No. 673,238. Patented Apr. 30, 1901.

H. M. BUCK & J. H. LOVE.

ELECTRIC SIGNAL.

(Application filed June 11, 1900.)

(No Model.) 2 Sheets—Sheet 1.

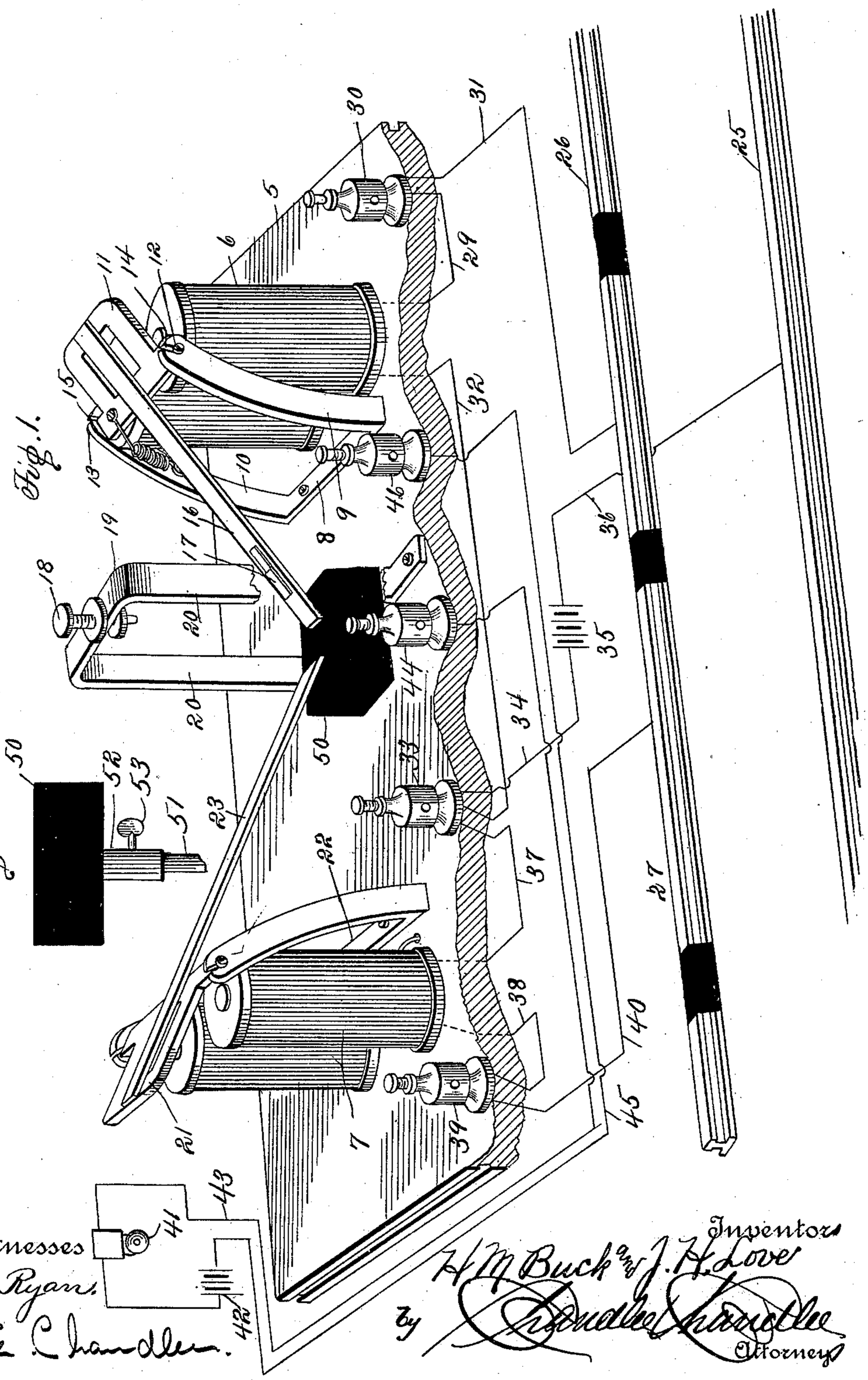

