

T. S. HALL.

Electro-Magnetic Railway Signal.

No. 103,174.

Patented May 17, 1870.

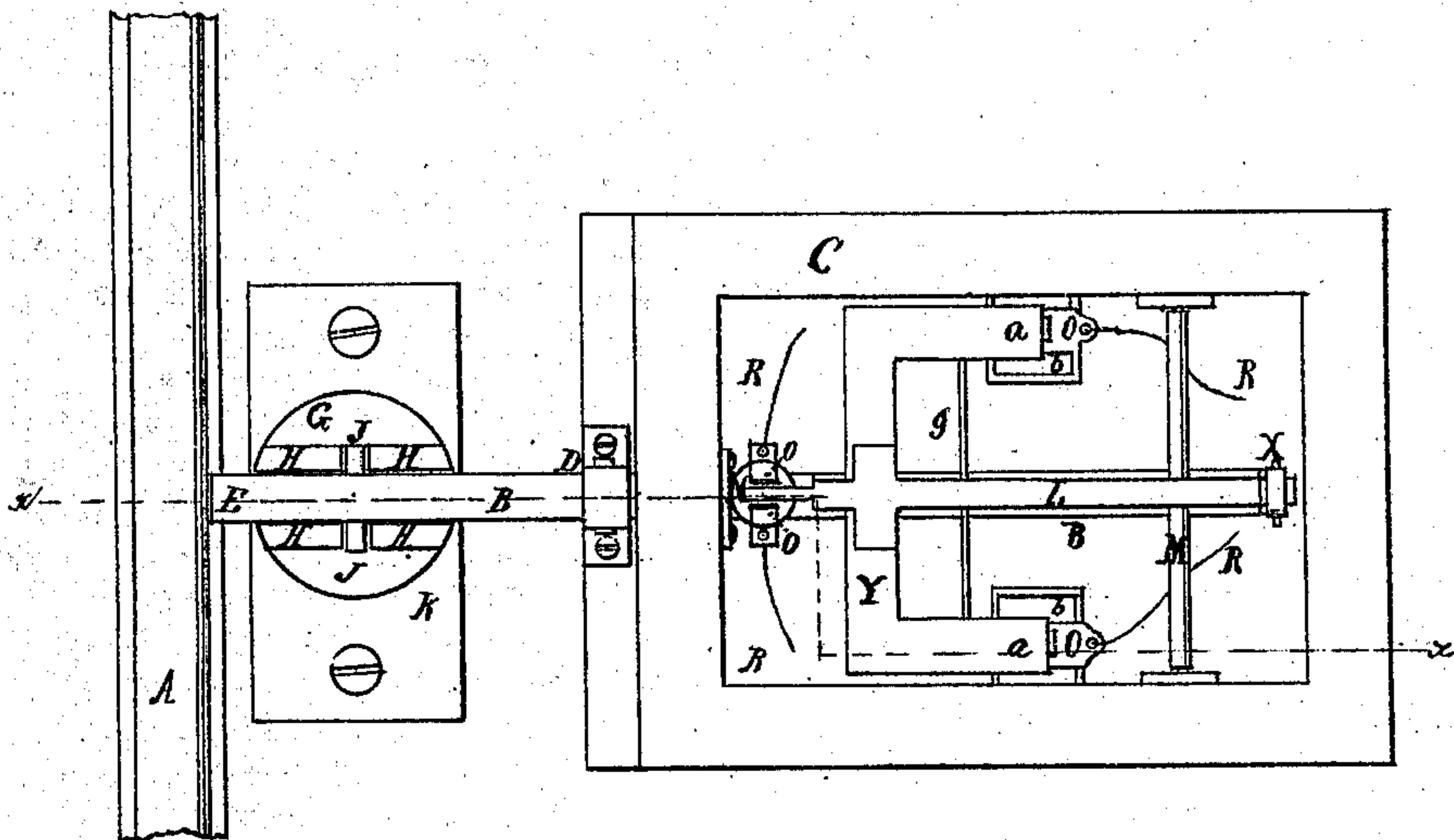
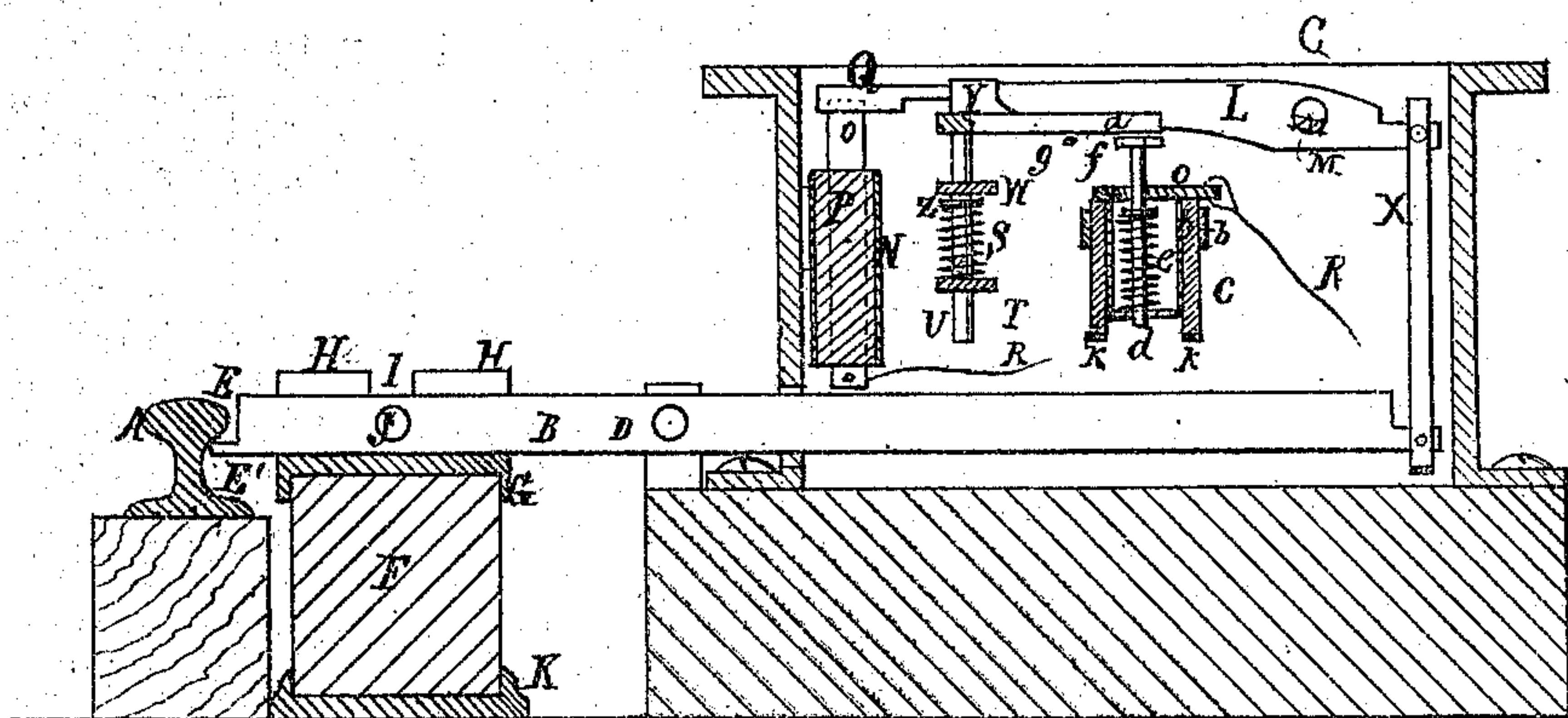


Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN ELECTRIC-CIRCUIT INSTRUMENTS FOR RAILWAY-SIGNALS.

Specification forming part of Letters Patent No. 103,174, dated May 17, 1870.

*To all whom it may concern:*

Be it known that I, THOMAS S. HALL, of Stamford, in the county of Fairfield and State of Connecticut, have invented a new and Improved Electrical Circuit Instrument for Railway-Signals; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 is a plan view of my improvement. Fig. 2 is an elevation of a vertical section, taken in line  $x x$ , Fig. 1.

Similar letters indicate corresponding parts.

This invention relates to operating signals, visible and audible, for railroads, by the action of currents of electricity; and consists in an arrangement of mechanism, in combination with the track of a railroad, in such a manner that a passing train will operate the mechanism, and close the electro-magnetic circuits, one or more, by the closing of which the signals are brought into action, and also reversed.

The letter A designates one of the rails of a railroad-track, and B is a horizontal lever, arranged at right angles thereto, and extending from the head of the rail to a suitable platform, which sustains its fulcrum D, and from thence into a closed box, C, which has a vertical slot in its front to receive the lever. The said lever B is so arranged on its fulcrum that it can vibrate in a vertical plane, and that part of said lever which is between the fulcrum and the rail is shorter than that whose end is contained in the box. That end E of the lever B which is adjacent to the rail is arranged close thereto, at a higher level than the surface of the rail, in which position it is held up, so that the wheels of passing trains will come in contact with it, by a spring, F, which supports a chair, G, across which the lever extends, and upon which it rests, between vertical guides H H, rising from the chair, which guides have vertical slots I I, that receive gudgeons J, extending from the sides of the lever.

The object of the guides H H is to prevent lateral displacement of the lever, and the slots I and gudgeons J prevent the lever from moving endwise.

The spring F rests in a bed, K, to which it is properly secured, and the chair G is firmly connected with the spring, so that they will always move together.

If it is thought necessary, the chair can be further secured from displacement by the use of rods and guides, arranged on the chair G and the bed K, so as to allow the chair to move up and down with the spring.

The spring F is prevented from throwing the end E of the lever too high above the rail by means of a stud, E', on the extremity of the under side of the lever B, which stud extends under the head of the rail toward its web, so that the under side of the head of the rail constitutes a stop to limit the upward movement of the lever.

The spring F can be of any suitable material, and a weight may be used instead thereof, if preferred.

The longer arm of the lever B extends into a box, C, which contains the ends of wires R R from the positive and negative poles of a battery.

The longer arm of lever B is allowed vertical play in said box, and its extremity is connected by a vertical rod, X, with the shorter end of the key-lever L, which is arranged above and parallel with lever B, and vibrates on a fulcrum, M. The key-lever L extends toward the front of the box, and terminates above a vertical tube or holder, N, which contains the ends of the wires R R, and in which they are properly insulated, and also held separate and apart from each other. The wires enter the tube from below, and terminate in spring-plates O O, which extend up vertically through the top of the tube or holder N, where they are held by means of rubber cushions P P in such a manner that they always remain out of contact with each other. These plates O constitute a divided anvil, between whose divisions the wedge-shaped end Q of the key-lever L is forced down, as hereinafter explained, in order to complete the electrical circuit through the wires R R, the upper extremities of the plates O being made to flare outward, so as to guide and facilitate the entrance of the key-lever between them, and their spring-cushions P P operate to insure their contact with the key by pressing them against its sides as the key is forced down between them.



The key-lever *L* is vibrated automatically by the impact or weight of a locomotive or car as its wheels roll upon and depress the raised end *E* of the track-lever *B*, whereby the longer arm of said lever is raised and the key-lever vibrated upon its fulcrum, so as to crowd its end down between the divisions of the anvil. When the end of lever *B* is relieved of the weight which depressed it, it is restored to its former elevated position by the spring *F*, which also, through lever *B* and connecting-rod *X*, throws up and holds the longer arm of the key-lever out of contact with the divisions of the anvil. The longer arm of the key-lever is also supported in its elevated position out of contact with the anvil by spiral springs *S S*, which rest on a stationary cross-bar, *T*, extending across the box *C* below the key-lever *L*, said springs being arranged around vertical rods *U U*, whose lower ends move through holes made in the cross-bar *T*, and whose upper ends pass up through holes in a stationary guide-bar, *W*, to the movable transverse plate *Y*, to which they are secured.

