(No Model.) 3 Sheets—Sheet 1.

J. STRINGHAM.

RAILWAY SIGNAL.

No. 539,396. Patented May 14, 1895.

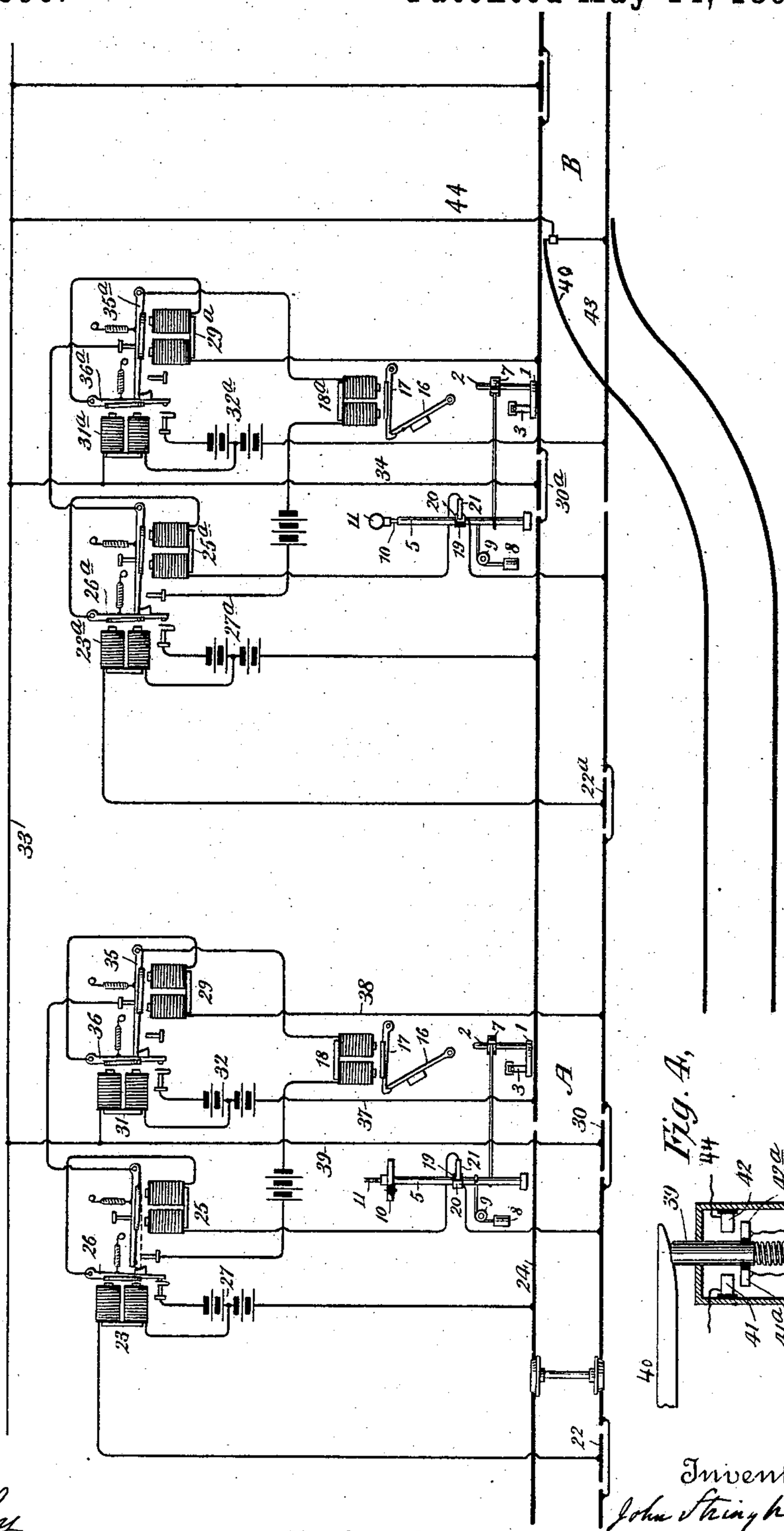

Fig. 1.

