2 Sheets--Sheet 1.

H. W. SPANG.

Circuit-Closers for Railway Signalling Apparatus.

No. 142,131. Patented August 26, 1873.

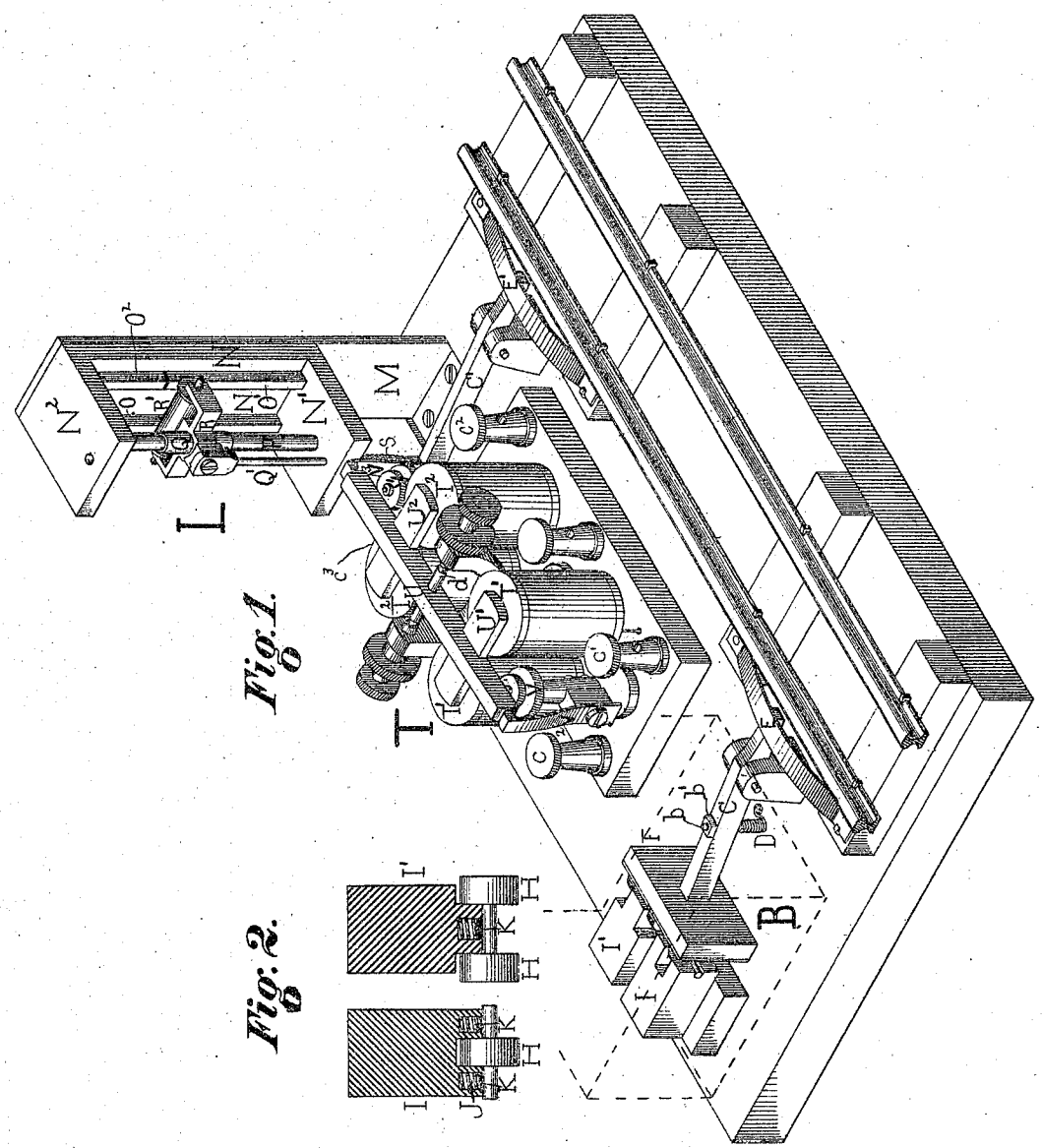

Fig. 1.

Fig. 2.

Witnesses.

