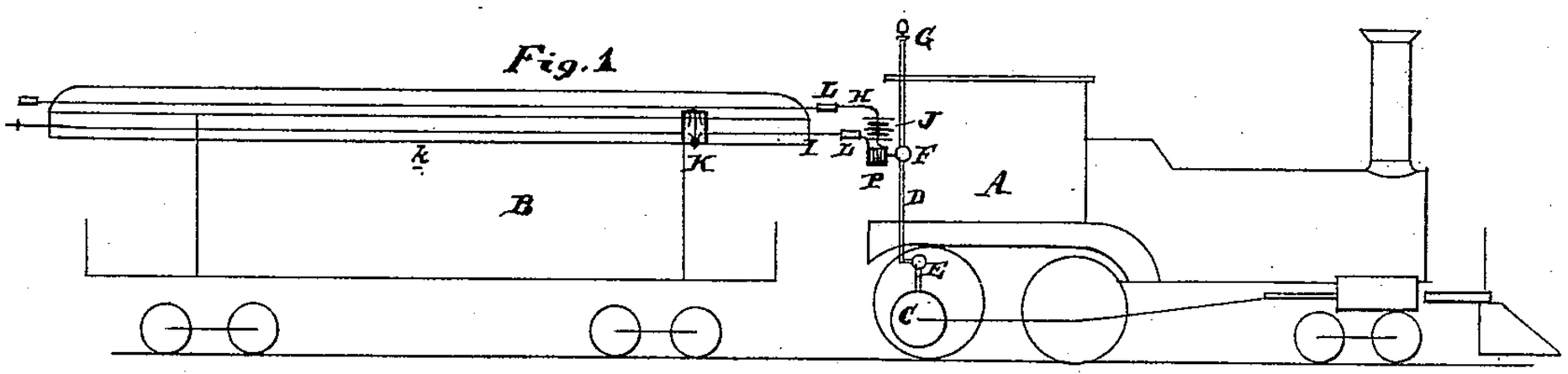
(No Model.)

A. C. GRIGGS.

TRAIN SIGNAL.

No. 393,431. Patented Nov. 27, 1888.

