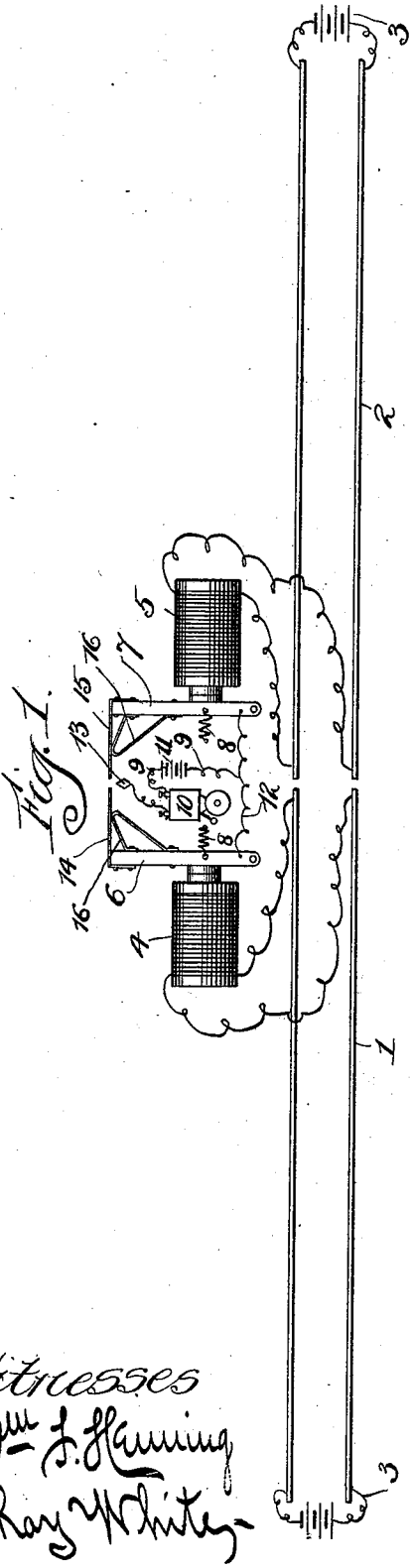
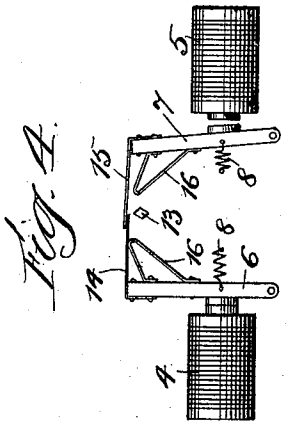
(No Model.)

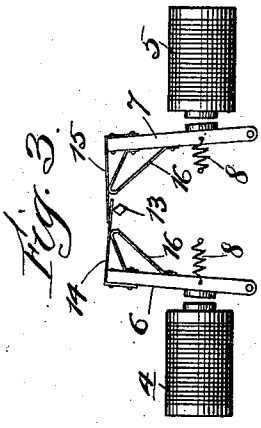
H. J. HOVEY.

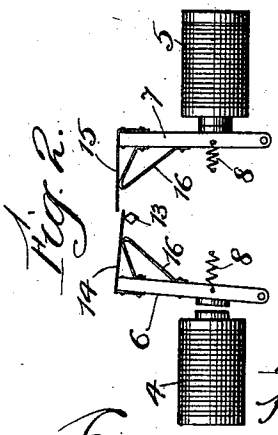
ELECTRICAL RAILWAY SIGNALING APPARATUS.

No. 552,181. Patented Dec. 31, 1895.









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UNITED STATES PATENT OFFICE.

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ELECTRICAL RAILWAY SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 552,181, dated December 31, 1895.

Application filed August 5, 1895. Serial No. 558,242. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. HOVEY, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Railway Signaling Apparatus, of which the following is a full, clear, and exact specification.

My invention relates to that class of electric railway-signals in which an alarm in a normally-open alarm-circuit is sounded by short-circuiting either of the rail-circuits adjacent to the crossing at which the alarm is situated through the medium of the rolling-stock, the rail-circuits being normally closed and each including an electromagnet whose armature or a part carried thereby constitutes a part of the alarm-circuit and the parts being so arranged that the short-circuiting of one of the rail-circuits will cause its armature to drop upon a contact forming one terminal of the alarm-circuit, and thus cause the alarm to sound as long as the train is in that rail-circuit; but when the train has passed the signal and gone into the next rail-circuit the short-circuiting of the latter is prevented from resounding the alarm and at the same time the first armature is free to be again actuated by a following train before the first train has left the second track-circuit.