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his Atty in fact

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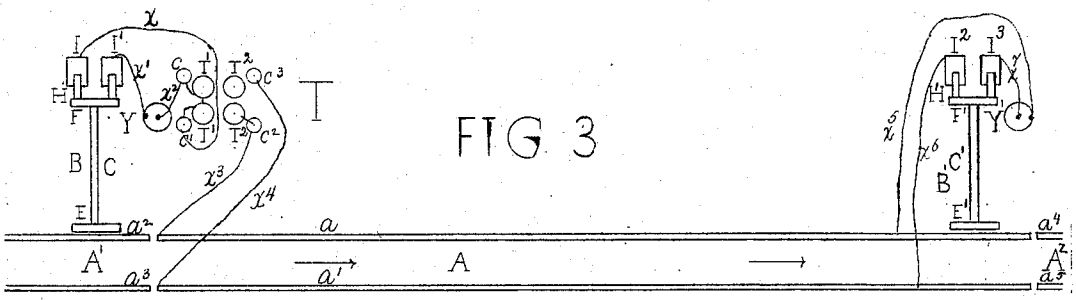

FIG 3

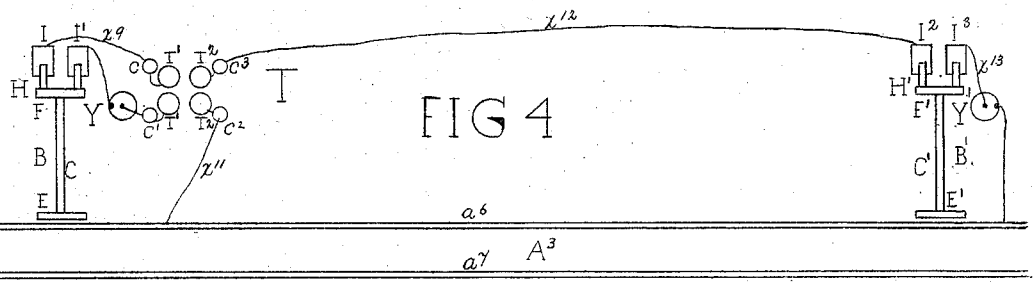

FIG 4

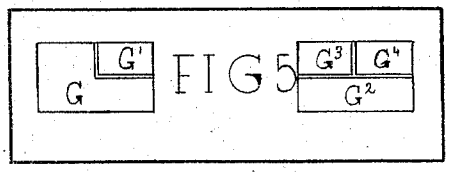

FIG 5

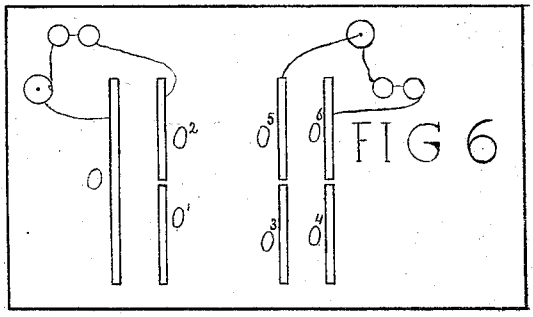

FIG 6

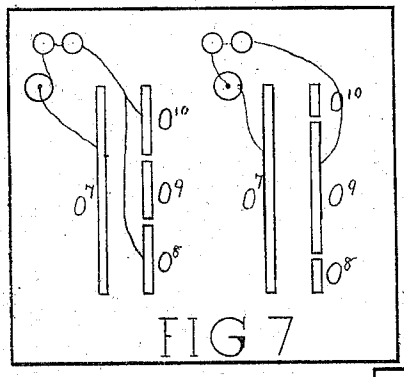

FIG 7

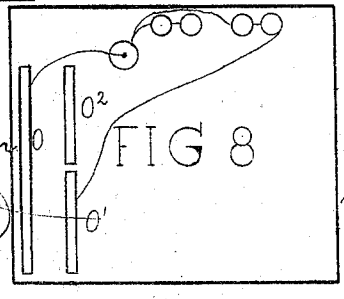

FIG 8

WITNESSES

Edmund P. Cochran

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UNITED STATES PATENT OFFICE.

HENRY W. SPANG, OF READING, PENNSYLVANIA.

IMPROVEMENT IN CIRCUIT-CLOSERS FOR RAILWAY SIGNALING APPARATUS.

Specification forming part of Letters Patent No. **142,131**, dated August 26, 1873; application filed April 1, 1873.

To all whom it may concern:

Be it known that I, HENRY W. SPANG, of Reading, in the county of Berks and State of Pennsylvania, have invented certain Improvements in Electric-Circuit Instruments and the Mode of Operating them for Railway-Signal Purposes, of which the following is a specification:

The object of the invention is to prevent the collision of railway-trains and accidents at street or road crossings by causing signals to be displayed or toned when a locomotive or train is occupying a specified section of the track or approaching a street or road crossing. It consists of a section of railway, wires, electro-magnets, and mechanism actuated by a passing locomotive or train, whereby one or more electro-magnetic circuits are closed or broken and signals displayed or toned until the said locomotive or train has passed over the specified section of railway.

