(No Model.) 2 Sheets—Sheet 1.

J. D. TAYLOR.

RAILWAY SIGNAL.

No. 594,300. Patented Nov. 23, 1897.

Fig. 1.

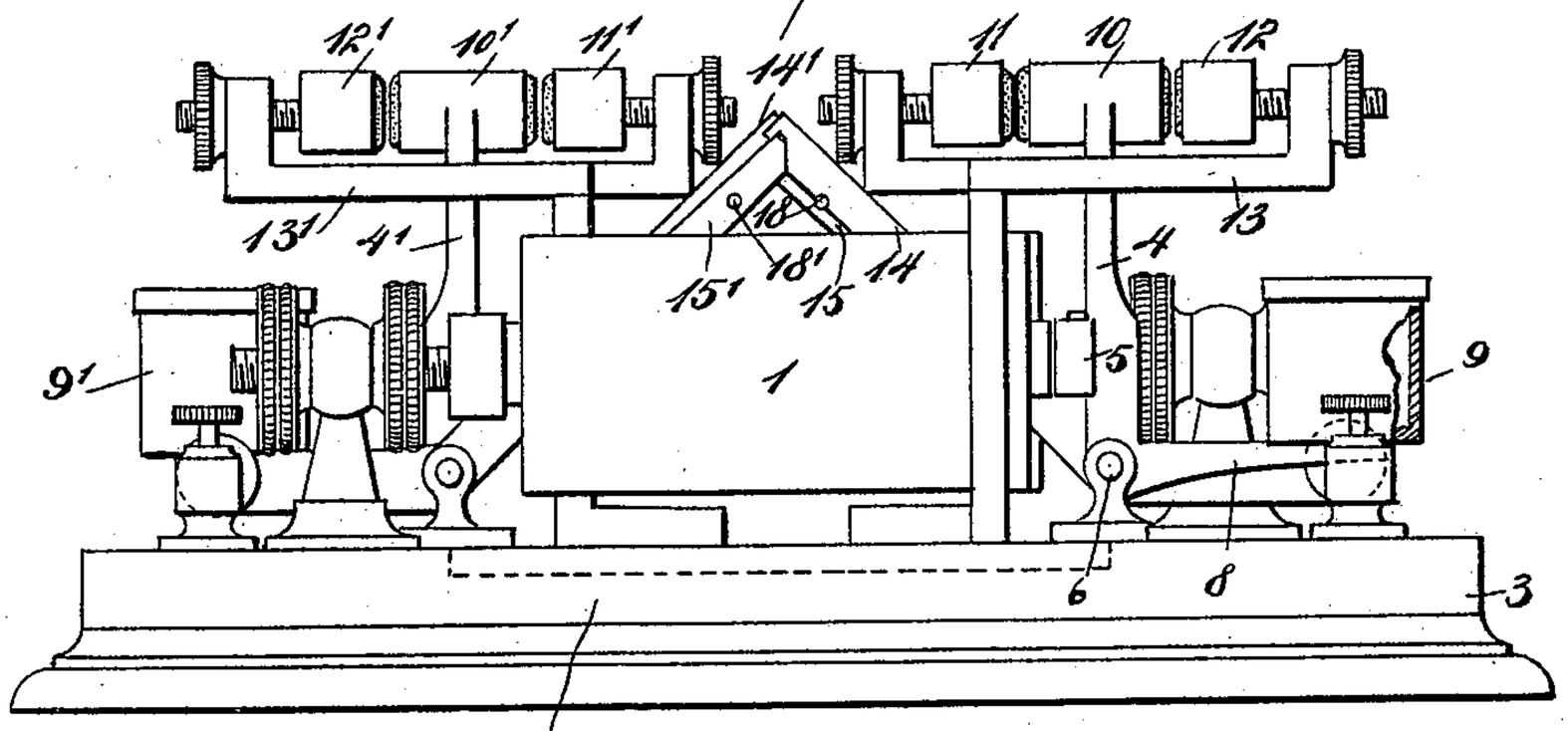
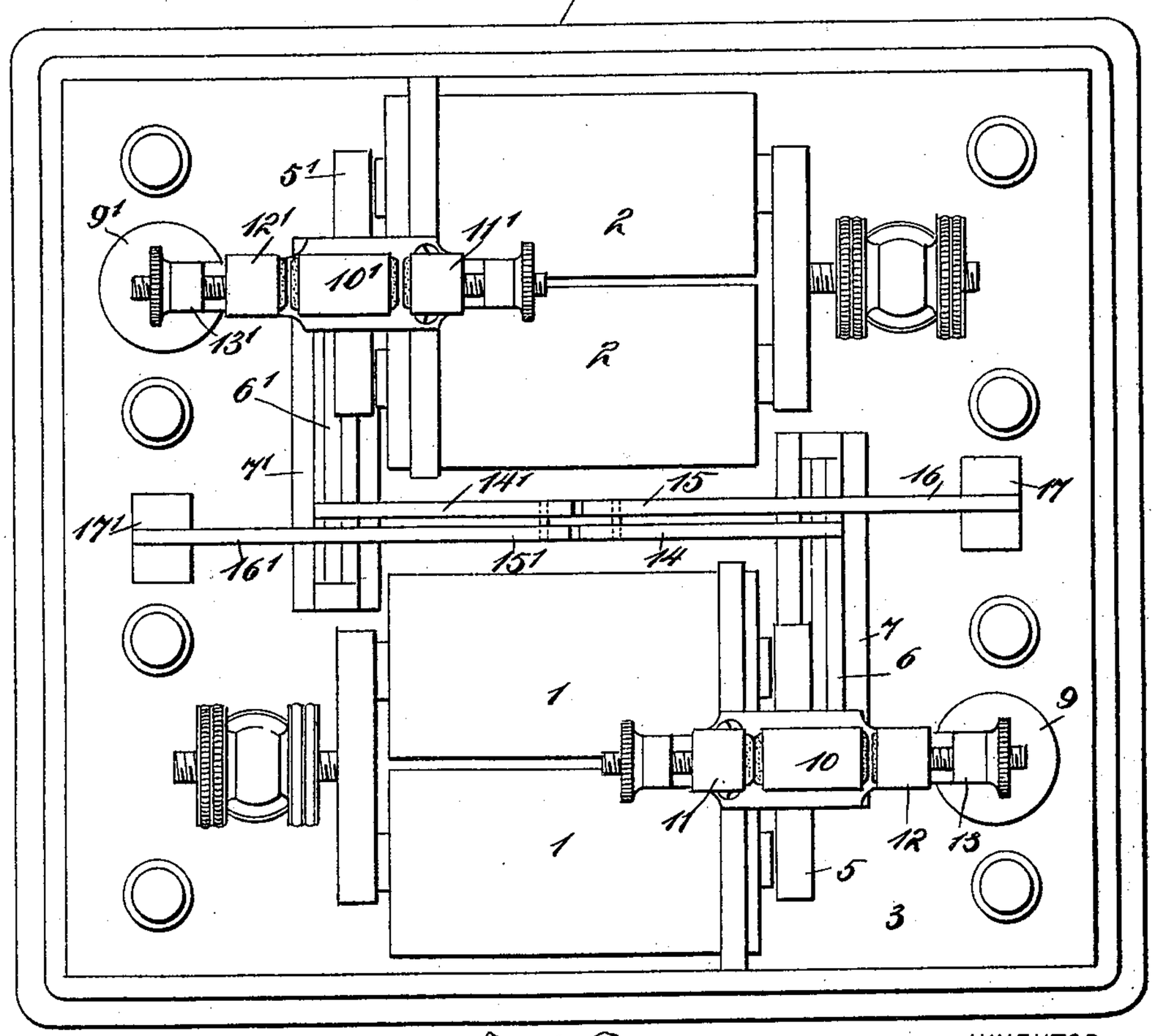


