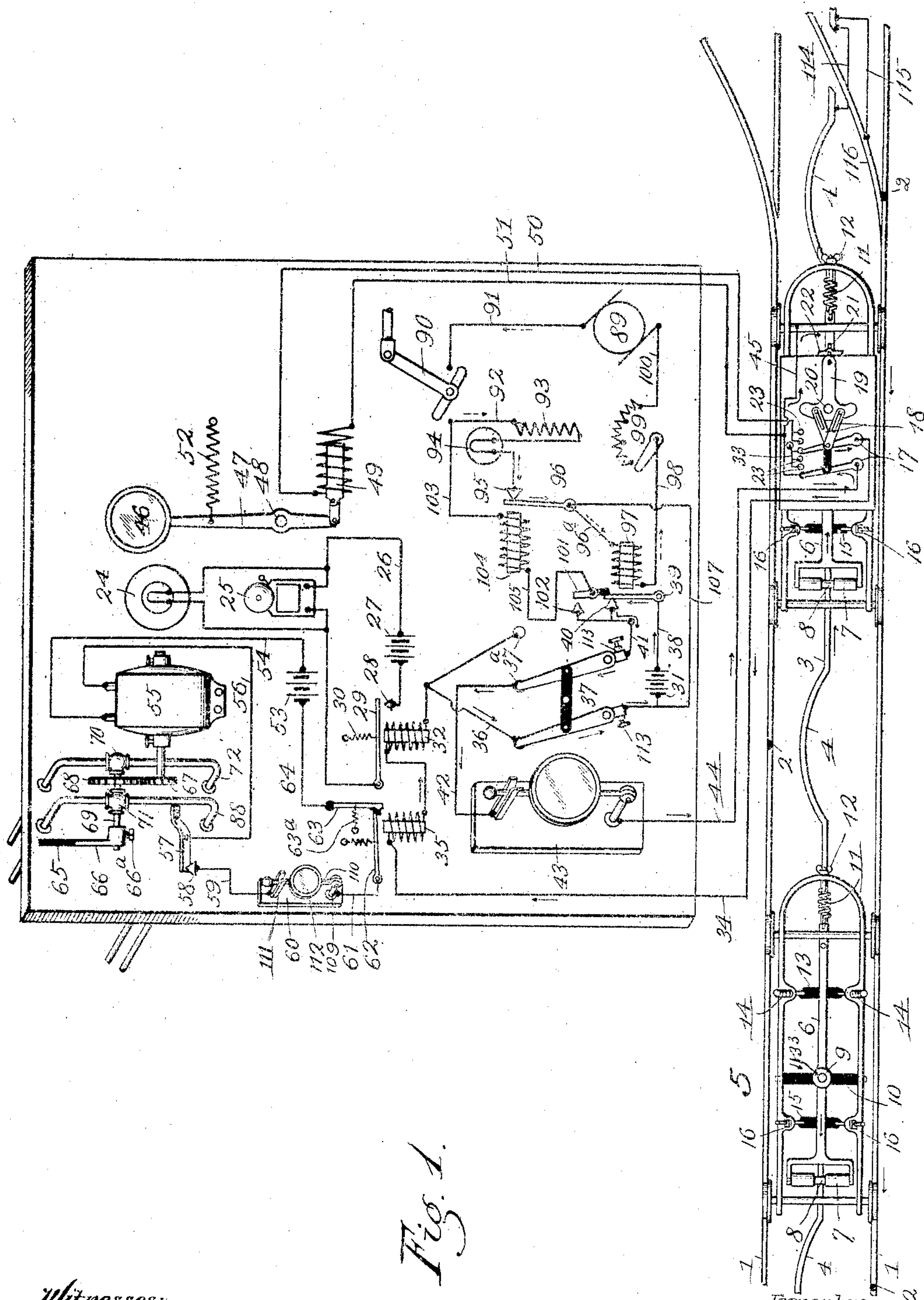


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2

