(No Model.) 2 Sheets—Sheet 1.

D. G. SMITH.

ELECTRIC RAILWAY SIGNAL.

No. 395,667. Patented Jan. 1, 1889.

Fig. 1.

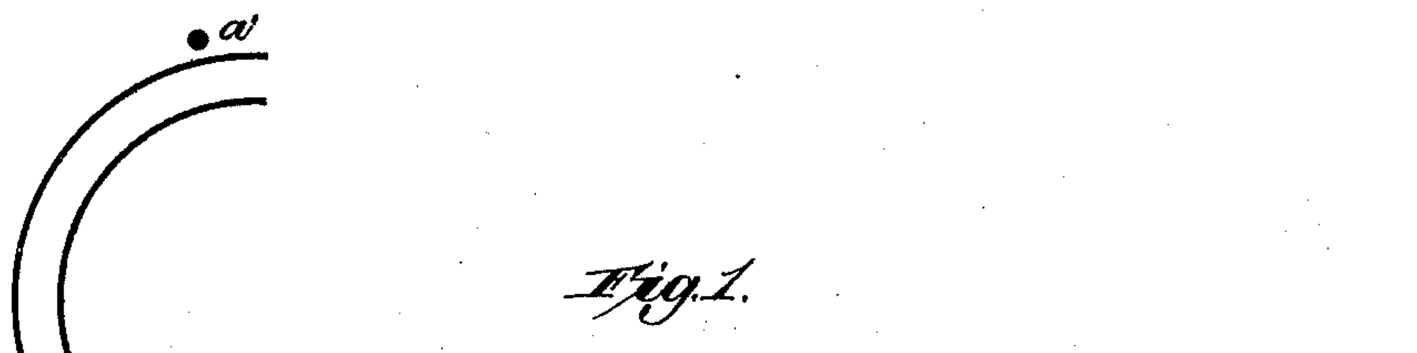


Fig. 2.