Fig. 2.



WITNESSES:

H. Walker

C. R. Ferguson

Fig. 3.

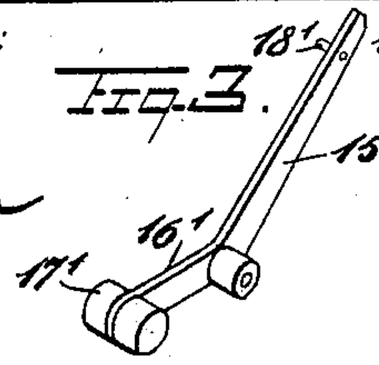
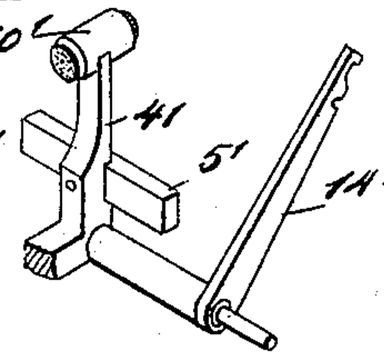


Fig. 4.



INVENTOR

J. D. Taylor

BY

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

J. D. TAYLOR.

RAILWAY SIGNAL.

No. 594,300. Patented Nov. 23, 1897.

Fig. 5.

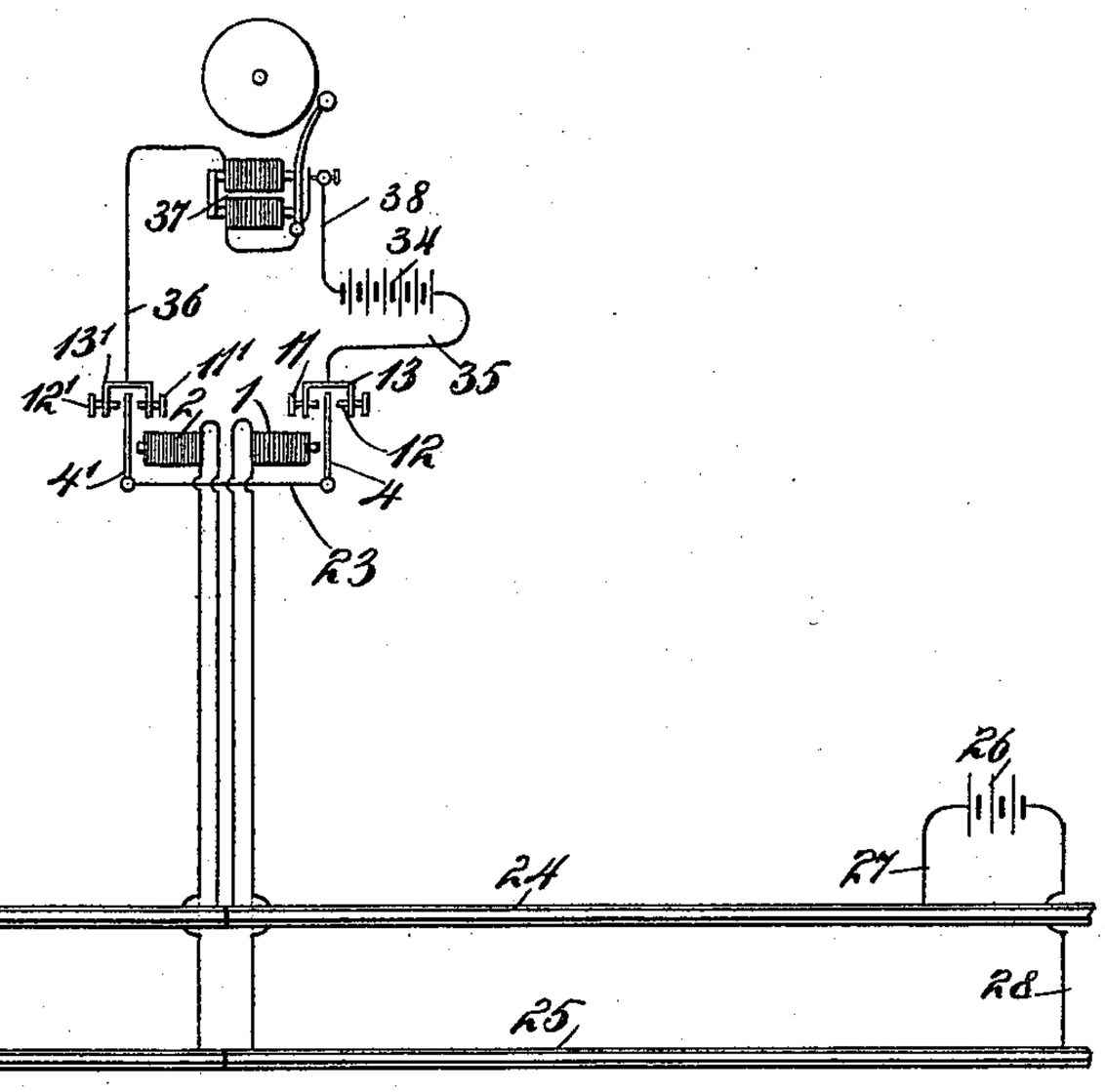


Fig. 6.