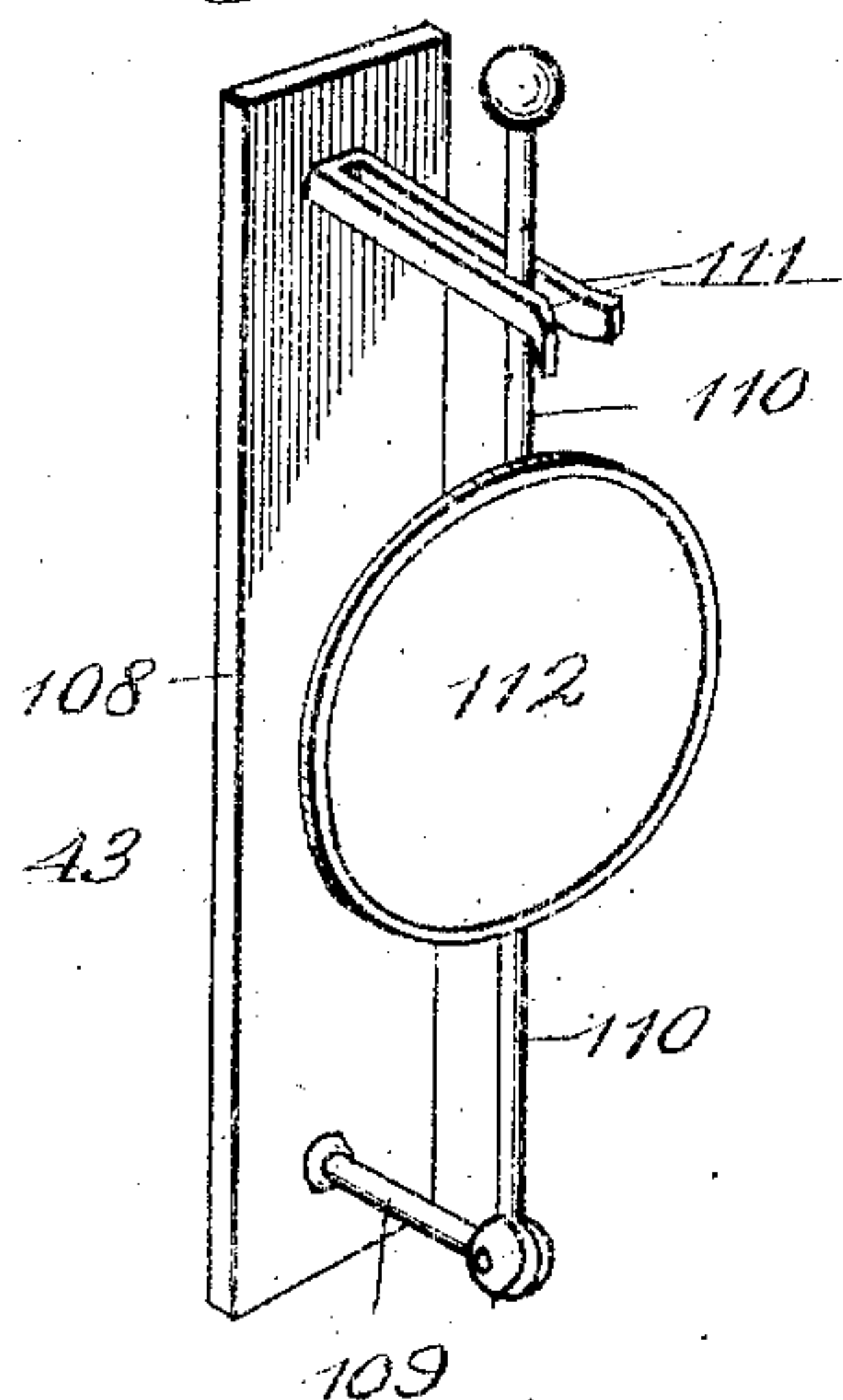


Fig. 3

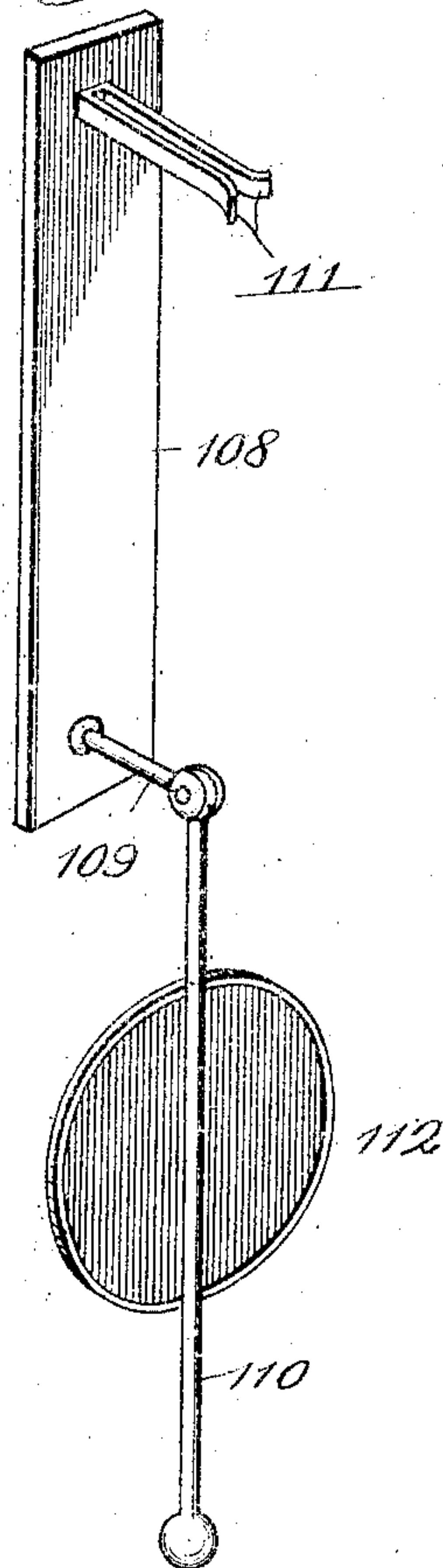