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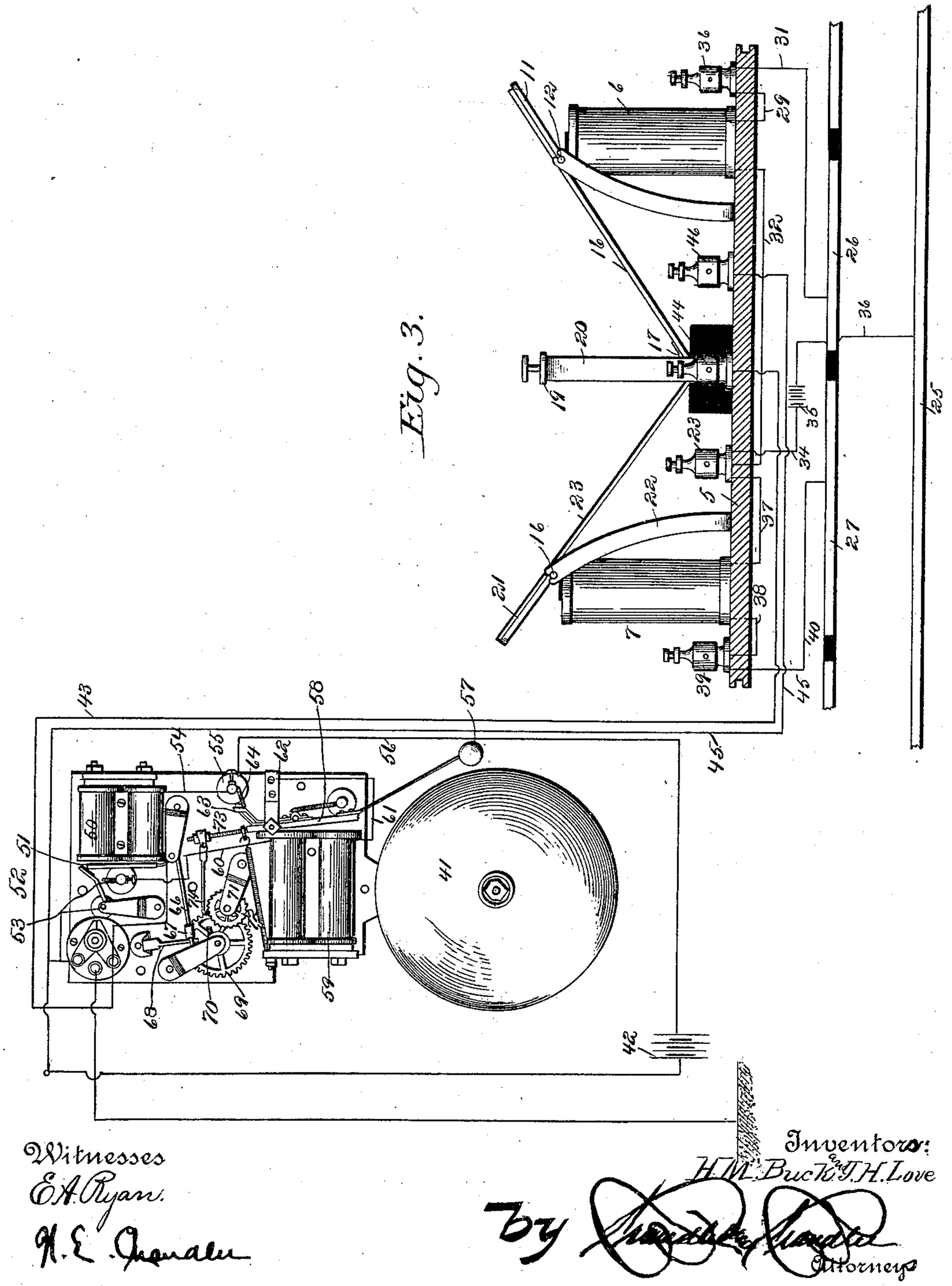
Fig. 3.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNAL.