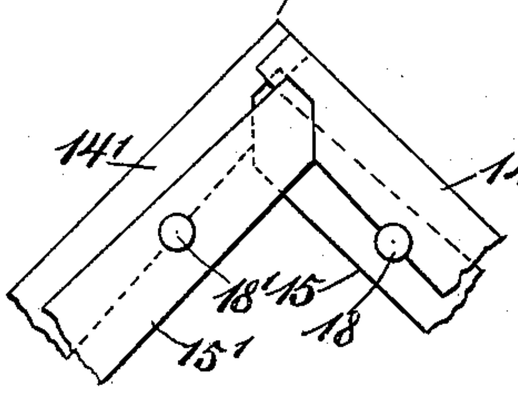


Fig. 7.

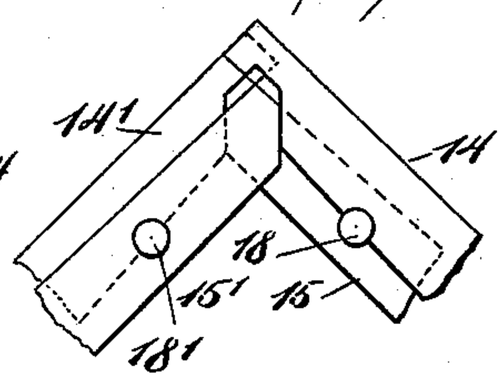


Fig. 13.

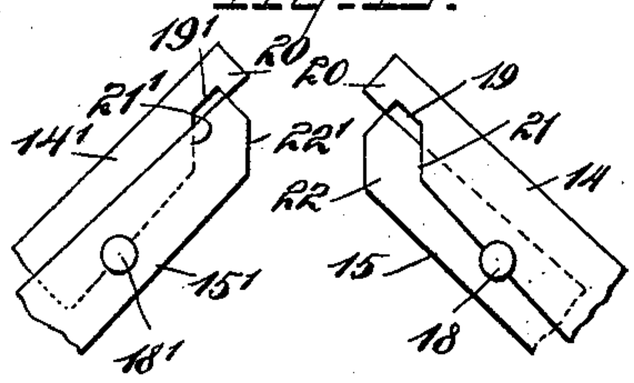


Fig. 9.

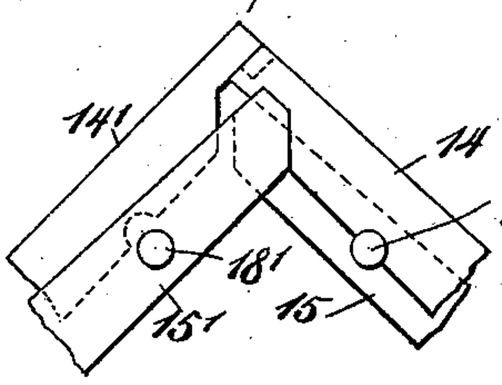


Fig. 10.

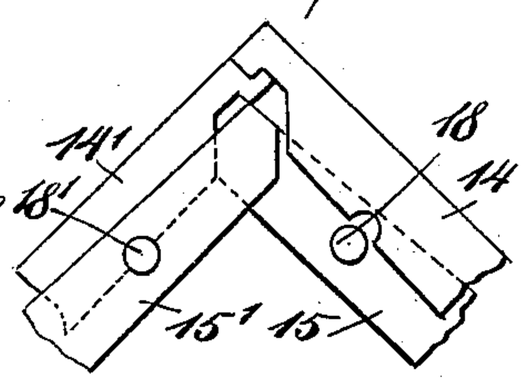


Fig. 11.

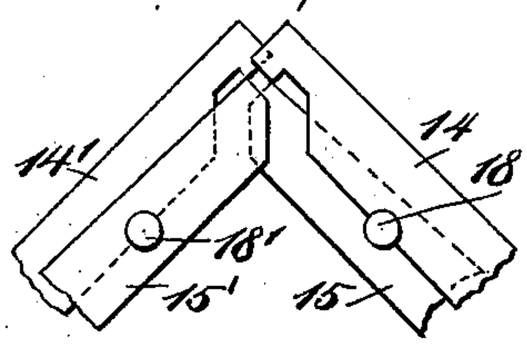


Fig. X.

