(No Model.)

C. J. MEANS.

ELECTRIC RAILWAY SIGNAL.

No. 273,377. Patented Mar. 6, 1883.

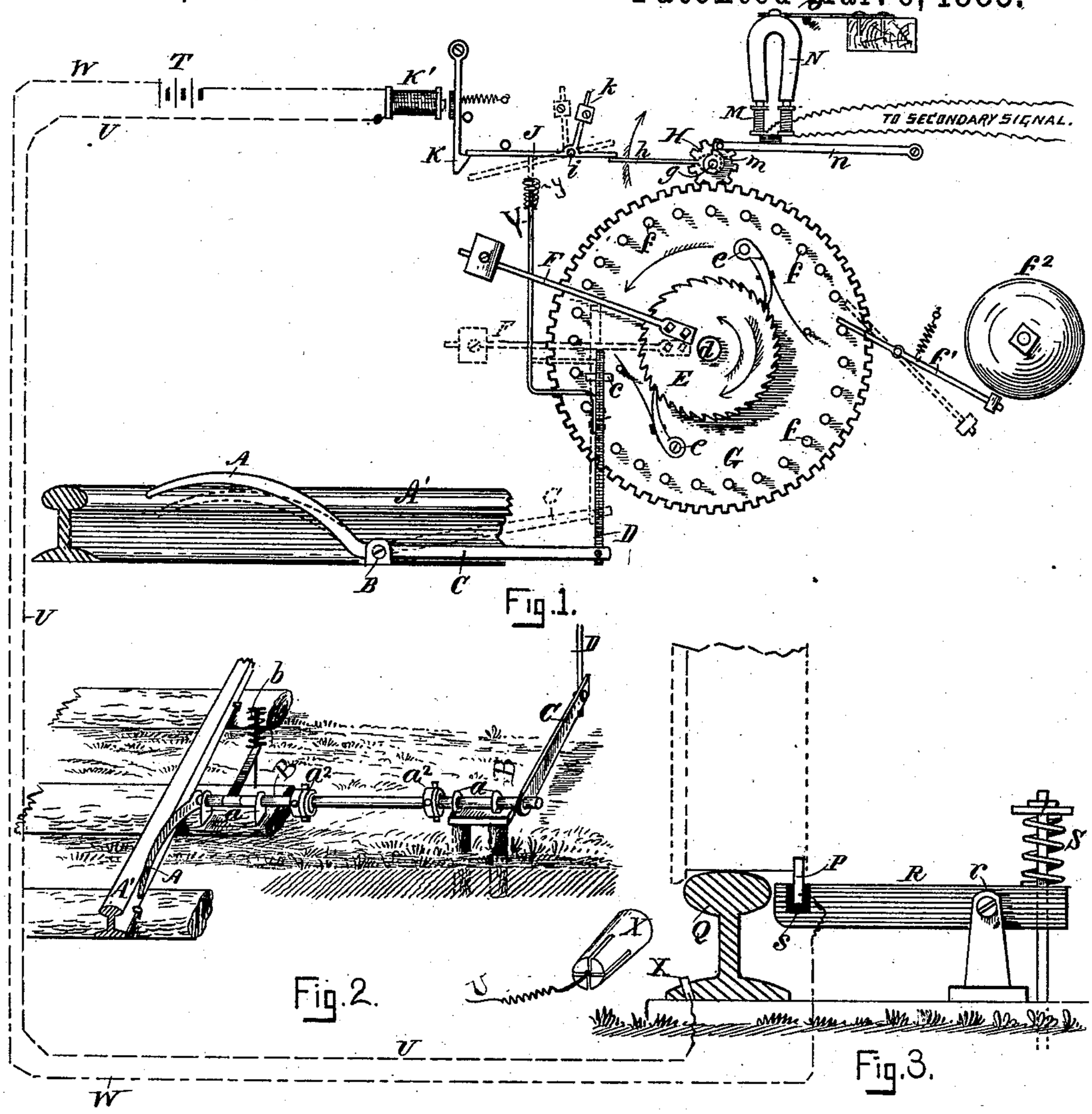

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 273,377, dated March 6, 1883.

Application filed November 14, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. MEANS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Electric Railway-Signals, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to that class of electric signals which are placed at highway-crossings on railways for sounding a continuous alarm whenever a train is approaching said crossing, and has for its object the production of signal mechanism which shall be released by a very slight current of electricity to sound an alarm, and shall signal its proper working at a neighboring station by means of magneto-electricity.