Fig. 5

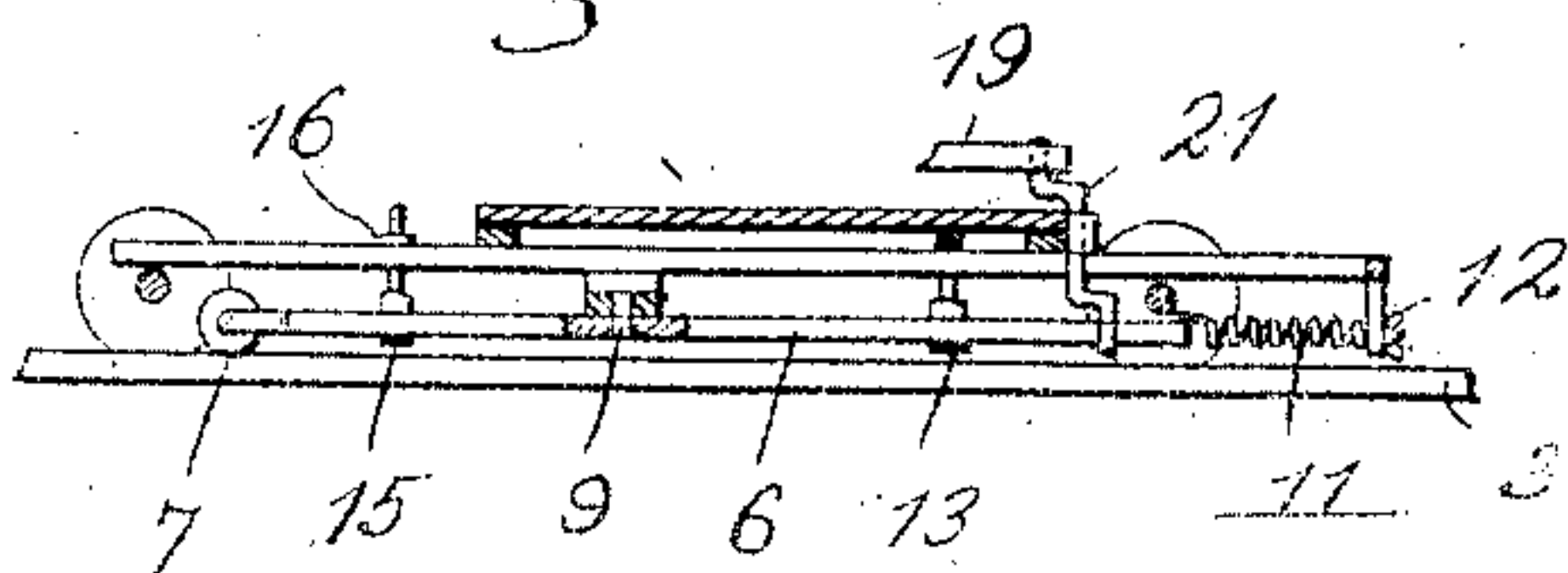
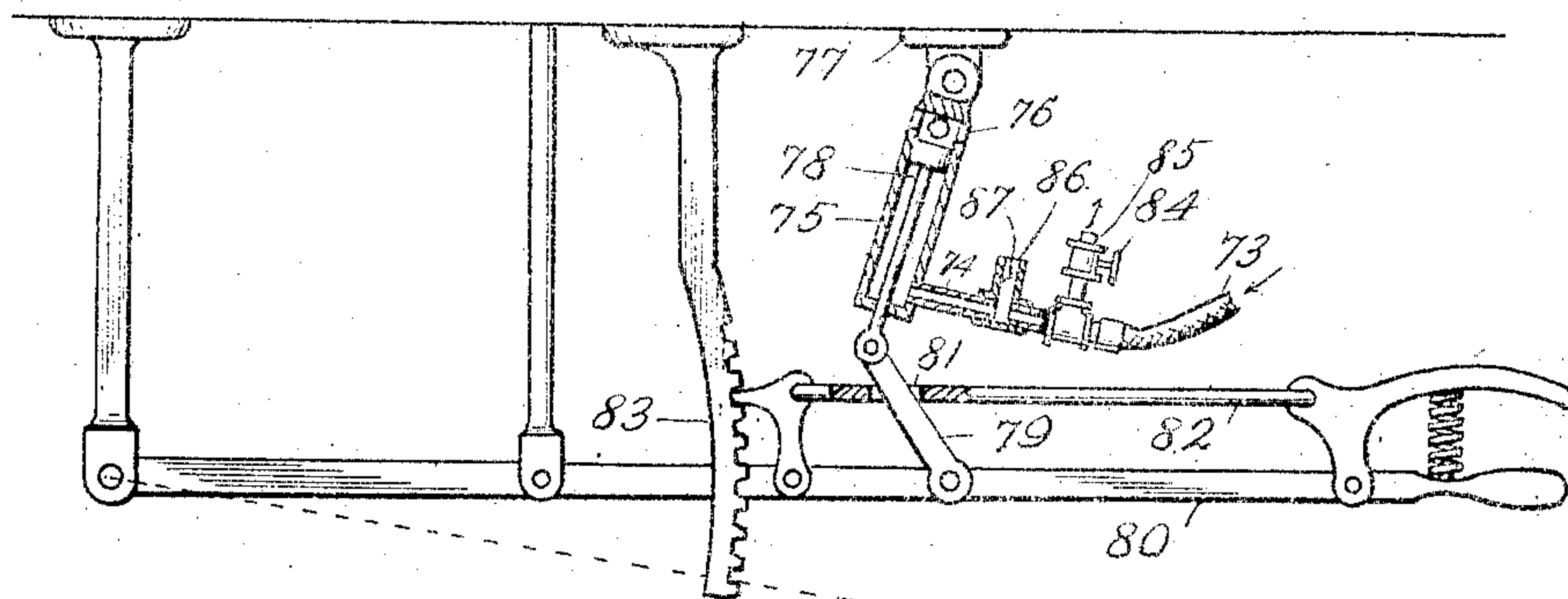