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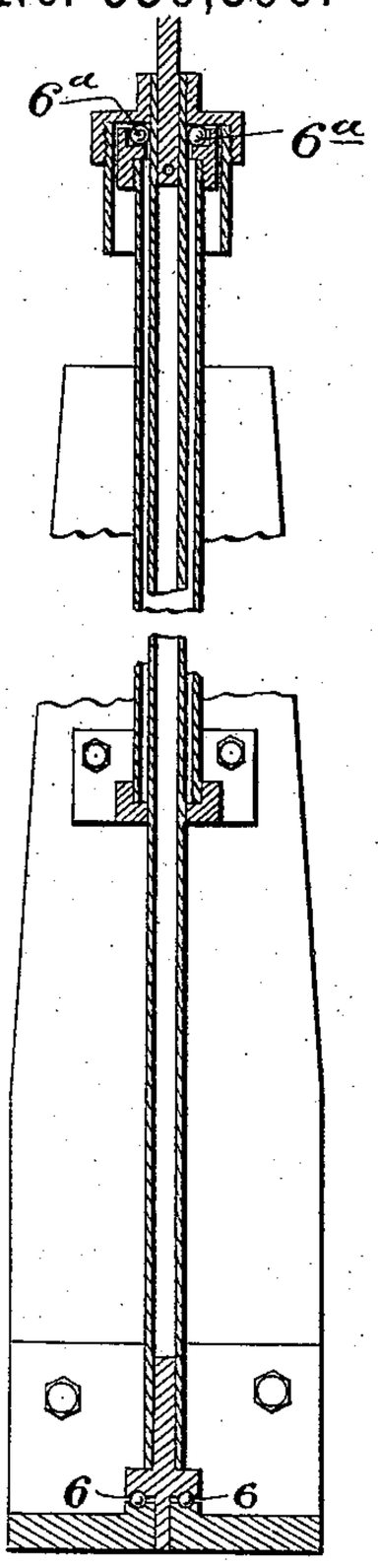