Fig. 1



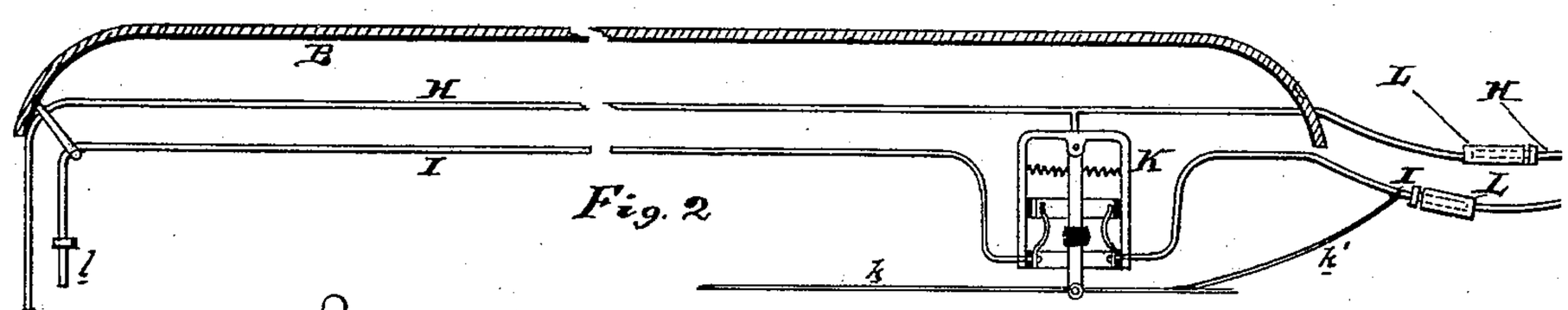


Fig. 2

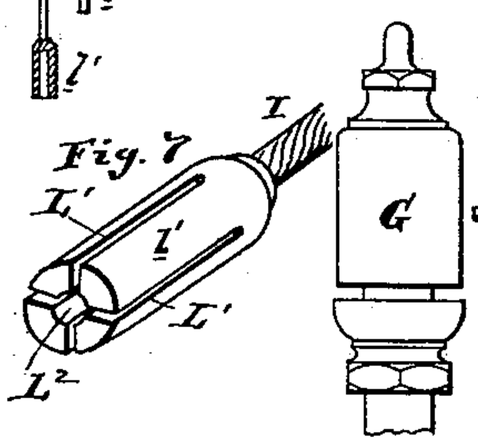


Fig. 7

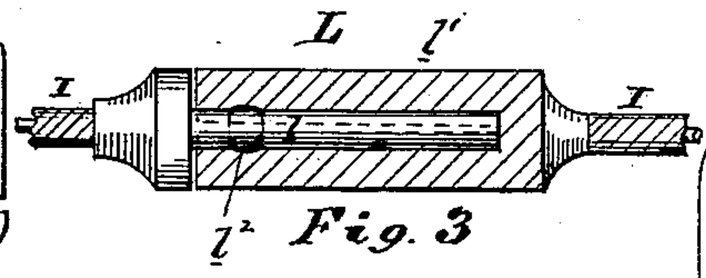


Fig. 3

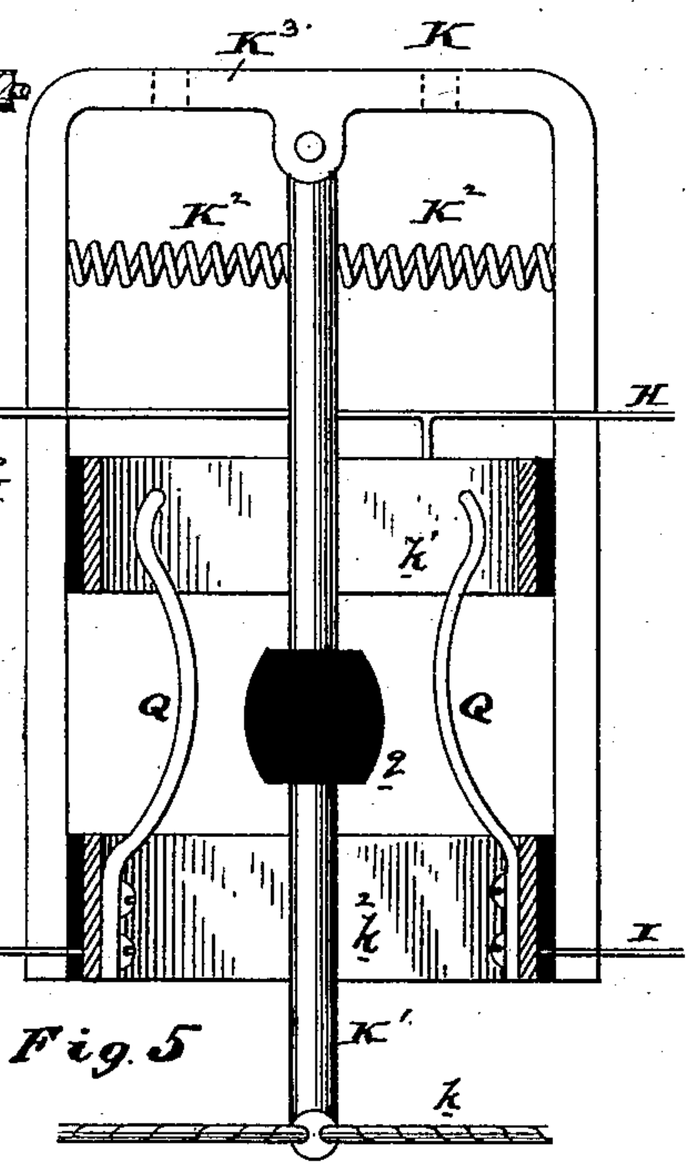