Fig. 4



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UNITED STATES PATENT OFFICE.

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COMBINATION SIGNAL AND TRAIN-STOPPING APPARATUS.

No. 883,350.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed June 15, 1907. Serial No. 379,177.

To all whom it may concern:

Be it known that I, ALFRED L. RUTHVEN, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Combination Signal and Train-Stopping Apparatus, of which the following is a specification.

My invention relates to improvements in combined signals and train stopping apparatus in which the signals and apparatus are carried on the train, and my objects are, first, to notify the engineers of two trains when the latter are within a given distance of each other so that precautionary measures may be taken to avert collision; second, to indicate by the signals upon each train in which direction the other train is traveling; third, to indicate by the signals the approach of the train to an open switch, and fourth, to automatically stop the train should the engineer fail to heed the signals.

In the accompanying drawings I have shown the preferred form of the invention and the best method of applying the principles thereof; but it is to be understood that I do not limit myself to the details of construction shown, as it is obvious that changes such as might suggest themselves to persons skilled in the art may be made without departing from the spirit or scope of the invention.

Referring now to the accompanying drawings which illustrate the invention: Figure 1 represents a diagram of a track divided into blocks with a car or locomotive upon the track equipped with my improved apparatus. Figs. 2 and 3 are detail perspective views of a manually-operable switch in its operative and inoperative positions. Fig. 4 is an elevation of a throttle and means for automatically closing the same. Fig. 5 is a broken side elevation of the locomotive and trolley employed in carrying out the invention.

1 designates a track, the rails of which are divided into blocks of suitable length by insulation points 2, the points of one rail being arranged alternately with respect to those on the opposite rail so the blocks will overlap.

3 designates a third rail or a continuous conductor, arranged between the rails of the track and provided with offsets 4 arranged, preferably, opposite the insulation points 2.

The upper surface of said third rail is higher than the surface of the track rails for a purpose which will hereinafter appear.

5 designates a car or locomotive provided with a trolley arranged to travel upon the third rail. Said trolley consists of a bar 6 and a roller 7, which latter has a centrally-disposed groove 8 for guiding it upon the third rail. Bar 6 is pivotally mounted upon a pin 9 so that its ends may swing laterally to permit roller 7 to follow offsets 4 and actuate a pole-changer as hereinafter described. The ends of bar 6 are also free to move up and down under tension so that roller 7 may accommodate itself to any undulations which may exist in the upper surface of the third rail. In order to allow this up and down movement, pin 9 is secured to an insulated transverse rock-shaft 10 pivotally mounted in the frame of the locomotive. Trolley-bar 6 is normally held in alinement with the third rail by means of a retractile spring 11, the front threaded end of which extends through the frame of the locomotive and is provided with a thumb-screw 12 for regulating the tension of said spring.