Fig. 3

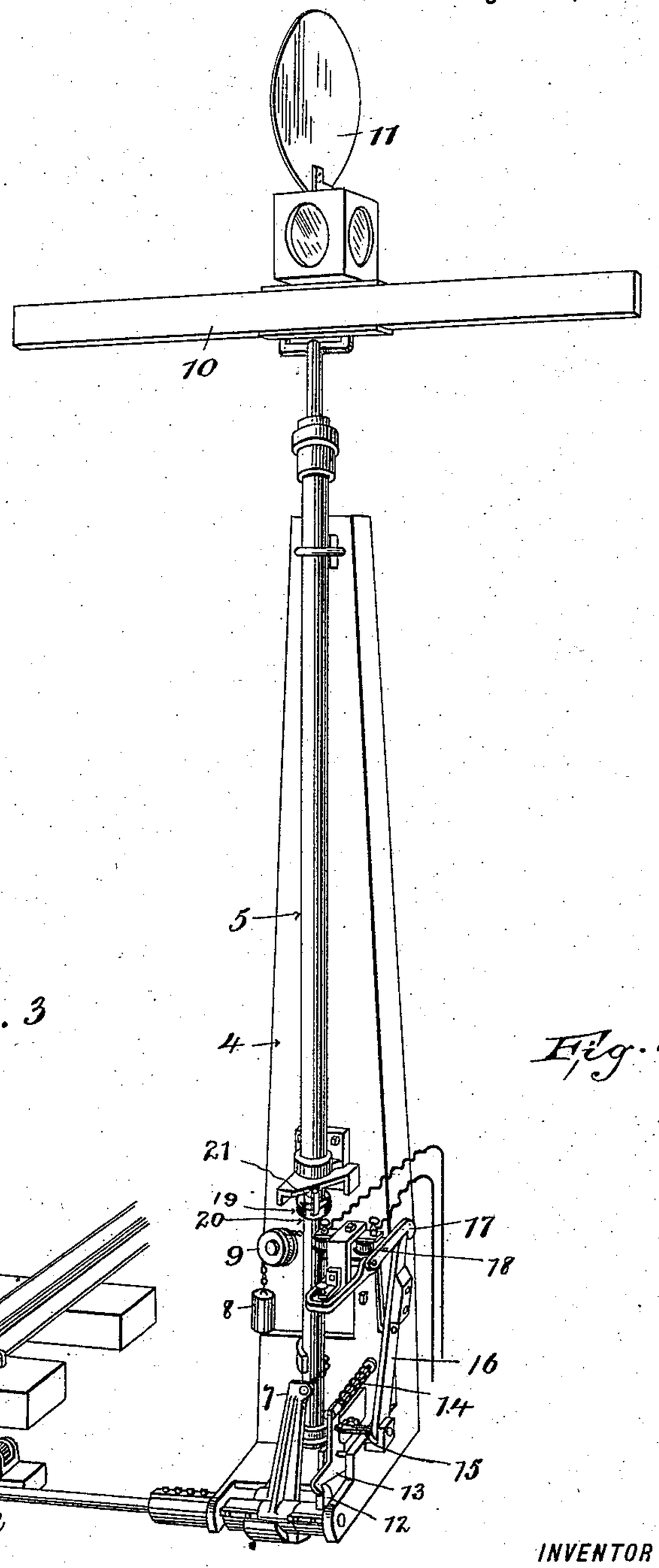

Fig. 2

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(No Model.) 3 Sheets—Sheet 3.

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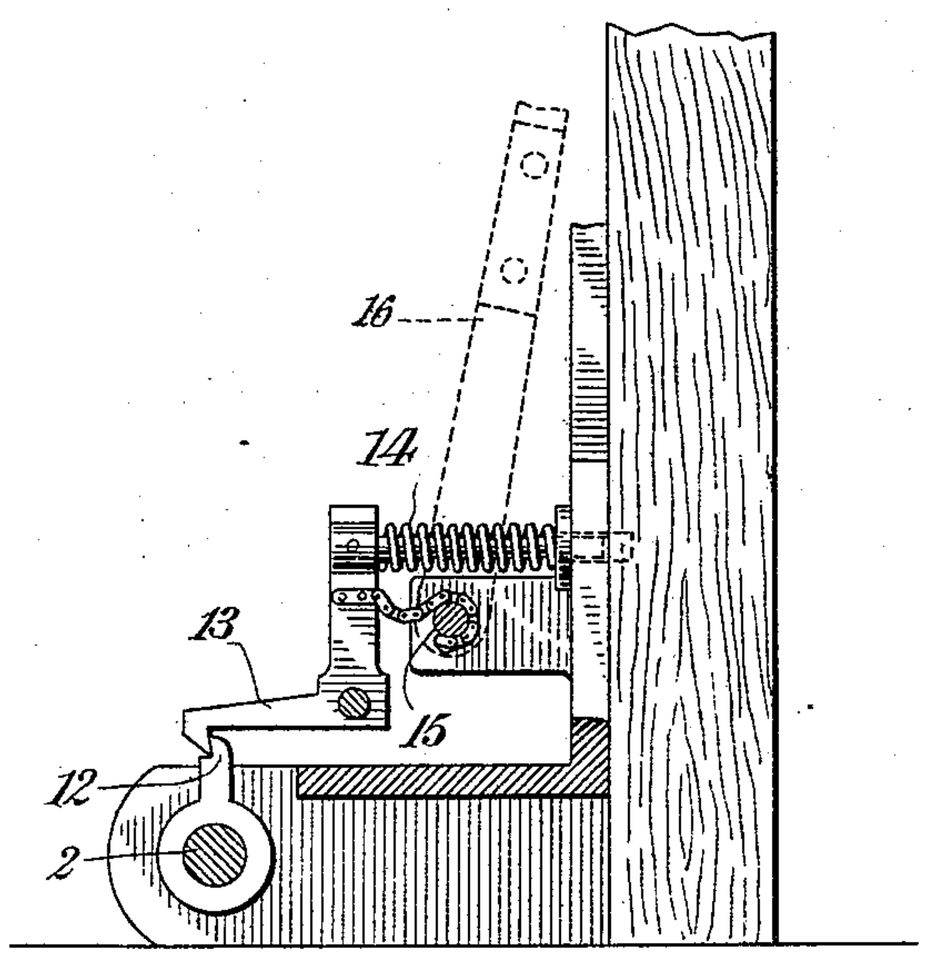
Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN STRINGHAM, OF JERSEY CITY, NEW JERSEY.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 539,396, dated May 14, 1895.