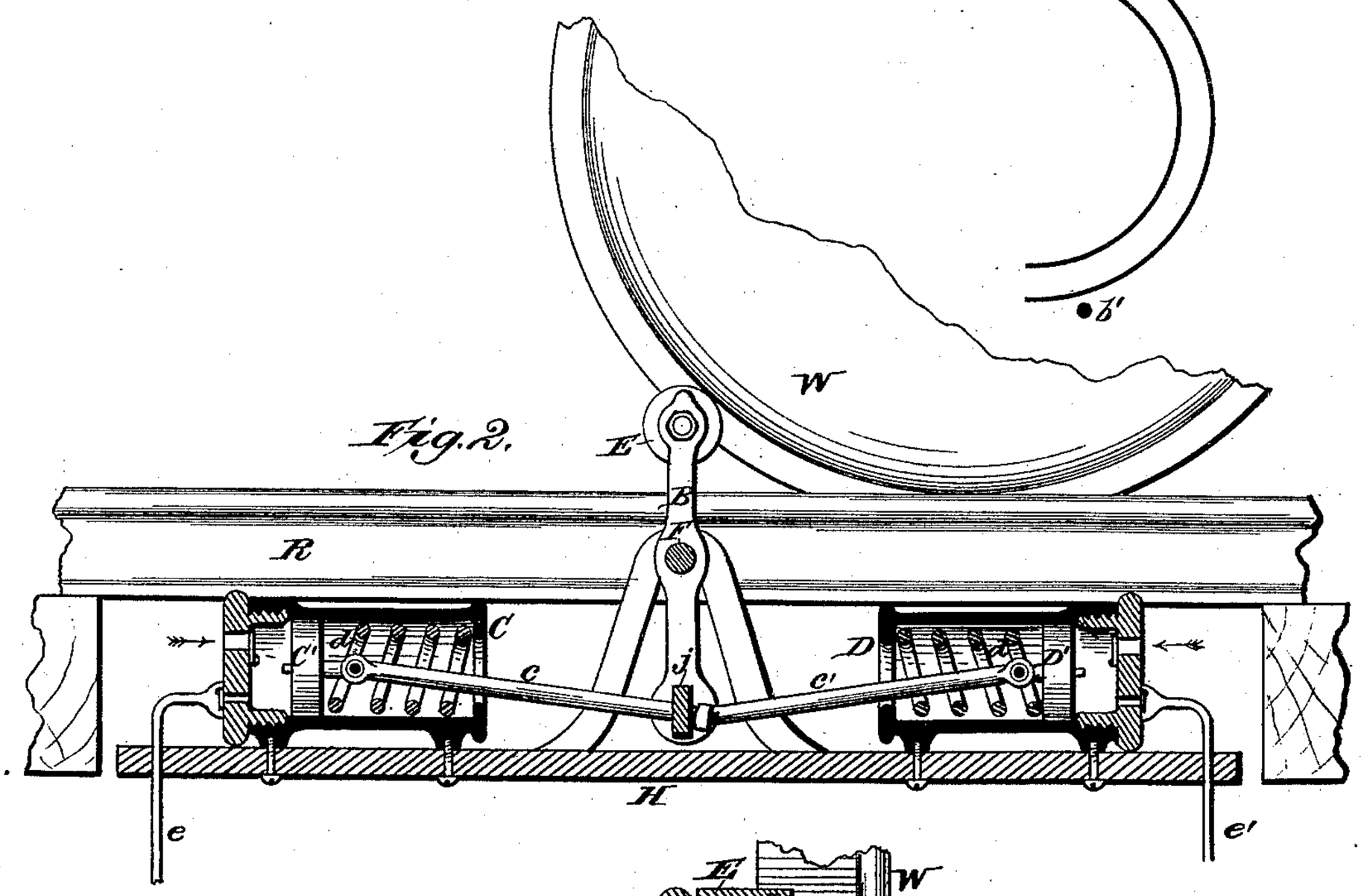
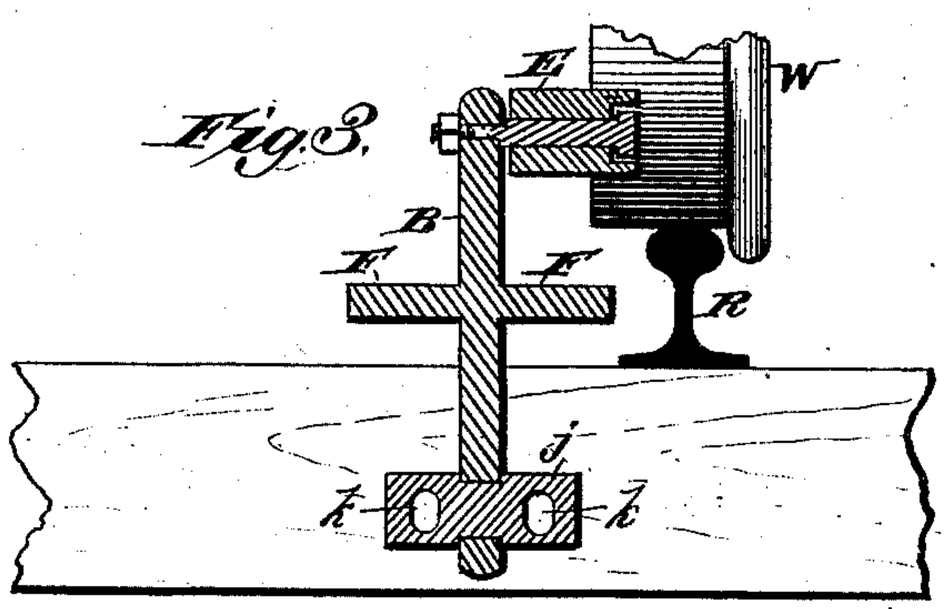


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

D. G. SMITH.

ELECTRIC RAILWAY SIGNAL.

No. 395,667. Patented Jan. 1, 1889.

Fig. 4.