Roller 7 is reliably held in contact with the third rail by an insulated transverse bar 13 engaging the under forward portion of the trolley-bar, and caused to exert upward pressure thereon by a pair of expansion springs 14. The downward movement of roller 7 is limited so that it will not contact with crossing or switch rails, by an adjustable stop 15 arranged beneath the under rear portion of the trolley-bar and provided with nuts 16 which engage its threaded ends for the purpose of adjusting said stop up or down.

17 designates the pole-changer which is automatically actuated by the trolley every time roller 7 passes around one of the offsets 4, which latter are preferably of long radius to give the trolley and the pole-changer ample time in which to operate. The connection between the trolley and the pole-changer is made through the medium of a pair of links 18 pivoted at their rear ends to the pole-changer, a T-lever 19 loosely connected to the forward ends of the links and pivotally mounted upon a pin 20 projecting from the frame 5, and a crank-shaft 21 mounted in a bearing 22 and connected to the forward end of the T-lever and bar 6. Thus when roller 7 passes around one of the

offsets 4, while the locomotive is traveling in a certain direction the forward end of the trolley-bar will be swung laterally, and through the instrumentality of T-lever 19 and one of the links 18, successively swing the arms of the pole-changer into engagement with contact points 23, and when the locomotive is traveling in the opposite direction the above operation will be repeated, except that the pole-changer will be actuated by the other link 18. By thus automatically shifting the pole-changer upon entering each block, it will be impossible for a second train to enter the same block with a preceding one without each engineer being notified by signals within the locomotive cabs, whereas if the pole-changer upon the following train were not automatically actuated upon entering the block, no signal would be given because the same poles of the batteries are connected with the third rail and would thus neutralize each other.

The signals above referred to, consist of a lamp 24 and a bell 25, arranged in what I will term a combination visual and audible signal circuit consisting of a wire 26, a battery 27, a contact terminal 28, and an armature 29, which latter is normally held away from terminal 28 by a retractile spring 30, so that said circuit will be normally open.

Should two trains, however, enter the same block, a main current will be closed by the trolleys, so that current from a main battery 31, in said circuit, will energize an electromagnet 32 also in the main circuit and cause said magnet to attract armature 29 into engagement with terminal 28.

The main circuit may be traced beginning with the third rail 3, through the trolley to a wire 33, to one arm of the automatic pole-changer, through a wire 34, through magnets 35 32, respectively, through a wire 36 to one arm of a manually-operable pole-changer 37, to the main battery 31, wire 38, an armature 39, a contact terminal 40, a wire 41, the other arm of the pole-changer 37, a wire 42, a main switch 43, a wire 44, the other arm of the automatic pole-changer, and a wire 45 to the running gear of the locomotive, whereby communication is made with the track rails. This circuit is normally open by reason of there being no electrical connection between the track rails and the third rail.

Should two trains traveling in the same direction enter the same block, the engineers will be notified as to who is in advance by the visual signal in the first locomotive remaining clear, while a translucent target, preferably colored red, will be thrown in front of the lamp in the following locomotive. The operation of the target on the following locomotive will occur by reason of the fact that it enters the block last, and hence the lateral movement of its trolley, effected by the offset 4 at the beginning of said block, will oc-

cur while the trolley on the preceding locomotive is traveling upon a straight portion of the third rail.

The operation of the target is effected as follows: As the trolley on the second locomotive sweeps around the offset 4 it will, through the intermediacy of the connecting parts cause the arms of the automatic pole-changer to successively engage the contacts 23 and thus intermittently close communication between the main circuits on both locomotives, so that the signals on each will be intermittently operated. But in addition to the main circuit on the rear locomotive being closed, the target-actuating circuit thereon will also be closed and thus intermittently throw the colored translucent target, above referred to, in front of the lamp. Said target consists of the translucent portion 46 and a lever 47. Lever 47 is fulcrumed upon a pin 48 and controlled by a solenoid 49, arranged in what I will term the target circuit, which consists of two wires 50 51 connected to one set of the contact terminals 23 and wire 45, respectively, hence when the arms of the automatic pole-changer are shifted, the main current will pass through said wires and energize the solenoid 49, which in turn will operate the target. When the target circuit is broken the target will be thrown back to normal position by a retractile spring 52.