Application filed February 6, 1895. Serial No. 537,483. (No model.)

To all whom it may concern:

Be it known that I, JOHN STRINGHAM, a citizen of the United States, residing in Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Railway-Signals, of which the following is a specification.

This invention relates to railroad signals, the object being to provide an installation of combined mechanically and electrically controlled signals which will be safe and comparatively inexpensive. In carrying out the invention I provide at suitable intervals along the line of way signals set at danger by the passage of a train to guard the occupied section and continuously maintain the signal in the danger position until a second train approaches the signal, when, if the advance train has passed out of the protected section, the signal will automatically indicate a clear track, but if the advance train is still in a protected section the signal will remain at danger. Provisions are also made so that if a train should back into a section after having passed out of it, a following train will be unable to get a clear signal. I prefer to operate with the controlling electric circuits normally open so that the energy of the electric generators will be used only while trains are passing. I preferably provide the signals with mechanical track apparatus which sets them at danger as a train passes, their release being controlled electrically.

The several features of novelty of the invention will be more particularly hereinafter described, and will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate the invention, Figure 1 is a diagram of a system embodying my improvements. Fig. 2 is a perspective view of one of the signals. Fig. 3 is a central vertical sectional view of the signal-post, showing the manner of mounting the same so as to admit of easy control; and Fig. 4 is a sectional view of a circuit-closer used at a siding. Fig. 5 is a detail view, on an enlarged scale, of the signal-tripping mechanism.

In the diagram, Fig. 1, I have shown two protected sections, A, B, of a railway. These sections may be of any convenient length. The electro-mechanical apparatus for controlling the signal is grouped at the signal post. For convenience of explanation it is shown in the diagram Fig. 1 detached from the post. At or near the entrance of each protected section is a mechanically set signal, such as shown in Fig. 2. Many different types of such signal may be employed. The preferable form, however, is that shown in Fig. 1, which, however, is not of my invention but is the invention of another. It comprises a track-lever 1 rigidly secured to a rock-shaft 2 mounted in suitable bearings at the side of one of the track rails.

A strong leaf-spring 3 engages the under side of the track-lever and tends to elevate the same so that it will stand above the level of the rail head when released. When the wheel of a train passes the lever it will depress the same and rock the shaft 2 against the tension of spring 3. The rock-shaft 2 is journaled in the base of a signal post 4 and is provided with a tubular vertical shaft 5 mounted on ball-bearings 6 and 6ª, as shown in Fig. 3, so as to rock with a minimum of mechanical effort. Flexibly connected with a projection from the shaft 5 is an arm 7 rigidly secured to the rock-shaft 2, a chain or other flexible coupling passing partially around the shaft and having one end secured thereto and the other end secured to the crank-arm 7. A weight 8 is provided with a flexible connection passing over a pulley 9 and partially about the shaft 5 and secured thereto. As thus organized, if the arm 7 be rocked so as to create slack in the chain with which it is connected to the shaft, the weight 8 will take up such slack and rock the shaft. The parts are so organized that the free end of the arm 7 when the track-lever 1 is depressed to the position shown will have sufficient play to shift the danger signal 10 to the position indicated in Fig. 2 from a position at right angles thereto.

A disk 11 is secured to the upper part of the signal and set with its face at right angles to the danger signal 10 so that in the danger position the signal 10 is exposed to view, but when rocked to a position at right angles to that indicated in Fig. 2 the signal 10 presents an edge view to the engineer and the disk 11 is in full sight.

Mounted on the rock-shaft 2 controlled by the track-lever is a lug 12 adapted to engage

in the normal position of the apparatus a hook or detent 13 pivoted at a central point and holding under pressure at its upper end a coil-spring 14.

On the same side of the pivot of the pawl or latch 13 as the spring 14 is a flexible coupling such as a chain, one end of which is connected to the pawl and the other end to a shaft 15 to which is secured a lever-arm 16 weighted at its upper end and co-operating with an electrically controlled latch 17. An electro-magnet 18 co-operates with this latch so that when the magnet is energized it is lifted away from the end of the lever 16 and the latter is permitted to fall by the action of gravity, thus winding up the chain 15 and withdrawing the pawl 13 from the projection 12 on the rock-shaft 2. The flexible connection or chain which connects the pawl 13 with the shaft 15 is given sufficient slack to permit the lever 16 to fall freely for a portion of its travel and thus acquire momentum sufficient to compress the spring 14 and unhook the pawl 13.