SPECIFICATION forming part of Letters Patent No. 673,238, dated April 30, 1901.

Application filed June 11, 1900. Serial No. 19,951. (No model.)

To all whom it may concern:

Be it known that we, HIRAM M. BUCK and JOHN H. LOVE, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Electric Signals; and we 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.

This invention relates to railway-signals in general, and more particularly to the class of crossing-signals, the object of the invention being to provide a relay and a system of wiring which is particularly adapted for single-track railways, whereby a signal will be given when the train is approaching the crossing and will prevent a signal from being given when it is passing away from the crossing.

With a slight modification the apparatus may be used and arranged for a double-track railroad where only a direct signal is required for a train approaching a crossing.

In the drawings forming a part of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a perspective view showing the relay of the present invention. Fig. 2 is a detailed elevation of the adjustable supporting-block. Fig. 3 is an elevation showing the form of bell that is preferably used in connection with the relay.

Referring to the drawings, and more particularly to Fig. 1 thereof, the relay comprises an insulating-base 5, upon which are mounted two electromagnets, which are spaced apart, as shown. Adjacent the magnet 6 is a U-shaped plate 8, the web of which is secured to the base and the arms 9 and 10 of which are carried in the direction of the magnet to lie on opposite sides thereof and to project thereabove. A soft-iron armature 11 is disposed between these upwardly-extending arms 9 and 10 and is pivoted thereto through the medium of pivot-screws 12 and 13, which are passed through the arms and engaged with depressions in the arms 14 and 15 at the ends of the armature.

Secured to the armature midway of its ends and projecting in the direction of the magnet 7 is an arm 16, which carries a contact-spring 17. This spring is adapted to engage a contact-screw 18, carried by the cross-bar 19, which connects the ends of the uprights 20, which lie, respectively, at opposite sides of the arm. Thus when the magnet 6 is energized the contact-spring engages the contact-screw.

In order to hold the spring in contact with the screw when magnet 6 is disengaged and also to prevent the contact under certain conditions, the magnet 7 and its accompanying parts are provided. The magnet 7 is provided with an armature 21, which is similar in all respects to the armature 11 and pivotally mounted in the same manner between the arms of a U-shaped plate 22, formed and arranged in the same manner as plate 8. Transversely of the armature 21 is secured an arm 23, similar to the arm 16, but having no contact-spring. These arms 16 and 23 are of such length that when both are raised, due to the movement of their respective armatures under the influence of their magnets, they will overlap, the one lying above the other. The bracket including the uprights 20 is located nearer to the magnet 6 than it is to the magnet 7, and this distance is such that when the magnet 6 is energized the contact 17, carried by arm 16, will engage the contact-screw 18, and the end of the arm 16 will project to the left of the contact 18. The arm 23 is of insufficient length to reach to the point 18, although near enough to engage the extreme end of the arm 16 when both arms are raised. Thus if the magnet 6 be energized and then the magnet 7 the arm will engage its spring with the contact-screw and will be held in this position by engagement of arm 23 with the under side thereof. If, however, the magnet 7 is first energized, the arm 23 will be projected into the path of upward movement of arm 16 and the spring 17 will be prevented from engagement with the screw 18. It will be noted that the pole-pieces of the magnet 7 are so disposed that they form a stop to limit the movement of the arm 23 upwardly to lie in such a position that it will be in the path of upward movement of arm 16 and will stop the upward movement of arm 16 before it has carried the contact-finger 17 into engagement with the contact 18.