Fig. 12.

WITNESSES:

H. Walker

C. R. Ferguson

INVENTOR

J. D. Taylor

BY

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN D. TAYLOR, OF CHILLICOTHE, OHIO.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 594,300, dated November 23, 1897.

Application filed April 2, 1897. Serial No. 630,387. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. TAYLOR, of Chillicothe, in the county of Ross and State of Ohio, have invented new and useful Improvements in Railway-Signals, of which the following is a full, clear, and exact description.

This invention relates to that class of highway-crossing signals in which an electric bell is placed near the crossing of the street or highway and is automatically thrown into circuit by a train approaching the crossing and cut out of circuit by the train when it passes the crossing.

The object of my invention is to simplify the electric circuits and mechanical parts of the apparatus, so as to reduce the cost of construction and maintenance to a minimum. Simplifying the electric circuits also reduces the frequency of derangement and makes the apparatus more effective and reliable.

I will describe a railway-signal embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of an interlocking relay embodied in my invention. Fig. 2 is a plan view thereof. Fig. 3 is a perspective view of an interlocking arm which is employed in connection with the relay. Fig. 4 is a perspective view of another interlocking arm used therewith and an armature-lever. Fig. 5 is a diagrammatic view of the track circuits, batteries, and magnets. Figs. 6 to 12, inclusive, represent different positions assumed by the interlocking arms; and Fig. 13 shows the arms separated to more clearly illustrate their construction.

The interlocking relay comprises two similar magnets 1 and 2, arranged on one base 3, and as these magnets and their coacting parts are alike a description of one will answer for both. The parts coacting with the magnet 2, however, will be designated by prime-marks in connection with the reference-numerals.

Coacting with the electromagnet 1 is an armature-lever 4, carrying an armature 5. The armature-lever 4 is connected to a shaft 6, pivoted in a frame 7, mounted on the base 3, and it is provided with a horizontally-disposed member 8, on the end of which is secured a weight, here shown as consisting of a box 9, in which mercury, shot, or other suitable material may be placed until the proper adjustment is obtained. The vertically-disposed member of the lever 4 is provided at its upper end with a contact 10, designed to engage with either a forward contact 11 or a rear contact 12. These contacts 11 and 12 are mounted in a metal bracket 13, supported on the base 3, and therefore are in electrical connection one with the other. The contacting ends of the contacts will preferably be provided with carbon instead of the usual platinum.

Attached to the shaft 6 is an arm 14, which extends at an angle of about forty-five degrees with relation to the vertical portion of the lever 4 and is approximately at right angles to the arm 14′, operated by the electromagnet 2. An arm 15 is mounted to swing on the shaft 6, and this arm 15 has a horizontally-disposed portion 16, to the outer end of which a weight 17 is attached, designed to raise the arm 15 at a certain time, which will be hereinafter described. The arm 15 is provided near its upper end with a pin 18, which projects horizontally under the arm 14 and prevents the arm 15 from being raised above a certain position relatively to the arm 14. A short distance from the upper end of the arm 14 a notch 19 is cut in the under side, providing a lug 20 at the end, which extends downwardly at right angles to the length of the arm, and inward of the notch 19 is a beveled shoulder 21. The lower corner of the upper end of the arm 15 is beveled, as shown at 22. This beveled surface 22 is at an angle of about forty-five degrees with relation to the length of the arm. The arm 14 is in the same vertical plane with the arm 15′, and the arm 14′ is in the same vertical plane as the arm 15, and the axes on which the several arms operate are placed at such distance apart that when both magnets 1 and 2 are energized either the lever 4 or 4′ is prevented from making contact with its forward contact 11 or 11′ by the beveled shoulder 21 on the arm 14 bearing against the beveled surface 22′ of the

arm 15′ and the shoulder 21′ on the arm 14′ bearing against the beveled surface 22 on the arm 15.

The interlocking arms offer no hindrance to the levers 4 and 4′ falling against the back contacts 12 and 12′ when the magnets are de-energized. If when both levers are resting against the back contacts one of the magnets—for instance, the magnet 1—is energized, its lever 4 will be attracted and the arms 14 and 15 will be drawn down until the lug 20 on the arm 14 strikes the square part of the end of the arm 15′, which stops the lever 4 at about half-stroke and prevents its making contact with the forward contact 11; but when the magnet 2 is also energized its lever 4′ is attracted, and acting through the shaft 6′, the arm 14′, and the pin 18′ pushes the arm 15′ off the lug 20 and into the notch in the arm 14, permitting the lever 4 to complete its stroke and make contact with the forward contact 11. The levers 4 and 4′ are electrically connected together by a wire 23.