The spring 3 under the track-lever will then act upon the latter and carry the projection 12 out of reach of the pawl 13, at the same time acting upon the arm 7 and forcibly turning the shaft 5 against the tendency of weight 8, setting the signal to safety. Upon the transit of a train, however, over the track-lever, the latter will be depressed and the beveled tip of the projection 12 will engage the beveled point of the pawl 13 and again latch the same. The spring 14 is made of sufficient power to lift the weighted arm 16 by its rebound within reach of the latch 17 so that after the magnet has been momentarily energized and the arm 16 released, the latter drops, compresses the spring, frees the projection 12, when the spring being free to rebound because the projection 12 has been carried out of its path by spring 3, raises the lever 16 so as to be engaged by the latch 17.

Mounted on the signal shaft 5 is a metallic collar 19 provided at a suitable point with a segment of insulating material 20, the collar being so adjusted that in the normal or danger position of the signal the circuit will be closed at that point through the brush 21 and the contact 20, but when the signal is shifted the collar will be partially rotated so as to open the circuit at that point, thus preventing a waste of battery power. As thus organized it will be understood that the signal will always be set at danger by the passage of a pair of wheels and will be released by a momentary operation of the latch 17. In order to render these operations safe in controlling the movements of trains, I provide at or near each section an insulated rail section 22 connecting with one side of a magnet 23, the other side of which connects with the opposite rail 24, the batteries and magnets all being located at or near the signal post. The rail section 22 is placed a sufficient distance in advance of the signal post, say a thousand yards, that the signal may shift and give the engineer the necessary signal before his train reaches the signal post. When the wheels of the engine bridge the two sides of the track at the point 22, magnet 23 is energized and draws up its armature.

The rails at a point beyond the insulated rail section 22 are provided with conductors leading through the circuit-breaker 19, 21 and a magnet 25, armature 26 of relay 23 and battery 27. The armature of magnet 25 interlocks with the armature of magnet 23, as indicated in the diagram, so that it will be impossible to draw down the armature of magnet 25 and close a local circuit containing the releasing magnet 18 until the armature 26 of magnet 23 has first been acted upon. This organization prevents malicious interference or an accidental bridge of the rails at one point from setting the signal to safety when it should stand at danger, since it is evident that a bridging of the rails at two separated points and the energization of both magnets 23 and 25 would be necessary to set the signal for a clear track. The passage of the train having first acted upon magnet 23 in the manner described, and thus drawn forward armature 26 out of the path of armature 28 and the next instant having bridged the rails at a point beyond the insulated section 22, magnet 25 is energized and its armature being free to move is drawn to its front stop, thus closing a local circuit containing a battery and releasing magnet 18. This local circuit also includes the armature of another relay 29, the function of which will presently be described, but in the normal condition of the system the releasing circuit is closed through the armature of relay 29 so that the combined action of the magnets 23 and 25 operates the releasing magnet 18, withdraws the latch 17 and permits the weighted arm 16 to drop and release the projection 12 in the manner hereinbefore described, thus permitting the weight 8 to turn the signal to a position indicating safety. The engineer will thus understand that the block ahead is unoccupied.

At or near the tread-lever is an insulated rail section 30, from which a circuit extends through magnet 31 and battery 32 to the opposite track rail. This rail section is preferably placed just in advance of the tread-lever 1 so that the magnet 31 will be energized and immediately after magnet 29 will be energized, thus permitting the armatnre of the latter to be drawn away from its back-stop and opening the circuit of releasing magnet 18, so that when the track-lever is operated the releasing circuit will be open at the armature of relay 29 and cannot therefore release the signal, which will be held at danger until the last wheels of the train have left the block, when a following train can turn it to safety. Upon the arrival of the front portion of the train at insulated rail section 22ª a similar cycle of operations to that described in connection with the preceding block occurs, and the

signal corresponding to the block will be similarly actuated.