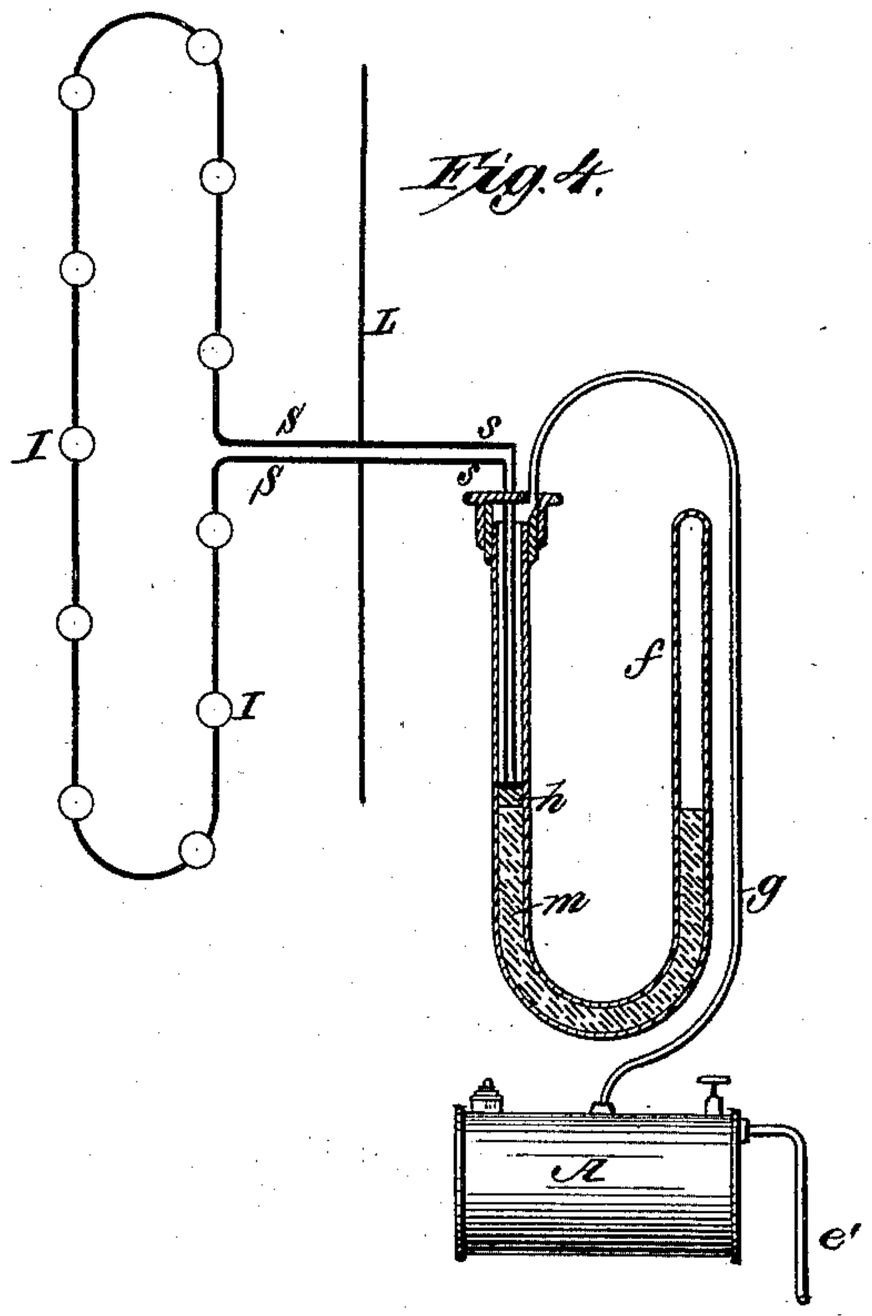
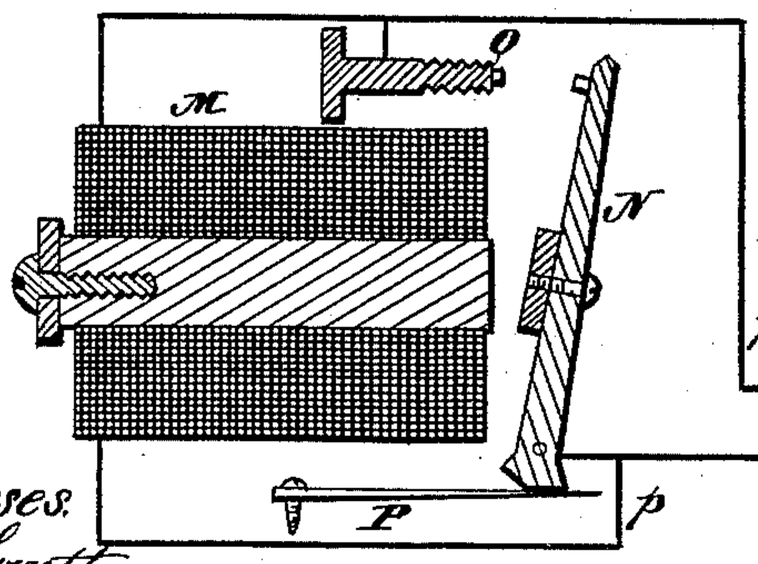
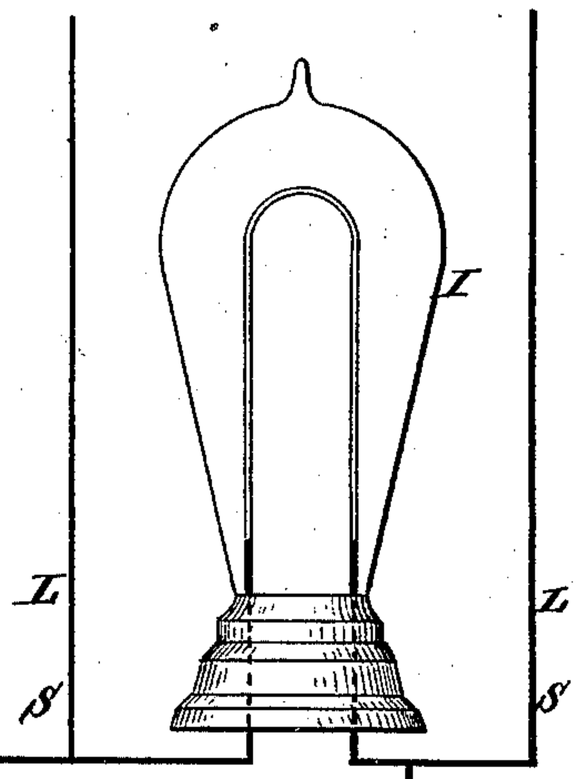