Fig. 5

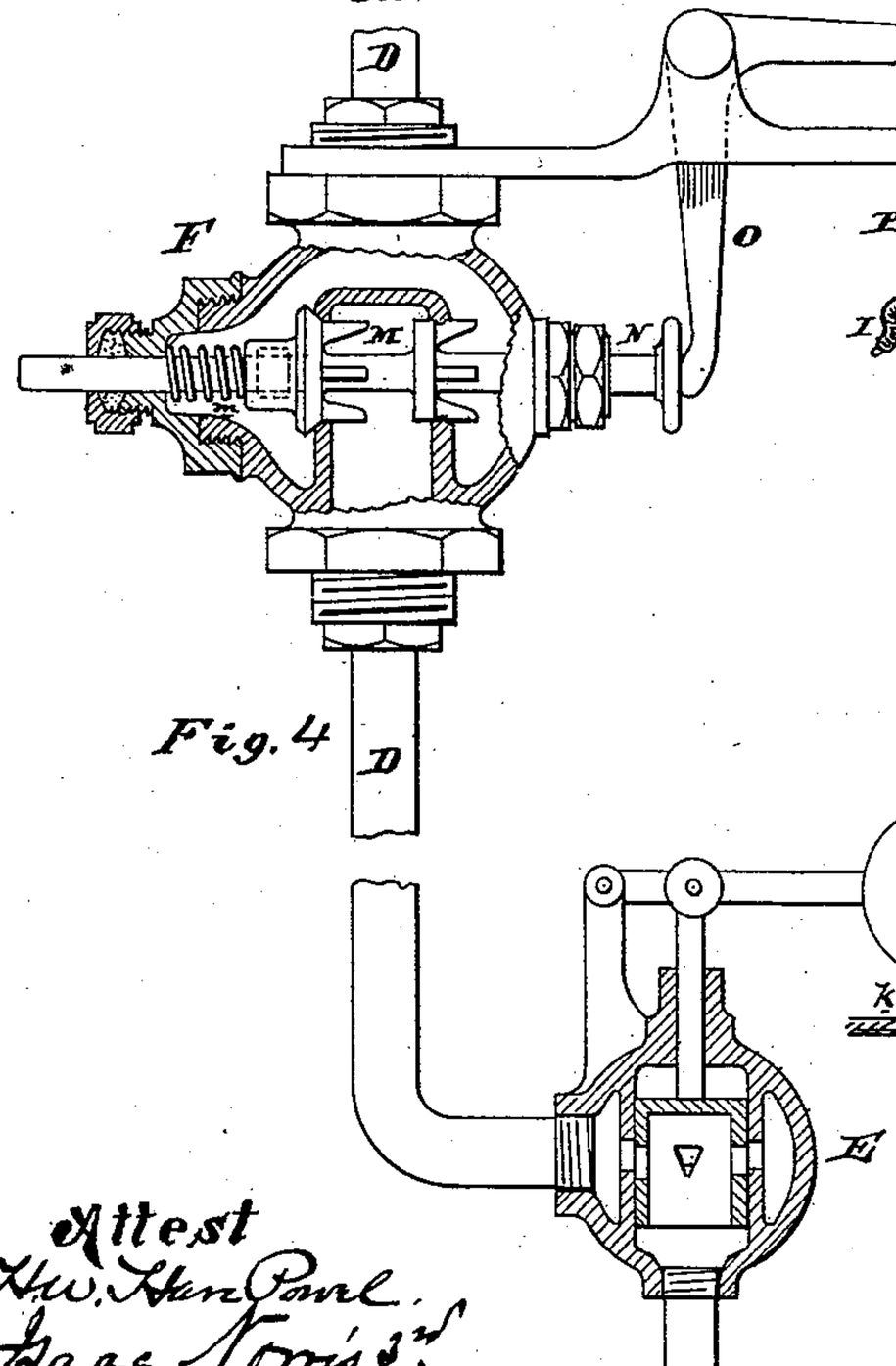


Fig. 4

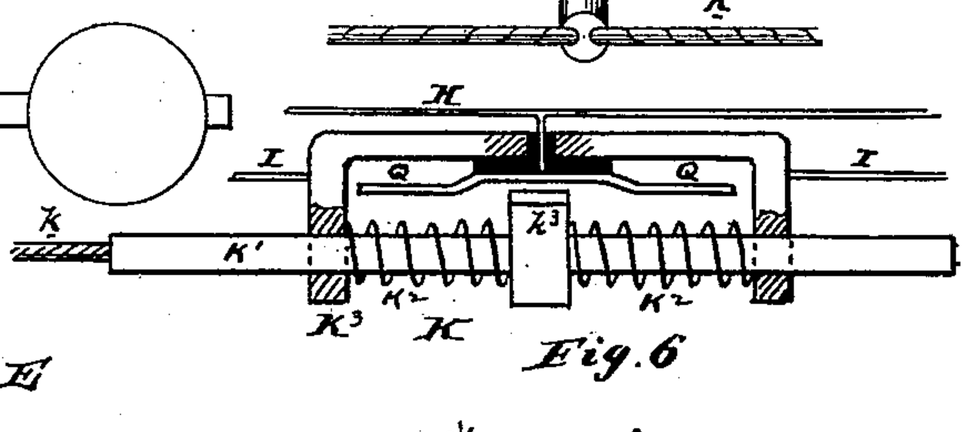


Fig. 6

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UNITED STATES PATENT OFFICE.

