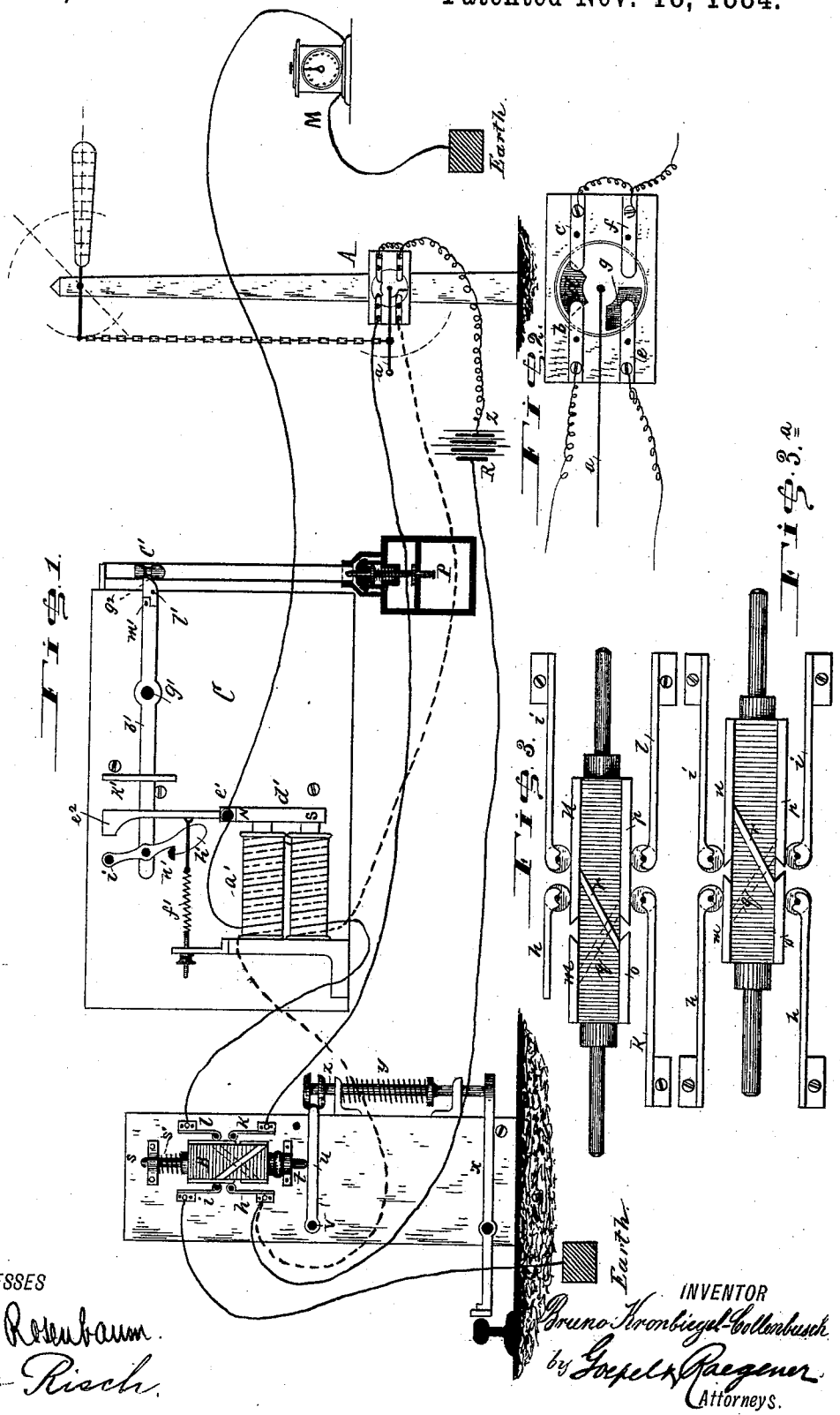
(No Model.)

B. KRONBIEGEL-COLLENBUSCH.

ELECTRIC RAILWAY SIGNALING APPARATUS.

No. 308,316. Patented Nov. 18, 1884.



WITNESSES

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UNITED STATES PATENT OFFICE.

BRUNO KRONBIEGEL-COLLENBUSCH, OF SOEMMERDA, PRUSSIA, GERMANY, ASSIGNOR TO DREYSE & COLLENBUSCH, OF SAME PLACE.

ELECTRIC RAILWAY-SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 308,316, dated November 18, 1884.

Application filed February 4, 1884. (No model.) Patented in England December 7, 1883, No. 5,668.

To all whom it may concern:

Be it known that I, BRUNO KRONBIEGEL-COLLENBUSCH, a citizen of the Kingdom of Prussia, Germany, residing at the city of Soemmerda, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Electric Railway-Signaling Apparatus, (for which Letters Patent have heretofore been granted to me by the Government of England under date of December 7, 1883, No. 5,668,) of which the following is a specification.