Fig. 5.





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UNITED STATES PATENT OFFICE.

DANIEL G. SMITH, OF POCATELLO, IDAHO TERRITORY, ASSIGNOR TO REINHART L. BROWN, OF SAME PLACE.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 395,667, dated January 1, 1889.

Application filed April 17, 1888. Serial No. 270,944. (No model.)

To all whom it may concern:

Be it known that I, DANIEL G. SMITH, of Pocatello, in the county of Bingham and Territory of Idaho, have invented a new and useful Improvement in Electric Railway-Signals, (Lights,) of which the following is a specification.

Figure 1 is a plan of a curved section of a railway-track. Fig. 2 is an elevation of a portion of the railway-track and of one wheel of a car or locomotive with the air-compressing machinery in section. Fig. 3 is a vertical section through the operating-lever. Fig. 4 is an elevation of a circuit-breaking mechanism, partly in section, and a diagram of a local circuit. Fig. 5 is a section through the shunt-magnet attached to one of the lamps.

The improvements will first be specifically set forth, and afterward pointed out in the claims.

The mechanism which I employ is as follows:

L represents the main-line circuit, which may extend the whole length of the track, or the whole length of the track which it is wished to guard, and through which an electrical current is kept constantly flowing.

S represents a local circuit connected with the main-line circuit, and having therein a series of lamps, I, or magnets for actuating semaphore or other visible signals, the resistance of said local circuit being greater than that of the main circuit. If this local circuit be applied to that section of the track illustrated in Fig. 1, it would embrace either or both ends of said section and carry signals at *a a* or *b b'*, or both.

At each point where the main-line circuit L is connected with the local circuit S, I provide a circuit-breaker. (Illustrated in Fig. 4.)

f represents a U-shaped vessel, of glass or metal, in which is contained a quantity of mercury, *m*, on the top of which in one leg of vessel floats the metallic plate *h*.

The main-line circuit L is broken at the circuit-breaker, and its ends *s s* pass through an insulating-plate in the top of one leg of the vessel *f*, and pass downward side by side, but insulated from each other, to such a distance that when the mercury is in a state of equilibrium it will press the metallic plate *h* against the ends *s s* of the main line, thus completing the circuit.

A represents a reservoir to hold compressed air, placed near the circuit-breaker *f*, and it is connected by the pipe *g* with that end of the vessel *f* through which the wires *s s* pass. The reservoir A should be provided with a pin-hole, or a slight leak should be left in some of the joints, so that when air is compressed within said reservoir it will gradually escape and return to its normal tension.

B represents a lever, pivoted at F in a bracket which is firmly attached to a bed-plate, H. Secured on the upper end of the lever B is a friction-roller, E, which projects within the line of travel of the tread of a car-wheel running on rail R, but not far enough to come in contact with the rail when depressed by the passage of a wheel. In the lower end of the lever B is secured a cross-bar, *j*, having therein holes *k*.