In addition to providing the signals, above described, I also equip each locomotive with a motor circuit for controlling the throttle and the air-brakes, so that the locomotives will be automatically stopped should the engineers fail to heed the signals. Said motor circuit consists of a battery 53, a wire 54 leading from one pole thereof to a motor 55, a wire 56 leading from the motor to a resilient contact 57, a contact terminal 58, which is normally engaged by the resilient contact 57, a wire 59, a manually-operable switch 60, a wire 61, an armature 62, a latch 63, and a wire 64 leading to the opposite pole of the battery. This circuit is normally open by reason of the fact that the free end of armature 62 is normally held in engagement with an insulation point on latch 63, but when magnet 35 is energized by reason of the main current passing therethrough, it will attract armature 62, causing it to push latch 63 back against the action of its spring 63^a so that the armature will be permitted to engage the exposed end of the latch and close the motor circuit. When this occurs the motor will be operated by the resultant current until the insulated end 65 of a lever 66 is swung downwardly into engagement with the resilient contact 57 and breaks the current by forcing said contact away from terminal 58. The operation of the lever is effected by the motor through the intermediacy of two cog-wheels 67 68, the former of which is mounted upon the motor shaft, while the latter is

mounted upon the stem 69 of two valves 70 71. Valve 70 controls the flow of motive fluid through a pipe 72, leading either from the locomotive boiler or the air-brake system of the train to a hose connection 73 communicating with a pipe 74, leading to a cylinder 75 provided at one end with exhaust ports 76, and pivotally secured at said end to a bracket 77. Said cylinder is provided with a plunger 78 pivotally connected at its outer end to a link 79 pivotally secured to the throttle 80.

Link 79 extends through a hole 81 in the latch-rod 82 of the throttle and when the latter is open, as indicated by dotted line *a*, the link 79 and the cylinder 75 occupy the same relative position to each other as shown in Fig. 4, with the exception that the plunger will be at the end of its outward stroke. Hence when valve 70 is opened the motive fluid will be admitted to cylinder 75 to force the plunger inward and straighten out the toggle formed by the plunger and the link, causing the latter to release the latch from segment 83 and close the throttle.

Should the engineer desire to immediately open the throttle, he may do so by opening switch 60, restoring lever 66 to normal to close valve 70, and opening a valve 84 to permit the motive fluid to exhaust from cylinder 75 through pipe 74 and an exhaust pipe 85 communicating with pipe 74 and controlled by the valve 84. The plunger is prevented from interfering with the free operation of the throttle, when there is no motive fluid in cylinder 75, by admitting the outer atmosphere to said cylinder through a port 86, so that a vacuum will not be formed therein when the plunger is pushed inwardly. Port 86 is normally closed by an inwardly opening check or leaf valve 87 to prevent the air from exhausting through said port.

The brakes are simultaneously set with the closing of the throttle by air under pressure passing through a by-pass 88 communicating with the air-brake system and controlled by valve 71.

Lever 66 is adjustably secured to stem 69 by a set-screw 66^a so that its free end may be set close to contact 57 when it is desired to only open valves 70 71 part way, it being readily understood that when said valves are only partly opened the motive fluid will act upon the throttle and the air-brakes gradually so that the train will not be abruptly checked. Should it be desirable to have two trains pass over the same block, while traveling in the same direction, the motor circuit may be cut out by opening switch 60 which is a duplicate of switch 43.

When the direction of the train is reversed to that shown in the drawings the arms of the manually-operated pole-changer 37 are shifted into engagement with contact point 37^a. Hence when two trains approaching each other, come upon the same block, their

respective batteries will be oppositely connected so that the current will flow through the circuit through both trains, and thus continually operate the signal devices. By thus keeping the signals in continual operation the engineers will be notified that they are approaching head on, so that they may take precautionary measures to avert a collision.

When the atmospheric conditions are such that the battery 31 will not supply sufficient voltage, I cut out said battery and cut in a dynamo 89 by closing a manually-operable switch 90, so that a circuit will be established from the dynamo through a wire 91, switch 90, a wire 92, a resistance-coil 93, a signal-light 94, a terminal contact 95, an armature 96, a wire 96^a, a relay 97, a wire 98, a rheostat 99 for regulating the voltage, and back to the dynamo through a wire 100.

The passing of the current through relay 97 will energize the same and cause it to draw armature 39 away from terminal 40, and thus automatically cut out battery 31. The end of armature 39 is in constant engagement with the insulated end of a switch 101, hence when it is attracted by relay 97 it will throw said switch into contact with a terminal 102, communicating with wire 41, and provide a path from the dynamo circuit to the main circuit through the pole-changer 37. Thus if said main circuit is closed by two trains upon the same block the current, instead of passing through the resistance-coil 93, will follow the easier path to the main circuit through a wire 103, a relay 104, a wire 105, switch 101, and terminal 102. As the current passes through relay 104 it will energize the same so that it will attract armature 96 away from terminal 95, and thus extinguish the lamp 94. The current will then return to the dynamo from the main circuit through wire 36, one of the arms of the pole-changer 37, a wire 107, wire 96^a, relay 97, wire 98, rheostat 99, and wire 100.