In practice the relay is employed in connection with the circuits and apparatus shown

in the drawings, and in which 25 represents one rail of a trackway at one side of a crossing. The opposite rail is divided into sections 26 and 27, which are insulated from each other. The section 27 in practice is about fifteen hundred feet from the crossing, and the section 26 is more distant, but directly adjoins section 27. One terminal of magnet 6 is connected with rail-section 26 through a wire 29, post 30, and wire 31, while the other terminal is connected with rail 25 through wire 32, post 33, wire 34, battery 35, and wire 36. One terminal of magnet 7 is connected with rail 25 through wire 37, post 33, wire 34, battery 35, and wire 36, and the opposite terminal of magnet 7 is connected with rail-section 27 through wire 38, post 39, and wire 40. Thus when the circuit between rail 25 and either of the sections 26 or 27 is closed the magnets 6 and 7, respectively, will be energized to operate their armatures and the connected arms, as above described.

In connection with this mechanism there is employed any one of the well-known forms of electric bells in which is employed a ringing mechanism which when once started by closing an electric circuit through the bell mechanism will continue to ring for a predetermined time. In the present instance such a bell is indicated at 41 and is provided with a local battery 42, one terminal of which is connected with screw 18 through the bell 41, wire 43, post 44, upright 20, and cross-piece 19. The opposite terminal of battery 42 is connected with contact-spring 17 through wire 45, post 46, plate 8, screws 12 and 13, armature 11, and arm 16. Thus when arm 16 is raised to engage the spring 17 with contact-screw 18 the circuit of battery 42 will be closed through the alarm which will be operated.

In Fig. 2 of the drawings is shown the form of bell preferably used. In this construction there is shown an electromagnetic circuit-closer including an electromagnet 50, having a pivoted armature 51, which normally lies in the path of an arm 52 and holds it from a contact-point 53, one terminal of the winding of the magnet being connected with the wire 43, while the other terminal of the magnet is connected by wire 54 with a post 55, which in turn is connected by wire 56 with a battery 42, the opposite terminal of said battery being connected with the wire 45. Thus as soon as the contact 17 engages the screw 18 the circuit of battery 42 is closed through the magnet 50 and the arm 52 is dropped into contact with the contact-screw 53. The bell 41 has a striker 57, carried by an armature 58 in the field of force of the electromagnet 59, and one terminal of the winding of this magnet is connected by wire 60 with the contact-screw 53, the other terminal being connected by wire 61 with the post 62, upon which is supported or to which is connected the pivoted armature 58. This armature carries a contact-finger 63, which coöperates with a contact 64, carried by the post 55. Thus when the arm 52 is against the point 53 the circuit of battery 42 is to arm 52, to contact 53, to magnet 59, to support 62, to finger 63, to contact 64, to post 55, and back to the battery. The armature 58 is thus caused to vibrate and the bell is rung. As hereinbefore set forth, the circuit including wires 43 and 45 is only momentarily closed; but this is sufficient to close the circuit of battery 42 through the bell-actuating mechanism, as above described. The bell being now in operation it is necessary that some means be provided for stopping it at the proper time, and for this purpose the following mechanism is provided: The armature 51 carries an arm 66, provided with a weight 67, which moves the armature from the magnet 50 when the latter is deënergized to raise the arm 52 from the contact 53 to break the local circuit. When the armature 51 is attracted by the magnet 50, however, the end of the arm 66 snaps over the end of a spring-arm 68 and is latched thereby against return movement. A gear-wheel 69 carries a finger 70, which moves with the wheel against the arm 68 and moves the latter rearwardly to release the arm 66 and permit it to drop to break the local circuit, as above set forth. To rotate the wheel 69, a pinion (shown in dotted lines at 71) is engaged with the wheel 69 and carries a ratchet-wheel 72. The armature 58 has an extension 73, which carries a pawl 74, which rests on the ratchet 72, and as the armature 58 vibrates the pawl is reciprocated to rotate the ratchet, which thereby rotates the pinion to move the wheel 69 and cause the finger 70 to engage and retract the arm 68, at which time the arm 66 is released, with the result that the local circuit is broken and the bell ceases to ring.