This invention relates to an improved apparatus for signaling railroad trains by means of torpedoes, which are exploded by means of a weight released by electrical devices, so as to warn the locomotive-engineer of danger in case he overlooks the optical danger-signal.

The invention consists of a semaphore-signal, a switch, a current-reversing device operated by a lever mechanism when the locomotive passes, an electro-magnet, and means actuated by said electro-magnet, by which a weight is released and a torpedo exploded, so that the engineer is warned.

The invention consists, further, in the construction and combination of devices, which will be hereinafter more fully described, and then set forth in the claims.

In the accompanying drawings, Figure 1 illustrates an elevation of my improved electric-signaling apparatus for railway-trains. Fig. 2 is an enlarged detail view of a switch connected with a semaphoric signal-board and operated therewith; and Figs. 3 and 3ª are detail views of the current-reverser that is operated by a passing train, and that releases the weight by which a torpedo is exploded.

Similar letters of reference indicate corresponding parts.

My improved signaling apparatus for railway-trains consists, essentially, of a semaphore or optical signal, which, when set by the attendant to "danger," also sets mechanism by which, in case of the non-observance of the optical signal, a torpedo or other detonating signal is exploded. The means employed for this purpose consist of a switch, A, secured to the semaphore-post and operated simultaneously with the semaphore-arm, said switch being placed in an electric circuit with a current-reversing device, B, actuated by the passing train, and with an electro-magnet, *a'*, the armature of which, on being released, actuates an intermediate lever mechanism that drops a weight, C', by which a torpedo is discharged. The switch A is operated by a lever, *a*, that is connected by a chain to the semaphore-arm and attached to a disk having metallic segments *d* and *g*. Two metallic spring-plates, *b* and *c*, form contact with the segment *d* when the semaphore-arm is in a horizontal position indicating danger, while two other plates, *e* and *f*, form contact with the segment *g* when the semaphore-board is raised so as to indicate a clear track. The contact-plates *b c* and *e f* are connected with one pole of a battery, R Z, located in the box of the signal-keeper or at any other suitable place, the other pole of the battery being connected with a current-reversing device, B, that is shown on an enlarged scale in Fig. 3. The current-reverser B consists of two pairs of spring-plates, *h i k l*, which are mounted to an upright board and provided with binding-screws at one end for the electric wires and with contact-rollers at the other ends. These rollers are pressed against four metal strips, *m n o p*, which are arranged in pairs on opposite sides of a prismatic block of insulating or non-conducting material. The strip *m* on one side of the prism is electrically connected with the strip *p* on the opposite side by a diagonal strip, *q*, the strips *n o* being in like manner connected by the strip *r*, which is insulated from the strip *q*. The prismatic supporting-block of the strips *m n o p* is vertically guided by rods *s* and *t* in keepers of the supporting-board. A spiral spring, *s'*, encircles the upper guide-rod of the block and exerts a pressure in a downward direction on the same. The lower guide-rod of the block of the current-reverser B rests upon a lever, *u*, that is pivoted at one end to the pin *v*, and connected at the opposite end with a collar at the upper end of the vertically-guided rod Z. This rod is acted upon by a spiral spring, *y*, interposed between a fixed guide-bracket and a collar on said rod, whereby the rod Z is pressed in downward direction upon a fulcrumed lever, *x*, the op-

posite end of which is arranged close to and slightly higher than the tread-surface of the track-rail. The lever *x* is arranged at right angles to the track, and causes, when depressed by the wheel of the locomotive, the current-reverser B to move in an upward direction through the intervention of the vertical rod Z and lever *u*. After the passage of the train the current-reverser is returned into normal position by means of the spiral springs *s'* and *y*.

The means proper for actuating the mechanism that explodes the signal-torpedo consist of an electro-magnet, *a'*, a fulcrumed lever, *b'*, and a weight, *c'*. The cores of the electro-magnet are each wound with two sets of insulated copper wires, which run in the same direction. The armature *d'* of the electro-magnet *a'* is fulcrumed at *e'* and provided at its end with a hammer-shaped enlargement, e^2. The armature *d'* is connected above the fulcrum *e'* with an adjustable releasing-spring, *f'*. The lever *b'* is fulcrumed at *g'* and provided at the inner end close to the armature-lever with a fulcrumed gravity-latch, *h'*, the upper end of which carries a projecting pin, *i'*, against which strikes the hammer-shaped end e^2 of the armature-lever. The lever *b'* moves in a keeper, *k'*, that guides and limits its movement. At the other end of the lever is arranged a pivoted nose, g^2, which turns on the pin *l'* in an upward direction, but is prevented from turning in a downward direction by a pin, *m'*, that engages a projection of the pivoted nose g^2. A sliding weight, C', is guided in a vertical frame of corresponding shape and size, and is free to pass the pivoted nose g^2, when lifted by hand or otherwise, above the same. The nose g^2 engages an annular groove of the weight C' when the same is lifted, and is maintained in this position until the latch *h'* is released from the pin *n'*. At the lower end of the guide-frame of the weight C' is arranged a casing into which a torpedo or other detonating device, P, of any approved construction is placed. Finally there is located at the railroad-station connected with the signaling device an ordinary galvanoscope, M, which indicates the condition of the circuit and the position of the semaphore arm or board. The electrical parts of the signaling apparatus are inclosed in a weather-tight manner, but the sliding weight can be exposed and operate in the open air, so as to effect the firing of the torpedo in such a way that the detonation and flame produced by the explosion can be easily seen by the engineer or trainman.