To this end my invention consists, first, in an improved balanced locking device controlled by an electro-magnet for a gong-sounding mechanism set for action by a passing train; second, in an improved combination, with a gong-sounding mechanism, of mechanism operated by and simultaneously therewith for producing magneto-electric currents for operating a secondary signal at a neighboring station; third, in an improved means for attaching a conducting-wire to the rails of a track. These three elements combined make an automatic crossing-signal which can be operated by a small battery, and which signals its proper working at any required point without the use of a battery.

In the accompanying drawings, Figure 1 is a side elevation of the gong-sounding mechanism. Fig. 2 is a view in perspective of the track-lever. Fig. 3 is an end view of the circuit-closer operated by a passing train, also showing my device for attaching a conducting-wire to the rails of the track. Fig. 4 is a top plan of the circuit-closer.

Referring to Figs. 1 and 2, A is an arm on a rock-shaft, B, supported in bearings *a a* on the road-bed, normally held above the top of the rail A′ by a suitable spring, *b*.

D is a rod, whose lower end is pivoted to an arm, C, also on rock-shaft B.

c is a guide for rod D.

E is a ratchet-wheel, secured on a shaft, *d*, having attached to it a weighted arm, F.

G is a large toothed wheel, loosely mounted on the shaft *d*.

e e are pawls on the toothed wheel, G, which engage the teeth of ratchet E.

The operation of the apparatus as thus far described is as follows: A train by depressing lever A, raises the weighted arm F by means of the arm C and rod D. When the arm F descends the pawls *e e*, pivoted on the wheel G, prevent the ratchet E from rotating independently, as it does when the arm F is raised, and a rotary motion is imparted to the wheel G.

I will here state that I make no claim to the mechanism thus far described, as the same is shown in English Patent No. 1,767 of 1863.

In Fig. 1, *f f* are pins, which, when the wheel G is rotated, engage with a bell-hammer, *f′*, causing it to sound the gong f^2, located at the crossing.

I will now describe my improved locking device controlling the movement of the gong-sounding mechanism and the magneto-generator operated thereby.

H is a small toothed wheel on a shaft, *g*.

h is a detent-arm on the shaft *g*, by which the rotation of the wheels G and H and the consequent sounding of the alarm is controlled.

J is a lever pivoted at *i*, whose shorter end normally engages the detent-arm *h*.

K is an armature-lever of an electro-magnet, K′, having a latch-shaped end, which holds the longer end of lever J in the position shown. This lever J is nearly balanced against the power of the detent-finger *h*, which has a tendency to move it in the direction of the arrow by a weight, *k*, so that the pressure against the armature-lever K is very light; consequently a feeble current of electricity is sufficient to operate it. The weighted arm *k* exerts its force near the center of gravity of lever J and normally on that side of the pivot *i* toward the detent-arm *h*; but when the lever J, being released by armature-lever K, is tipped by the detent-arm *h* into the position shown by the dotted lines, the center of gravity is changed and the action of the weighted arm *k* is on the other side of the pivot *i*, so that the lever J falls out of the path of the detent-arm *h* until it is restored to its normal position by mechanism hereinafter described. I shall refer to this same figure in describing my device for producing currents of magneto-electricity to operate a secondary signal at a neigh-

boring station, which shall indicate that the apparatus is in working order. This is an important feature, as the apparatus is commonly used where there is no flagman, and it is important that it should be kept in perfect order.

On the shaft *g* is a cam, *m*, upon which rests a lever, *n*.

M is an electro-magnet acting as an armature to a permanent magnet. The coils of this magnet are connected to any suitable signal—such as an electric bell.

N is the permanent magnet, supported by a very stiff flat spring, *o*.

The operation is as follows: As the shaft *g* revolves, the electro-magnet M on the lever *n* is brought in contact with permanent magnet N by the action of the cam *m*, and then suddenly permitted to drop, producing a current of electricity, which operates the secondary signal.

The object of this arrangement of a permanent magnet and electro-magnet is to produce a current of magneto-electricity when the lever *n* is vibrated by the cam *m* or its equivalent; and, instead of this arrangement, any suitable device for producing a magneto-electric current may be used.