C and D represent two single-acting air-compressing cylinders secured to the bed-plate H, each having a piston therein, (marked C' and D',) and each having at its closed end an inlet-port provided with an inwardly-opening valve, and an outlet-port provided with an outwardly-opening valve and connected with the reservoir A by a pipe, *e* or *e'*.

The piston-rods *c c'* are jointed and each piston-rod passes through a hole, *k*, in cross-bar *j*, and has on its end a nut, *l*, by which arrangement motion of the cross-bar *j* to the left, Fig. 2, actuates piston-rod *c'* without affecting piston-rod *c*, and vice versa.

d d are coiled springs within the cylinders C D, surrounding the piston-rods, by which the piston, after being actuated by the lever B, is forced back to the position shown in the drawings, thereby compressing the air in the cylinder and driving it, through the pipe *e* or *e'*, to the reservoir A.

I represents an incandescent lamp connected in series in the local circuit S.

To prevent the interruption of the local circuit by the breaking of the lamp, I make a shunt-circuit, *p p*, which is connected with the magnet M of greater resistance than the local circuit S, and one side of this shunt-cir-

cuit is connected with the pivoted armature N and the other side with the contact-point O.

P represents a spring acting on the lower end of the armature N to hold it away from the core of the magnet, and also acting, when its force is overcome and the armature is attracted by the magnet, to hold the other end of the armature firmly against the contact-point O, thus establishing the circuit through the line *p p*, armature N, and contact-point O.

It is evident that while the current flows normally through the local circuit S the shunt-circuit *p* will be inoperative, but that an interruption in the local circuit, as by breaking a lamp, I, causes the magnet M to be energized, attracts armature N, and completes the shunt-circuit through contact-point O, thus simply cutting out the broken lamp.

The operation of my invention is as follows: The current passing through the main-line circuit normally does not affect any of the local circuits. If, now, a train comes into the section protected by the local circuit, its wheels W strike the friction-roller E on lever B and successively depress the upper end of the lever, thereby, if moving in the direction indicated by the arrow in Fig. 2, actuating the piston C^s in cylinder C, and the recoil of spring *d*, when the lever B rises after the passage of the wheel, compresses the air in cylinder C and forces it through the pipe *e* into the reservoir A. This is repeated with each wheel of the train on one side of the track. As soon as the air is compressed in reservoir A, it flows through pipe *g* into one leg of vessel *f* and depresses the mercury in that leg, thereby causing the metallic plate *h* to drop away from the terminals *s s* and break the connection between them, when the current is immediately diverted through the local circuit S and the signals contained therein, and continues to flow through said local circuit until the gradual escape of air from the cylinder A permits the mercury to again come to a state of equilibrium and re-establishes the terminal *s*. The length of time required for the escape of air from reservoir A should be adjusted by regulating the size of the leak to the length of time that the signals are to be displayed.

It is evident that instead of using the lamps I for signals, or in addition to the lamps I, the local circuit S may operate target or semaphore signals by means of electrically-controlled machinery which is well known, and which I therefore do not describe.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a main-line circuit extending between two points, a local circuit connected with and of a higher resistance than the main circuit, an air-compressor mechanism actuated by a passing train, and a circuit-breaker operated by air from the air-compressor mechanism to break the main-line circuit, substantially as described.

2. The combination, with a main-line circuit extending between two points, a local circuit connected with and of a higher resistance than the main circuit, a pivoted lever operated by a passing train, an air-compressor mechanism, and a circuit-breaker operated by the air from the air-compressor mechanism to break the main-line circuit, substantially as described.

3. The combination, with a main-line circuit extending between two points, a local circuit connected with and of a higher resistance than the main circuit, a lever arranged to be operated by a passing train, an air-compressing cylinder having a piston connected with the lever, an air-reservoir connected with the cylinder, and a circuit-breaker operated by air from the reservoir to break the main-line circuit, substantially as described.

4. In combination with a main-line circuit and a local circuit, including electric signals directly connected therewith and of higher resistance than the main-line circuit, a circuit-breaker consisting of a U-shaped vessel, *f*, containing the mercury *m*, metallic plate *h*, and insulated terminals *s s*, connected with a reservoir for compressed air, adapted to be operated by a passing train, substantially as and for the purposes set forth.

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Witnesses:
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