If the terminals of an electric circuit, including a bell and a battery, are connected to the contact-supports 13 and 13′, respectively, the bell will ring whenever the levers 4 and 4′ both rest against their back contacts or when one is against its back contact and the other against its forward contact, and will not ring when either the lever 4 or 4′ is held in the middle position by the interlocking arms.

The relay above described is connected to the signal mechanism as follows: The terminals of the magnet 1 are connected to the ends of the track-rails 24 and 25, near the street-crossing, and a battery 26 has electrical connections 27 and 28 with the other end of the section comprising the rails 24 and 25. The terminals of the magnet 2 are connected to the ends of the rails 29 and 30, and the other end of the section comprising these rails 29 and 30 has connections 31 and 32 with a battery 33. In the normal condition—that is, when the rail-sections 24 25 and 29 30 are clear of trains or cars—the magnets 1 and 2 will both be energized and the levers 4 and 4′ will both be drawn toward the contacts 11 11′, respectively, but only one can make contact, the other being held in the middle position by the interlocking arms 14 and 15 and 14′ and 15′. Consequently the bell will not ring.

When a train approaching the crossing passes the battery 26, that battery is shunted by the wheels and axles and the magnet 1 loses its power of attracting its armature, and therefore its lever, under the influence of the weight 9, falls against the back contact 12. This releases the lever 4′ and permits it to make contact with its forward contact 11′, completing a circuit through the battery 34, so that the current will flow through the wire 35, back contact 12, lever 4, wire 23, lever 4′, forward contact 11′, wire 36, bell-magnets 37, and back to the battery 34 through the wire 38, thus causing the bell to ring.

When the first pair of wheels of a train enter the section comprising the rails 29 and 30, the battery 13 is shunted and its magnet 2 is deënergized, permitting the lever 4′ to fall against the back contact 12′, and while the train is passing over the crossing and is partly in both sections both levers 4 and 4′ will rest against their back contacts and the before-mentioned circuit will be maintained and the bell will continue to ring. As soon, however, as the last pair of wheels of the train leaves the section comprising the rails 24 and 25 the magnet 1 will again be energized and its lever 4 will be drawn away from the back contact 12, but will be prevented from making contact with the forward contact 11 by the lug 20 on the arm 14 bearing on the end of the arm 15′. The circuit will consequently be interrupted and the bell will stop ringing. When the last pair of wheels leaves the section comprising the rails 29 and 30, the magnet 2 will also be energized and its lever 4′ will be drawn forward; but either the lever 4 or 4′ will be held away from its forward contact by the interlocking arms, as before described, and both will be held away from the back contacts by the magnets. Consequently the bell-circuit will be open and the bell will not ring. When a train moves in the opposite direction, the operation is the same, only reversed in order.

If a train enters a section and stops before reaching the crossing and then backs off, the bell will ring while the train is in the section, but will stop when the train leaves it, because both magnets 1 and 2 will again be energized and the levers 4 and 4′ will be in their normal position. If after a train has passed the crossing, but while it is still in the rail-circuit section, a following train enters the other section, the bell will be set ringing again, because in that condition of the track both batteries 26 and 33 will be shunted, both magnets 1 and 2 will be deënergized, and both levers 4 and 4′ will rest against the back contacts 12 and 12′, respectively, which completes the circuit through the bell. This I claim to be a great advantage in my system, as in no other system known to me will a following train ring the bell until a preceding train shall have completely left the rail-section on the other side of the crossing before the following train enters the first section.