The upper ends of the springs *S S* are confined to the rods below the bar *W* by the collars and pins *Z Z*, through which they act to raise the rods and with them the movable plate *Y*, which is in turn brought up against the longer arm of the key-lever, so as to assist in keeping it up out of contact with the anvil while the mechanism is at rest. The guide-bar *W* serves as a stop to the springs *S*, and arrests their action in lifting the movable plate *Y* and the key-lever *L*, by the contact of the nuts *Z Z* with the bottom of said guide-bar, which is adjusted in the machine to the proper height to cause the key-lever *L* to be always held up clear of the anvil while the mechanism is at rest.

Ordinarily the secondary springs *S S* are not required to raise and hold up the key-lever *L*, as described, as I make the spring *F* stiff and powerful, so as to require considerable power to compress it, and so as to prevent it from being actuated by accident by persons passing along the track.

The drawing shows a modification in the manner of constructing and arranging the divided anvil *O* and the parts which bring its divisions into communication. In this modification the yielding plate *Y* forms a component part of the key-lever *L*, although the latter only rests upon said plate, without being attached to it. From the ends of said plate *Y* two arms, *a a*, connected by a copper wire, *g*, extend along the sides of box *C* until they reach positions over cases or frames *c c* fixed to the sides of the box *C*, as shown in the drawing. The divisions *O O* of the anvil are here made in the form of boxes, which are contained within the insulating rubber cushions *b b*, extending through the cushions from top to bottom, but supported therein by the overlapping heads of said divisions *O*, which overlap the upper surface of the rubber cushions and have

holes in them to allow of their attachment to the wires *R*. Within the divisions or anvils *O O* are placed spiral springs *e*, which rest on the bottoms of the hollow anvils *O O* and surround rods *d d*, which work through holes in the tops and bottoms of the anvil-divisions. The upper ends of said springs are fastened to the rods *d* by collars and pins, in the ordinary manner, so that the rods are held up, with their heads *f* clear of the surface of the anvils. The cushions *b b* are securely held in the cases or frames *c c*, the bottoms of the cushions being sustained in the bottom parts *k k* of the cases, the central portions of whose bottoms are removed, as shown in Fig. 2. By this construction and arrangement the rods *d* and their heads *f* form component parts of the anvils *O O*, and said parts, with the springs *e* of the rods, are effectually insulated by the hollow cushions *b*.

In operating my invention according to this modification the descent of the key-lever *L* forces the yielding plate *Y* downward, and the arms *a a* of said plate are brought in contact with the heads of the spring-rods *d*, whereby electrical communication is established between the wires *R R*, through the parts *O*, rods *d*, arms *a*, and wire *g*, the arms *a* constituting the key.

It will be observed that the anvil plates or divisions are supported in a yielding manner, so that the key-lever comes in contact with yielding surfaces, which will prevent the liability to injury that might occur if the parts were injured.

In the illustrations here given of the divided anvil, I establish communication between them through the medium of a device which comes between them, or is brought in contact with them, but it is obvious that the same result may be produced by bringing together the tops of the upright divisions *O O* contained in the case or holder *N*, instead of introducing between them the wedge-key *Q*.

This invention may be operated in connection with my improvement in electro-magnetic railroad-signals, for which I received Letters Patent of the United States, December 7, 1869, or with other devices for automatically operating signals by means of electro-magnetic circuits.

I do not confine myself to the particular devices here shown for carrying out my invention, but can vary the same without departing from the nature of my invention; as, for example, the lever *B* which is moved by the train, can be arranged with the track, either between the rails or outside thereof in such a manner as to be moved by an arm projecting from the locomotive or from a car, or the lever can be so arranged within the track as to be depressed by the impact of the flange of the wheel. And the outer end of lever *B* can be brought directly in contact with the poles of the battery by placing them in the proper position.



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

1. The lever B, in combination with the key-lever L, rod X, and the divisions of a divided anvil, substantially as described.

2. The projection E' on the end of lever B, arranged beneath the head of the rail, substantially as and for the purpose described.

3. The divided anvil, composed of independent parts O, supported in such a manner as to yield under the advance of the key-lever

and press against the same, substantially as described.

4. The manner of operating the key-lever, which throws the anvil out of contact by means of the same spring F which restores the lever to its elevation, substantially as described.

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