The operation of my apparatus is as follows, viz: When the semaphore-arm is set into horizontal position indicating "danger," the current will then pass from one pole of the battery to the contact-plate *c*, segment *d*, spring-plate *b* of the switch A, and from thence to the spring-plate *k*, strip *p*, spring-plate *l*, through the coils of the electro-magnets drawn in full lines to the galvanoscope at the station, thence to the ground, returning through the ground to the spring-plate *i*, strip *n*, and plate *h*, to the opposite pole of the battery R Z. When the current is passing in this manner, the circuit is closed, and the armature *d'* attracted by the electro-magnet *a'*. The gravity-latch *h'* engages the pin *n'*, so that the lever *b'* holds the weight in an elevated position by the nose g^2. When a train approaches without the engineer observing the semaphore-signal, the lever *x* is depressed by the wheel of the locomotive, whereby the current-reverser B is lifted, so that the spring-plates *h*, *i*, *k*, and *l* form no longer contact with the metal plates *n* or *p*, but with the diagonally-connected metal plates *m* and *p* and *n* and *o*, as shown in Fig. 3ª, whereby the current is reversed, and consequently the armature *d'* instantly repulsed by the reversed polarity imparted to the poles of the electro-magnet *a'*. The hammer-shaped end e^2 of the armature-lever strikes the pin *i'* of the gravity-latch *h'*, and releases the latter from the pin *n'*. The lever *b'* is thereby liberated, and causes the dropping of the weight C', which explodes thereby the torpedo or other detonating device. The locality where the torpedo is exploded can be near the signal-board or at any suitable distance therefrom. The insertion of a new torpedo, and the resetting of the weight C', lever *b'*, and gravity-latch *h'* into their normal positions is performed by the signal-keeper after each action of the detonating signaling device. When the semaphore-arm is raised so as to indicate a clear track, the current flows from one pole of the battery to the plate *f*, segment *g*, spring-plate *e*, through the coils of the electro-magnet shown in dotted lines, then to plate *h* of the reverser B, and back again to the other pole of the battery. The current-reverser B is thus cut out of the circuit; also the galvanoscope at the station, so that the needle of the same is at zero, indicating that the track is clear. When the signal is set for danger, the needle of the galvanoscope is moved away from zero, and indicates that the track is occupied. In this manner the station is fully informed of the condition of the track at any time.

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

1. An electric railway-signaling apparatus consisting of a switch actuated in conjunction with a semaphore, a current-reverser adapted to be placed in circuit with said switch, a lever mechanism actuated by the railway-train for shifting the current-reverser, an electro-magnet adapted to be placed in circuit with the switch and current-reverser, and a lever mechanism actuated by the armature of the electro-magnet so as to release a drop-weight and explode a torpedo, substantially as and for the purpose set forth.

2. The combination of a switch actuated in conjunction with a semaphore, a current-reverser adapted to be placed in circuit with said switch, an electro-magnet the coils of

which are wound with two separate wires in the same direction, that are connected with the switch and current-reverser, whereby the switch is adapted to cut the current-reverser out of or throw it into circuit, substantially as set forth.

3. In an electric railway-signaling device, the combination of a current-reverser, B, consisting of spring-plates *i h k l*, a vertically-guided and spring-acted block, having metallic strips *m n o p* and diagonal connections *r* and *q*, and a fulcrumed lever, *x*, connected by intermediate mechanism with the slide-block, one end of said lever being arranged sidewise of and above the level of the tread-surface of the track-rail, substantially as set forth.

4. In an electric railway-signaling device, the combination of an electro-magnet, *a'*, oscillating armature *d'*, having hammer-shaped extension e^2, fulcrumed lever *b'*, having an oscillating gravity-latch. *h'*, at one end and a pivoted nose, g^2, at the other end of the lever *b'*, stop-pin *n'*, drop-weight C', and means vertically below the weight for supporting a torpedo or other detonating device, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BRUNO KRONBIEGEL-COLLENBUSCH.

Witnesses:

H. F. HESS,

RICHARD BRANDT.