Fig. 6 shows the position of the interlocking arms when the lever 4 makes contact with the contact 11 and the lever 4′ is held in its middle position. Fig. 7 shows the position of the arms when the lever 4′ is in contact with the contact 11′ and the lever 4 is held in its middle position. Both positions are normal and the one assumed will depend upon which magnet is energized first and upon the relative strength of the magnet. Fig. 9 shows the position of interlocking arms when after everything is normal the magnet 2 only is shunted by a train and the lever 4′ falls against the back stop 12′. Fig. 10 shows the posi-

tion of interlocking arms when after everything is normal the magnet 1 is shunted by a train and the lever 4 rests against the back stop 12. Figs. 9 and 10 show the utility of pivoting the arms 15 and 15′ loosely with reference to the levers and rigid arms and limiting their motion in one direction by the pins 18 and 18′. Limiting their motion by the pins 18 and 18′ prevents both levers 4 and 4′ making contact with the forward stops at the same time, while giving them freedom of motion in the other direction permits either lever to fall against its back stop while the other lever is against the forward stop. Fig. 9 shows the rigid arm 14′, attached to the lever 4′, drawn away from the pin in the loose arm 15′, while the arm 15′ is held by the lug 20 on the rigid arm 14, attached to the lever 4, this lug 20 being necessary for another purpose before described. Fig. 10 shows the same position of the other arms. Fig. 11 shows the position of the interlocking arms when both magnets have been shunted, and Figs. 12 and 8 show the position of the arms when one of the magnets 2 and 1, respectively, has again been energized after both have been shunted by a train and show the lug 20′ or 20, as the case may be, bearing on the arms 15 and 15′, which stops the corresponding lever 4′ or 4 half-way.

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

1. In an electric-signal system, a relay comprising a pair of electromagnets, pivoted armature-levers coacting therewith, contacts carried by the armature-levers, front and back contact-pieces for engagement with the contacts carried by the levers, rock-shafts on which the armature-levers are mounted, arms rigidly mounted on the rock-shafts, and arms loosely mounted on the rock-shafts, the loose arm of one shaft being adapted to interlock with the rigid arm of the other shaft, substantially as specified.

2. In an electric-signal system for railways, a relay comprising a pair of electromagnets, pivoted armature-levers coacting therewith, a counterbalance on each armature-lever, contacts carried by the armature-levers, front and back contact-pieces for engagement with the contacts carried by the levers, the front and back contact-pieces of the pair being in electrical connection, rock-shafts upon which the armature-levers are mounted, an arm extended rigidly from the rock-shafts, and arms loosely mounted on said shafts and having outwardly-extended counterbalancing portions, the loose arm of one shaft being adapted to interlock with the rigid arm of the other shaft, substantially as specified.

3. An electric-signal system for railways, comprising a relay consisting of two electromagnets, armature-levers coacting with the electromagnets, contact-pieces in the alarm-circuit and adapted to be engaged by the armature-levers, shafts upon which the armature-levers are mounted, arms extended upward from said shafts, other arms loosely mounted on the shafts and having counterweights, and pins extended laterally from said loosely-mounted arms to engage underneath the first-named arms, the several arms being adapted to interlock at the ends, substantially as specified.

4. An electric-signal system for railways, comprising a relay consisting of two electromagnets, an armature-lever coacting with each electromagnet and adapted to close an alarm-circuit, shafts upon which said armature-levers are mounted, an arm extended at an angle from each shaft, each arm having a notch at its end providing a lug extended substantially at right angles to the length of the arm, and also providing a beveled shoulder, and other arms mounted to swing on the shafts, the said other arms being beveled at the ends, the loose arm on one shaft being adapted to interlock with the arm rigidly extended from the other shaft, substantially as specified.

5. A railway-crossing alarm system, comprising two track-sections, batteries having connection with opposite rails of the sections, a relay comprising two electromagnets connected respectively with opposite rails of the sections, a signal-circuit comprising a battery, armature-levers coacting with the relay-electromagnets, front and back contacts having connection with the signal-circuit and adapted to be closed by the armature-levers, and interlocking arms operated by the armature-levers, substantially as specified.

6. An electric-signal mechanism for railways, comprising two electromagnets, an armature-lever coacting with each electromagnet, rock-shafts upon which the armature-levers are mounted, an arm extended rigidly from each shaft, and a counterbalanced arm mounted to swing on each shaft, each rigid arm having a notch 19, a lug 20, for limiting the motion of the arm and lever connected thereto by engaging the square portion of the end of the opposite swinging arm, and a beveled shoulder 21 for effecting the same purpose by engaging the beveled shoulder of the opposite swinging arm, and the swinging arms each having a square portion and a beveled portion 22′ at the end and carrying a pin 18′ projecting under the adjacent rigid arm for limiting the motion of the swinging arm, substantially as specified.

JOHN D. TAYLOR.

Witnesses:
BENJ. F. STONE,
WM. C. DUNLAP.