In the diagram the signal for block A is shown as thrown to safety, the front end of an approaching train having just passed the insulated section 22. The signal for block B is in the normal danger position. The rails are bonded around the insulated rail sections so as to form a continuous conductor of each rail in a track section.

In order to prevent a safety signal to an approaching train if an advance train should back into the advance section, I provide an auxiliary circuit 33 preferably an insulated wire extending the length of the road connected with an insulated contact or rail in each block as at 30, 30ª. The rear train on backing over the insulated rail 30ª connects this momentarily with the main rail section and closes a circuit over conductors 34 and 33, magnet 31 and battery 32, thus drawing forward armature 36 and releasing armature 35, magnet 29 being then energized by the wheel bridge across the rails, closing a circuit over the rails, conductor 37, battery 32, armature 36 (then drawn forward) and conductor 38. If the train should stand in the block armature 36 will drop off, locking armature 35 and thus holding the releasing circuit of section A open at 35. When the train again leaves block A armature 36 will be energized by momentary closure of the auxiliary circuit at 30ª by the last pair of wheels, and relay 29 being de-energized at this moment its armature 35 is drawn to its back stop by a retractile spring and the releasing circuit of section A may be actuated by a train waiting at the signal station. By placing the insulated rails or contacts 30, 30ª for successive track sections on opposite sides of the track the same battery 32 may be made to control the circuit for a backing train and the local circuit by way of wires 37 and 39 which holds open the releasing circuit when a train enters the block. It will thus be seen that all batteries are normally open-circuited and are active only during the passage of a train, a feature permitting the employment of open-circuit batteries and reducing the cost of equipment and maintenance without reducing the margin of safety.

In order to guard a train entering or leaving a siding I provide a switch box shown in Fig. 4, which, when the siding switch is connected with the main track completes the track and auxiliary circuit, thus energizing relays 29ª and 31ª and holding open the releasing circuit so that an approaching train cannot get a clear signal until the siding switch is opened. The device shown comprises a plunger 39 mounted in a box and controlled by a light spring, and in a position to be operated by one of the switch points 40. When the switch is open the point engages the plunger as clearly shown in the detached view, Fig. 4, and holds the track and auxiliary circuits both open. When closed the spring forces out the plunger and bridges contacts 41, 41ª and 42, 42ª. 41ª and 42ª may have a common connection with one side 43 of the track, while 41 and 42 connect respectively with the other rail and the auxiliary circuit connection 44.

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

1. In a railway signal system, a signal set at danger by passage of a train into a guarded section, a releasing circuit for setting the signal at safety, a circuit controller for said releasing circuit, and electrical connections with the track preventing actuation of said circuit controller until the rails are bridged at a plurality of points before the signal is reached by the train.

2. In a railway signal system, a signal set at danger by passage of a train into a guarded section, a releasing circuit for giving a safety indication to an approaching train, two relays controlling said releasing circuit, one having normally open and the other normally closed contacts, said relays being actuated by the train before and after passing the signal respectively, and track circuit closers for locking magnets for said relays, one located at the entrance and the other at the end of the guarded section.

3. In a railway signal system, a mechanically operated signal set at danger by the passage of the wheels of a train on entering a guarded section, a releasing circuit for setting the signal at safety, a circuit controlling device in advance of the station for operating said releasing circuit, means for preventing such operation when the section is occupied by a train, and a circuit-breaker actuated by the signal for opening the track circuit after the signal has been shifted to safety, whereby the periods of battery service are rendered momentary.

4. In a railway signal system, a signal set at danger by passage of a train into a guarded section, a releasing circuit for giving a safety indication to an approaching train, two relays controlling said releasing circuit, one having normally open and the other normally closed contacts, said relays being actuated by the train before and after passing the signal respectively, track circuit closers for locking magnets for said relays, one located at the entrance and the other at the end of the guarded section, and a siding provided with a mechanically controlled switch for completing the circuit of the relay having a normally closed contact and its locking magnet when the siding switch is closed and the siding is occupied by a train.

In testimony whereof I have hereunto subscribed my name this 8th day of December, A. D. 1894.

JOHN STRINGHAM.

Witnesses:
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JAMES WAYLAND.