Heretofore the contact constituting one terminal of the alarm-circuit and upon which the armatures fall when the rail-circuits are short-circuited has been pivoted or made in the form of an oscillating contact, whereby one end thereof will be moved out of the way of the second armature when the latter is released from its magnet through the short-circuiting of the second rail-circuit. A serious objection to this prior construction is that such oscillating contact must be nicely adjusted and balanced, so as to bear the same relation to both armatures, and this condition is almost impossible of attainment in practice by devices known in the prior art, inasmuch as the pivot of the contact is apt to corrode or rust, and thus retard if not prevent the oscillation of the contact, and its stability is also materially affected and its position altered by jar when located in the vicinity of the track.

The primary object of my invention, therefore, is to do away with the oscillating contact heretofore used and avoid the described objections and at the same time fully accomplish the above-named results by even simpler and more improved means.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a diagrammatic view illustrating my improved apparatus, the parts being in their normal or inactive position. Fig. 2 is a diagrammatic view illustrating the condition of the apparatus when a train is on the first rail-circuit. Fig. 3 is a similar view illustrating its condition when the train is in such a position as to bridge the two rail-circuits, and Fig. 4 is a similar view illustrating its condition when the train has fully passed from the first rail-circuit onto the second rail-circuit and is yet on and short-circuiting the latter circuit.

In carrying out my invention I employ a fixed contact, as heretofore mentioned, instead of the oscillating contact of the prior art, which constitutes one terminal of the alarm-circuit, and I so arrange the armatures of the rail-circuit magnets that they will contact with this said contact, and each in making its movement to and from said contact will pass through the line of movement of the other, so that when the armatures are successively thrown down against the contact and remain there one will rest upon and be supported by the other when the latter has been withdrawn by its magnet to its normal or elevated position, and will consequently also elevate the other armature resting upon it and hold the latter away from the contact; but at the same time the first or bottom armature will be at liberty to again descend upon the contact in the event its rail-circuit should be short-circuited by a following train before the first train has entirely left the second rail-circuit.

Referring now to the drawings, which represent an embodiment of this principle, 1 represents one of the rail-circuits, and 2 the other, which, if desired, may be constituted by the

rails themselves, as usual, and each of which is provided with a battery 3 or other suitable source of electric energy and with an electromagnet 4 5, having oscillatory armatures 6 7, respectively, which are adapted to recede from their magnets when the latter are de-energized, the armatures being arranged opposite each other and the magnetic attraction being preferably opposed by springs 8 or other suitable means for causing the armatures to promptly approach each other the instant their attraction by the magnets ceases.

9 is the alarm-circuit, which, unlike the track-circuits 1 2, is normally open and in which are included the alarm 10 and generator or battery 11. One limb of the alarm-circuit is connected by conductor 12 to both armatures 6 7, (or of course, if desired, to some conductor carried by the armatures,) while the other limb of such alarm-circuit is connected to the contact 13, with which the armatures contact when closing the alarm-circuit, and which contact 13 in my apparatus takes the place of the oscillatory contact heretofore used, and may be in the form of a fixed pin or contact of any other suitable construction. This contact 13 is situated between the armatures 6 7 in such a position that the armatures or some part carried thereby will fall upon it when the rail-circuits are short-circuited. In practice it is preferable to provide each of the armatures with a delicate tongue or spring 14 15, respectively, which are adapted to rest upon the contact 13 and thus close the alarm-circuit through either of the armatures. The object in making the tongues flexible is to enable one armature to raise the tongue of the other armature when the first armature is drawn back by its magnet without requiring such first armature to overcome the inertia of the spring 8 of the other armature and to lift the entire armature; but it is of course evident that if the magnets be of sufficient power the portions 14 15 need not be flexible.

Inasmuch as the tongues 14 15 are flexible it is desirable to locate under each of them a support or brace 16, so that the tongue which is underneath may have sufficient resistance against downward flexure to raise the other tongue resting upon it in the manner shown in Fig. 4, the tongues 14 15 being detached from the ends of the support 16, so that the upper tongue may be readily elevated by slight pressure from below.