I am aware that it is not new to produce a current of electricity for operating a railroad-signal by causing an electro-magnet to vibrate before a permanent magnet, as such a device was patented in England by Edward Tyer prior to 1860; but heretofore the electro-magnet has been attached to a track-lever and moved but once for each wheel of a train; but with my arrangement I increase the number of the currents by means of the toothed wheels G and H, thus making the operation of the secondary signal more prolonged. In case a continuous current in one direction is preferred, I employ a commutator of suitable construction.

In Figs. 3 and 4 I show the circuit-closer. This is a form of the instrument patented by me March 22, 1881. In these figures P is a steel bar, ten feet in length, supported by levers R R′ R² on fulcrums *r r′ r²*, parallel to the rail Q and slightly above it. S S′ S² are spiral springs, which keep the bar normally above the top of the rail. *s* is a strip of hard rubber, which prevents an escape of the current from the bar.

The arrangement of the circuits is as follows: T, Fig. 1, is the battery, to one pole of which one end of the coils of electro-magnet K′ is attached. The other pole is connected by wire W to the circuit-closing bar P, Fig. 3. The other end of the coils of electro-magnet K′ is connected to the rail Q by means of a spring-plug, X. This plug is tapered and has a hole in the center just the size of wire U. The end of the plug is slit like the plugs used for making connections on switch-boards, so that when it is driven forcibly into a hole drilled in the rail it clamps the wire, making a reliable electric connection.

The operation of the apparatus as a whole is as follows, supposing the apparatus shown in Fig. 1 to be in its normal position: A train approaching the crossing, when about one-half mile distant, runs on the circuit-closing bar P. A current of electricity then flows from battery T to electro-magnet K′, wire U, spring-plug X, rail Q, the car-wheel, bar P to battery T. The electro-magnet K′ attracts armature-lever K, liberating the locking-lever J. The force of the weighted arm F acting on the detent-arm *h* through toothed wheels G and H overcomes the weight *k* on the locking-lever J and throws it into the position shown by the dotted lines. The arm F then descends, rotating the toothed wheel G. The pins *f f* on said wheel engaging with the bell-hammer cause the gong *f*² to be sounded until the train reaches the crossing. At the same time a current is produced by the magneto electric device, which current operates the secondary signal at a neighboring station. When the train reaches the crossing it depresses the lever A, and the weighted arm F is again raised by the action of the arm C and rod D. At the same time the locking-lever J is restored to its normal position by a rod, Y, bearing a spring, *y*, attached to rod D. As the locking-lever J is retained by the armature-lever K, the weighted arm F is held in its raised position, and cannot again descend to operate the gong-sounding mechanism until a succeeding train acts on the circuit-closing bar P and charges the electro-magnet K′. The operation of the signal is therefore insured during and limited to the time in which the train is passing from the circuit-closing bar P to the crossing.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination of the electro-magnet K′, armature-lever K, lever J, bearing the weighted arm *k*, exerting its force near the center of gravity of said lever, and detent-arm *h*, the said weighted arm *k* normally acting against the tendency of detent-arm *h* to move, but having its center of gravity changed by the movement of said detent-arm *h*, so that it falls out of its path, substantially as and for the purpose set forth.

2. The combination of the track-lever A, arm C, and rods D and Y, for restoring the lever J, bearing the weighted oscillating arm *k*, to its normal position with the armature-lever K, adapted to hold the lever J in said normal position, substantially as and for the purpose set forth.

3. The combination of the track-lever A, arm C, connecting-rod D, weighted arm F, ratchet E, pawl *e*, toothed wheel G, bearing pins *f f*, bell-hammer *f′*, gong *f*², detent-arm *h*, weighted lever J, and armature-lever K, substantially as and for the purpose set forth.

4. In an electric railway-signal, the combination of the following elements, namely: a track-lever, signal mechanism operated thereby, and a magneto-electric generator in the circuit of a secondary signal operated by the

said track-lever simultaneously with the said signal mechanism, substantially as and for the purpose set forth.

5. The combination, with the gong-sounding mechanism, of mechanism for producing magneto-electricity operated by and simultaneously therewith for operating a secondary signal, substantially as and for the purpose set forth.

6. The combination, with the conducting-wire U, of the split plug X, and railroad-track Q, substantially as and for the purpose set forth.

In witness whereof I hereunto set my hand in the presence of two subscribing witnesses.

CHARLES J. MEANS.

Witnesses:
WM. H. MILLER,
H. E. REMICK.