In practice if a train be moving along the track (shown from right to left) the circuit between section 26 and rail 25 will be closed and with the result that contact-spring 17 will be raised to engage the contact-screw 18, and the alarm will be sounded. When the train enters upon that portion of the track including section 27, the arm 23 will be raised against arm 16, and the circuit of battery 42 through the alarm will be kept closed until the train has passed from the section 27, when both arms will drop. If a train be moved to the right, then the magnet 7 will be first to be energized to raise arm 23 into the path of arm 16, and when magnet 6 is subsequently energized by the train running upon the track-section 26 the raising of arm 16 will only act to lock arm 23 in place and prevent contact-spring 17 from coming in contact with screw 18.

One relay is arranged at each side of the crossing, and it will be seen that the alarm is operated when the train is approaching and that it is locked against operation when the direction of the train is reversed.

It will of course be understood that the

present relay may be used for any purpose to which it is adapted and that various modifications may be made without departing from the spirit of our invention.

In order to regulate the strength of current necessary to energize magnets 6 and 7 sufficiently to attract their armatures and raise the arms 16 and 23, it is only necessary to support the free ends of said arms at the proper heights, and for this purpose there is provided a table at one side of the arch, and which table consists of a block 50, of insulating material, having a depending stem 51 at the center of one side. The stem 51 is slidably engaged with a tubular post 52 upon the base 5 and is held at different points of its sliding movement by means of a set-screw 53, which is passed through a perforation in the post and engaged with the stem. Thus by raising the block 50 the arms will be supported with the armatures relatively close to the poles of their respective magnets, and a comparatively slight energization of the magnets will attract the armatures and raise the arms. Conversely, when the block is lowered the armatures lie farther from the magnets and a greater energization is necessary to operate the arms.

Having thus described our invention, what we claim is—

1. A relay comprising spaced electromagnets, a pivoted armature for each magnet, an arm carried by each armature, said arms being disposed for movement in a common plane, a contact adapted for engagement by one of the arms when moved under the influence of its electromagnet, the opposite arm being adapted to lie out of contact with the contact and in the path of movement of the first arm, and means for connecting the contact-point and the first arm in a circuit to be closed.

2. A relay comprising spaced electromagnets, a pivoted armature for each magnet, a contact disposed between the magnets, an arm carried by the armature of one magnet and adapted for engagement with the contact to close a circuit including said arm and contact, an arm carried by the second armature and movable in the plane of movement of the first arm, and means for stopping the movement of the second arm to cause it to lie in the path of movement of the first arm and spaced from the contact, to hold the first arm from electrical connection with the contact-point.

3. A relay comprising spaced electromagnets having pivoted armatures, arms carried by the armatures for movement in a common plane and adapted to overlap, a contact between the magnets and adapted for engagement by one of the arms, means for stopping the other arm in the path of the first arm to hold the first arm free from the contact, and an adjustable supporting-block disposed to receive the free ends of the arms in spaced relation.

4. In a signal system, the combination with a continuously-ringing bell and electromechanical means for starting it, of a relay comprising spaced magnets having pivoted armatures arms carried by the armatures for movement in a common plane, a contact-point for engagement by one of the arms, a remote bell having a starting-circuit including said arm and the contact-point, and the second arm having a stop for limiting its movement to lie in the path of movement of the first arm to prevent contact of the first arm with the contact, said second arm being adapted to lie at times against the under side of the first arm to hold it against the contact.

In testimony whereof we affix our signatures in the presence of two witnesses.

HIRAM M. BUCK.
JOHN H. LOVE.

Witnesses:
WILLIAM H. MARSHALL,
SAML. M. WEBB.