Figure 1 is a perspective view of a section of railway, with a circuit closer and breaker at each end, and a relay-magnet, which can be placed at any suitable point of the section. Fig. 2 is a sectional view of the contact rollers and breakers. Fig. 3 is a view of a given length of track which is insulated or separated from metallic contact with its adjacent sections in the same line. A contact closer or breaker is located at each end. Fig. 4 is a view of a given length or section of track which is not insulated from its adjacent sections in the same line, with a contact closer and breaker at each end. Figs. 5 are views of the contact-plates or conductors on the end of the vibrating lever. Figs. 6, 7, 8 are views of the contact-plates or conductors of the vertical or upright circuit closer and breaker.

A, Fig. 3, is a section of a railway-track, of any required length—usually one mile. It is insulated from metallic contact with its adjacent sections A^1 A^2 in the same line.

A^3, Figs. 1, 4, is a section of track not insulated, but forms metallic contact with the adjacent sections in the same line.

B, Fig. 1, is an automatic electric-circuit closer and breaker, which is operated by a passing train. It is constructed as follows: C is a metallic lever, the short end of which is adjacent to and slightly above the rail, in which position it is retained by the spiral or other spring D acting on the under side of the opposite end of the lever. To take up the set of the spring, which it acquires from excessive use, a bolt, *b*, is passed through the lever and spring. Its tightening-nut *b'* bears on the upper side. E is a bridge or yielding presser-bar on sills adjacent to the track. One or both of its ends are loose, to permit it to spread and lower under pressure. The track end of the lever C bears against the under side of it.

The wheels of a locomotive or train ride over the bridge, which gradually and easily spreads and lowers, and thereby depresses the track end of the lever C of the circuit closer and breaker B. Heretofore the wheels have struck the end of the lever directly and with a percussive force, which, while it served to depress it, at the same time rendered the lever liable to sudden destruction.

To the inner end or long arm of the lever C is fixed an insulating-plate, F, to the face of which the metallic contact-plates G G^1 or G^2 G^3 G^4 are attached. They are insulated or separated from each other, as fully shown at Figs. 5. In place of the metallic plates G^1 G^3 G^4, plates of ebonite or any insulating substance can be used. H H H are metallic contact-rollers in suitable bearings in the blocks or heads I I^1, which are insulated or separated from each other. They are kept in firm and constant contact with the plates G G^2, or G^1 G^3 G^4, by the springs J, which are recessed in the blocks I I^1, and exert their force on the journals of the rollers through intervening caps K. L is a vertical circuit closer and breaker, constructed as follows: M is an upright, upon which is fixed a plate, N, of ebonite or other insulating substance. N^1 N^2 are ebonite projections from the plate N. A similar-shaped cast-iron box, lined with ebonite or insulating material, and fixed to the same upright, can be used with equal effect. Upon the ebonite plate N are fixed the parallel metallic plates or conductors O O^1 O^2, or O^3 O^4 O^5 O^6, which are separated from each other, as in Figs. 6, 7, 8, and so completely insulated that very little

electricity can escape from them. P is a vertical guide-rod, over which moves the sleeve Q. The roller-head R, attached to the sleeve, carries the contact-rollers R′, which traverse the plates or rails O O^1 O^2, or O^3 O^4 O^5 O^6. They are kept firmly against them by springs and caps similar to J K, Fig. 2. To the sleeve Q is attached a rod, Q′, which is actuated by the lever C′, like in construction, arrangement and mode of operation to the lever C of the first circuit closer and breaker B, Fig. 1. A spiral spring, S, brings the connecting-rod Q′, sleeve Q, and their attendant parts back to their normal position after the wheels of a train have passed over the bridge E′. The sleeve Q can be insulated from metallic contact with the connecting-rod Q′ or the roller-head R by placing a plate of any insulating substance between them. Plates or rails of ebonite can be substituted for the metallic plates O^1 O^3 O^4. T, Fig. 1, is a compound relay-magnet, having two pairs of electro-magnets, T^1 T^1 T^2 T^2, the terminal wires of which are connected with the binding or connecting posts c c^1 c^2 c^3. U is an armature-lever on the shaft d. It has the armatures U^1 U^2 on its opposite ends. V V^1 are posts which regulate the extent of the vibration of the lever and prevent its armatures from sticking on the heads of the electro-magnets. They also serve to close or break a secondary or local circuit for operating a visible or audible signal. V^2 V^3 are springs which press against the lever U and hold it in the position it was placed by an electric current closed temporarily, and charging a pair of electro-magnets, and attracting an armature on one end of the lever, which it holds until another electric current is closed, and charges the opposite electro-magnets and attracts the opposite armature.