When either of the rail-circuits 1 2 is short-circuited by the presence of a train thereon or by other means, the magnet 4 5 belonging to that circuit will be de-energized and its armature allowed to fall toward the contact 13, the ends of the tongues 14 15 being so arranged and proportioned that they will pass one another and strike upon the contact 13 when either makes its downward movement while both are in their normal position; but when one of the armatures is in its abnormal position the tongue of one will strike against the tongue of the other, and this is due to the fact that the ends of the tongues are arranged to pass through the line of movement of each other.

Assuming that the rail-circuit 1 is the first to be short-circuited, permitting the armature 6 to fall into the position shown in Fig. 2, the alarm-circuit will be closed through the leads 9, the conductor 12, armature 6, tongue 14 and contact 13. As soon as the train passes onto the rail-circuit 2 and while it is yet partially on the circuit 1, the magnet 5 will of course become de-energized also and permit its armature 7 to also move toward the contact 13; but inasmuch as the tongue 14 of the armature 6 is resting over and against the contact 13 at this time the tongue 15 of the armature 7 will fall upon the upper side of the tongue 14 in the manner shown in Fig. 3, and it will remain in this position until the train has left either or both of the rail-circuits 1 2. Since, however, the train would naturally leave the circuit 1 first, the magnet 5 remains de-energized after the magnet 4 has again been placed in circuit and its armature 6 raised to its normal position. Consequently the spring-tongue 15 of the de-energized magnet-armature will hang upon the upper side of the tongue 14 and be elevated thereby when the armature 6 returns to normal in the manner shown in Fig. 4; but this does not necessarily require the magnet 4 and armature 6 to overcome the inertia of the opposite spring 8 or to raise the armature 7, inasmuch as the springs 14 15 are susceptible of upward flexure by slight pressure while their downward flexure is prevented by the support 16. As soon as the train has left the rail-circuit 2, the magnet 5 becomes energized and the armature 7 is again returned to normal, and the spring 15 withdrawn from the end of the spring 14 and the parts assume their normal position with the alarm-circuit broken, as shown in Fig. 1. It is evident, however, that this interlocking of the spring-tongues 14 15 does not prevent the armature which is first to operate from again approaching the contact 13 and forcing its spring-tongue thereagainst, in the event a following train should come onto the first rail-circuit before the first train leaves the second rail-circuit. In other words, it is evident that the parts may move from the position shown in Fig. 4 back to that shown in Fig. 3.

In practice I prefer to provide the contact 13 with a knife-edge, as shown in the drawings, whereby it will abrade the tongues 14 15 as the latter descend upon it, and thus keep the contact-surfaces free from insulating deposits.

It will of course be understood that the terms "flexible tongues" "independently movable portions," or "deflectible portions," as applied to the portions 14 15, are intended to embrace any part or portion which is movable independently of the armature to which it is attached, and it is also evident that the

portions which engage with the contact 13 may be rigid with and a part of the armatures, should it be desired to have the magnet 4 of sufficient power to raise the armatures bodily and overcome the inertia of the springs 8, as before described.

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

1. The combination with two track circuits, each having an electro magnet therein provided with an armature, of a contact arranged adjacent to said armatures and adapted to form contact therewith, said armatures having flexible portions arranged in the line of movement of each other whereby one may hold the other away from said contact, and a signal circuit having one limb connected with said contact and the other with both of said armatures, substantially as set forth.

2. The combination with two track circuits each having an electro magnet therein, of a contact, an armature for each of said magnets provided with a deflectible tongue adapted to rest against said contact, the tongue of one armature being adapted to be raised by the movement of the other armature, and an alarm circuit having one limb connected with said contact and the other with said tongues, substantially as set forth.

3. The combination with two track circuits each having an electro magnet therein, of an armature for each of said magnets provided with an independently deflectible portion, means for preventing the flexure of said portion in one direction, a contact with which said deflectible portions engage, and an alarm circuit having one limb connected with said contact and the other with said deflectible portions, substantially as set forth.

4. The combination with two track circuits each having an electro magnet therein, of armatures for said magnets each having an independently movable portion, a contact with which said portions engage, one of said armatures being adapted to raise said independently movable portion of the other armature, and an alarm circuit having one limb connected with said contact and the other with said independently movable portions, substantially as set forth.

5. The combination with two track circuits each having an electro magnet therein, of an armature for each of said magnets having a spring tongue secured thereto and said tongues being projected toward each other, a contact arranged under an intermediate point between the ends of said tongues, supports projected under said tongues for preventing their flexure in one direction, and an alarm circuit having one limb connected to said contact and the other to said tongues, substantially as set forth.

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