Switch 43 consists of a plate 108, an arm 109 projecting therefrom, a handle 110 pivotally secured at its lower end to said arm, and a resilient bifurcated contact 111 for frictionally engaging the handle and normally holding the switch closed. Handle 110 is provided with a target 112, one side of which is white, while the opposite side is preferably colored red. Hence when the switch is thrown open, see Fig. 3, to break the main circuit for the purpose of interrupting communication between the trains, the red side of the target will be in view to remind the engineer of said interruption.

Pole-changer 37 is provided with a pair of binding-posts 113, so that a telephone circuit may be established between two trains in the same block if desired.

The signals in the cab will be actuated on the approach of the train to an open switch

by reason of the fact that the main circuit will be closed through a wire 114, the middle rail, a wire 115, the switch rail 116, and the main rail against which the switch rail is thrown.

Having thus described my invention what I claim is:—

1. In an apparatus of the character described, a series of sectional conductors arranged along the track, suitable connecting means with the train, a circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, a visual signal which is operated by the closing of the circuit, and a target which is thrown in front of the visual signal each time the circuit is closed and the pole-changer is shifted.

2. In an apparatus of the character described, sectional conductors arranged along the track, suitable connecting means with the train, a circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, a visual signal which is operated by the closing of the main circuit, a translucent target which is thrown in front of the visual signal each time the circuit is closed and the pole-changer is shifted, and means for retracting said target each time the circuit is opened.

3. In an apparatus of the character described, a series of sectional conductors arranged along the track, suitable connecting means with the train, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, a combination audible and visual signal circuit which is closed by the closing of the main circuit, and a colored translucent target which is thrown in front of the visual signal each time the combination circuit is closed and the pole-changer is shifted.

4. In an apparatus of the character described, a series of sectional conductors arranged along the track, suitable connecting means with the train, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, a toggle connected with the throttle for closing the same, said toggle including a plunger and a link which latter extends through the throttle latch-rod, a cylinder in which the plunger operates, a pipe for conducting motive fluid to the cylinder, a valve for normally closing said pipe, a motor for opening said valve, a circuit containing said motor which circuit is closed by the closing of the main circuit, and means actuated by the motor for breaking its circuit after the valve has been opened.

5. In an apparatus of the character described, a series of sectional conductors ar-

ranged along the track, suitable connecting means with the train, a battery, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, means connected with the throttle for closing the same, a pipe for conducting motive fluid to the throttle closing means, a valve for normally closing said pipe, a motor for opening said valve, a circuit containing said motor which circuit is closed by the closing of the main circuit, and adjustable means actuated by the motor for breaking its circuit after the valve has been opened.

6. In an apparatus of the character described, a series of sectional conductors arranged along the track, suitable connecting means with the train, a battery, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, a toggle connected with the throttle for closing the same, said toggle including a plunger and a link which latter extends through the throttle latch-rod, a pivotally mounted cylinder in which the plunger operates, a pipe for conducting motive fluid to the cylinder, a valve for normally closing said pipe, a motor for opening said valve, a circuit containing said motor which circuit is closed by the closing of the main circuit, a contact in the motor circuit, and a lever actuated by the motor for opening said motor circuit.

7. In an apparatus of the character described, a series of sectional conductors arranged along the track, suitable connecting means with the train, a battery, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, means connected with the throttle for closing the same, a pipe for conducting motive fluid to the throttle closing means, a valve for normally closing said pipe, a motor for opening said valve, a circuit containing said motor which circuit is closed by the closing of the main circuit, a contact in the motor circuit, a lever actuated by the motor for opening said motor circuit, and means for adjustably mounting said lever, for the purpose described.

8. In an apparatus of the character described, a series of sectional conductors arranged along the track, suitable connecting means with the train, a battery, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for automatically shifting the pole-changer, a pivotally-mounted cylinder, a plunger therein, means connecting said plunger to the throttle and its latch, a pipe for conducting motive fluid to the cylinder, a valve for normally closing said pipe, a motor

for opening said valve, and a circuit containing said motor which circuit is closed by the closing of the main circuit.

9. In an apparatus of the character described, a main circuit, means carried by the train for automatically closing said main circuit, a motor circuit which is automatically closed by the main circuit, a motor within said circuit, a toggle connected with the throttle for closing the same, said toggle including a plunger and a link which latter extends through the throttle latch-rod, a cylinder in which the plunger operates, a pipe for conducting motive fluid to the cylinder, and a valve which is geared to the motor for controlling the flow of fluid through the pipe.