In place of the compound relay-magnets, needles or their equivalents, in connection with metallic posts or conductors and electro-magnets or coils of insulated wire or other devices, can be substituted and arranged to close or break a secondary or local circuit for operating a visible or audible signal.

Fig. 3 is a plan view of a section of track insulated from its adjacent sections. B B are circuit closers and breakers at opposite ends of the section. T is a relay-magnet at one end of the section. The wire x connects the roller-head I and the connecting-post c^1 of the electro-magnets T^1 T^1; wire x^1 connects the roller-head I^1 and the battery Y; wire x^2 connects the battery Y and the binding-post c of the electro-magnets T^1 T^1; wire x^3 connects the line of rails a and the binding-post c^2 of the electro-magnets T^2 T^2; wire x^4 connects the line of rails a^1 and the connecting-post c^3 of the electro-magnets T^2 T^2; wire x^5 connects the line of rails a and the battery Y′; wire x^6 connects the line of rails a^1 and the roller-head I^2; wire x^7 connects the roller-head I^3 and the battery Y′.

A train, reference being had to Fig. 3, passing over the track in the direction of the arrow, the tread of the wheels depresses the bridge, bar, or spring E, and, of consequence, the end of the lever C adjacent to the rail is depressed and the opposite end elevated, when the contact-plate G or G^2 is raised and the rollers H H H make contact upon one and the same plate and close the electric circuit which flows from the battery Y over the wires x x^1 x^2, the roller-heads I I^1, springs J, rollers H H H, plates G or G^2, and charges the electro-magnets T^1 T^1, which attract their armature and close or open a secondary or local circuit, when a signal is displayed or toned until the train depresses the bridge E′ and the end of the lever C′ of the circuit closer and breaker L at the other end of the section, which, in a similar manner, causes the electric circuit from the battery Y′ to be closed and flow over the wires x^3 x^4 x^5 x^6 x^7, line of rails a a^1, roller-heads, springs, rollers, and the plate G or G^2 of the circuit closer and breaker L, and charges the electro-magnets T^2 T^2, which attract their armature and close or break the secondary or local circuit. As shown in Fig. 4, the electric circuit from the battery Y′ is completed by passing over the wires x^{11} x^{12} x^{13} x^{14}, line of rails a^6, roller-heads, springs, rollers, and the plate G or G^2 of the circuit-closer B, and charges the electro-magnets T^2 T^2.

In Fig. 3, the two lines of rails a a^1 are part of the conductors of the electric current between the battery Y′ and the electro-magnets T^2 T^2 at the other end of the section. In Fig. 4, the line-wire x^{12} and one line, a^6, of the rails are part of the conductors of the electric current between the battery Y′ and the electro-magnets T^2 T^2.

Figs. 6 show the arrangement of the battery, electro-magnets, and the wires in connection with the metallic plates or conductors O O^1 O^2 or O^3 O^4 O^5 O^6 of the upright circuit closer and breaker L. When the roller R′ rests upon the plates O O^3 or O^3 O^4 the electric circuit is broken, and when on the plates O O^2 or O^5 O^6 the electric circuit is closed.

The bridge or depressor-spring E can be used in connection with any other contrivance for operating an electro-magnetic or a mechanical signal apparatus. I claim broadly its use for general railway-signal purposes.

The vertical circuit closer and breaker can be used for railway-switch signal or alarm purposes by arranging it so that the rod Q′ will be actuated by a switch lever, rod, or a movable rail. Upon the ebonite plate N, metallic rails or conductors can be fixed, as shown at N^7 N^8 N^9 N^{10}, Fig. 7.

I claim as my invention—

1. The combination, in a circuit-closer to be operated by a lever or a lever and a spring presser-bar, as set forth, of an insulated foundation, with metallic conducting-pieces arranged thereon, and metallic roller or rollers for electrically connecting the same, substantially as set forth.

2. The metallic rails or conductors O O^1 O^2 or O^3 O^4 O^5 O^6, in combination with the insulating-plate N, the guide-rod P, the sleeve Q, the roller-head R, and the roller R′, as and for the purpose shown and described.

3. The combination of the electro-magnets T^1 T^1 T^2 T^2, the armature-lever U, the armatures U^1 U^2, and the springs V^2 V^3, substantially as and for the purpose shown and described.

In testimony whereof I hereunto sign my name in presence of two subscribing witnesses.

HENRY W. SPANG.

Witnesses:

CHAS. H. LAVIS,

FRANCIS D. PASTORIUS.