10. In an apparatus of the character described, a main circuit, means carried by the train for automatically closing said main circuit, a motor circuit which is automatically closed by the main circuit, a resilient contact forming part of said motor circuit and normally bearing against a terminal contact, a motor within the motor circuit, means actuated by the motor for disengaging the resilient contact from the terminal contact, a toggle connected with the throttle for closing the same, said toggle including a plunger and a link which latter extends through the throttle latch-rod, a pivotally mounted cylinder in which the plunger operates, a pipe for conducting motive fluid to the cylinder, and a valve which is geared to the motor for controlling the flow of fluid through the pipe.

11. In an apparatus of the character described, a main circuit, means carried by the train for automatically closing said main circuit, a motor circuit including a motor, a resilient contact, a terminal contact, a latch having an insulation point and an exposed point, and an armature normally engaging the insulation point; an electro-magnet in the main circuit for attracting the armature into engagement with the exposed point of the latch, and means actuated by the motor for forcing the resilient contact out of engagement with the terminal contact.

12. In an apparatus of the character described, a main circuit, an automatically-operable pole-changer in said circuit, means at intervals along the track for shifting the pole-changer so it may intermittently close the main circuit, a visual signal circuit which is automatically closed by the closing of the main circuit, a lamp in said circuit, a target circuit which is intermittently closed by the closing of the main circuit and the shifting of the pole-changer, and a target which is thrown in front of the lamp each time the target circuit is closed.

13. In an apparatus of the character described, a signal light on the train, a target circuit including a series of contact points, means for sweeping across the contact points to intermittently close the circuit, a

target adapted to swing in front of the signal light, and means in the target circuit for actuating the target each time the circuit is closed.

14. In an apparatus of the character described, a signal light on the train, a target circuit including a series of contact points, means for sweeping across the contact points to intermittently close the circuit, a translucent target adapted to swing in front of the signal light, means for normally holding same inoperative, and a solenoid in the circuit for actuating the target.

15. In an apparatus of the character described, a main circuit including two contact terminals 40 102, a main battery circuit normally communicating with the main circuit and consisting of a battery, a circuit wire leading thereto, a circuit wire 38 leading therefrom, and an armature 39 communicating with wire 38 and normally engaging terminal 40, in combination with a dynamo circuit consisting of a manually-operable switch for opening and closing said circuit, a dynamo in the circuit, a resistance coil, a terminal contact 95, an armature 96 normally engaging contact 95, a lamp between the resistance coil and terminal 95, a relay 97 opposite armature 39 and adapted when energized to attract said armature and automatically interrupt the main battery circuit, a branch-wire, a switch 101 which is thrown into engagement with terminal 102 by armature 39 and automatically closes communication between the main circuit and the dynamo circuit, and a relay 104 communicating with the branch-wire and adapted to cut out the lamp by drawing armature 96 from terminal 95.

16. In an apparatus of the character described, a main circuit including two contact terminals 40 102, a main battery circuit normally communicating with the main circuit and consisting of a battery, a circuit wire leading thereto, a circuit wire 38 leading therefrom, and an armature 39 communicating with wire 38 and normally engaging terminal 40, in combination with a dynamo circuit consisting of a manually-operable switch for opening and closing said dynamo circuit, a dynamo, a relay 97 which when energized attracts armature 39 away from terminal 40 and thus automatically interrupts the battery circuit, and a switch 101 which is thrown by armature 39 into contact with terminal 102 and thus automatically establishes communication between the dynamo circuit and the main circuit.

17. In an apparatus of the character described, a main circuit, means carried by the train for automatically closing said main circuit, a motor circuit which is automatically closed by the main circuit, said motor circuit including a resilient contact normally bearing against a terminal contact, a motor with-

in said circuit, a by-pass pipe communicating with the air-brake system of the train, a valve for normally closing said pipe provided with a stem, connections between the motor and the valve-stem whereby the valve is opened 5 by the motor, and a lever adjustably mounted upon the valve-stem for disengaging the resilient contact from the terminal contact.

10 18. In an apparatus of the character described, a main circuit, means carried by the train for automatically closing said main circuit, a motor circuit which is automatically closed by the main circuit, said motor circuit including a resilient contact normally bearing 15 against a terminal contact, a motor within said circuit, a by-pass pipe communicat-

ing with the air-brake system of the train, a valve for normally closing said pipe provided with a stem, cog-wheels connecting the motor and the valve-stem whereby the valve 20 is opened by the motor, a lever on the valve-stem for disengaging the resilient contact from the terminal contact, and a manually-operable switch in the motor circuit including a target, substantially as described. 25

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

ALFRED L. RUTHVEN.

Witnesses:

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DORA H. WATKINS.