ALBERT C. GRIGGS, OF WILMINGTON, DELAWARE.

TRAIN-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 393,431, dated November 27, 1888.

Application filed May 31, 1887. Serial No. 239.738. (No model.)

To all whom it may concern:

Be it known that I, ALBERT C. GRIGGS, of Wilmington, New Castle county, State of Delaware, have invented a new and useful Improved Train Signal, of which the following is a true and exact description, due reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of devices whereby an audible signal in a locomotive-engine is operated from any of the cars connected with it, the ordinary bell-cord passing through the train being the best known of these devices.

The object of my invention is to so combine the signal-whistle situated upon the engine and connected with the boiler or compressed air-reservoir (preferably the latter) by means of a conduit or pipe provided with a valve with an electro-magnet arranged in such a way with respect to the valve-stem as to actuate it and open the valve when a current is passed through the magnet and permit it to close with the cessation of the current, a battery and a system of electric conduits passing through the train and provided with devices in each car whereby the circuit between the battery and electro-magnet may be readily closed, my said invention being illustrated in the accompanying sheet of drawings, in which—

Figure 1 is an outline sketch of a locomotive and attached railway-car provided with my improvement; Fig. 2, a view showing the arrangement of electric conduits in a railway-car; Fig. 3, an enlarged view of the device which I prefer to use for coupling the conduits of one car with those of another. Fig. 4 is a view, partly in section, of the whistle, valve, electro-magnet, and governor situated in the conduit leading from the air-reservoir to the whistle, said parts being combined as I propose to combine them in embodying my invention. Figs. 5 and 6 are devices for closing the circuit in the different cars, and Fig. 7 is a perspective view of the socket-piece of the coupling L.

A is a locomotive; B, a railway-car; C, an air-storage tank, preferably that connected with the air-brake system; D, a pipe or conduit leading from the storage-tank; E, a pressure-regulator situated in the conduit D, and whereby the air escaping from the tank C has its pressure reduced. F is a valve for opening and closing the conduit or pipe D; G, a whistle situated on the end of the pipe D. J is a battery, one pole of which connects directly with an electro-magnet, P, while the other is adapted for connection to the circuit-wire H. (See Fig. 1.)

I is a circuit-wire similar to H, passing through the train and adapted to be connected with the electro-magnet. In each car I provide one or more devices, K, for connecting the conduits H and I and completing the circuit through said conduits. Thus in Fig. 5 the wire H is connected with a metallic plate, k', secured in a frame, K^3. The wire I is connected with a plate, k^2, in the said frame, and metallic springs Q Q, attached to the plate k^2, extend upward so that their ends are close to although not in contact with the plate k'. A rod, K′, is suspended at the top of the frame K^3 and passes down between the spring-plates Q Q, being kept from contact with the said plates by means of springs K^2 K^2, which hold it centered between them. An annular knob, q, is secured upon the rod K′, and to its free end are attached actuating-cords k. If now the cord k be pulled in either direction, the knob q will press against one of the springs Q, forcing its free end into contact with the plate k', thus completing the circuit through the conductors H and I.

In Fig. 6 I have shown a somewhat modified form of circuit-connector in which the frame K^3 is made a part of the circuit-wire I, the rod K′ passing through bearings in frame K^3, and having an annular projection, k^3, in its center, made of a conducting material and kept centered and out of contact with the springs Q Q, which are in electric connection with the conductor H by means of the springs K^2 K^2. The actuating-cords k are attached to each end of the rod K′, and when pulled in either direction the projection k^3 is brought into contact with one of the springs Q, and an electric connection thus made between the wires H and I.

I do not of course intend in giving these two plans, as shown in Figs. 5 and 6, to limit myself to their use, as any of the very many well-known devices for making and breaking electric circuits may be used. I prefer to make the valve F of the general character shown in Fig. 4—that is, of the kind known as a "balanced" valve, as is shown at M, and I provide

a spring, *m*, to hold said valves M against their seats with a known and adjustable pressure. N is of course the actuating rod or stem of the valve M.

O is a bell-crank lever having one end resting near or against the rod N, and having an armature, O′, secured at its other end close to and within the field of the magnet P. The proportionate length of the arms of the lever O can be varied in any way deemed most advantageous; or it may be dispensed with entirely and the magnet made to draw on the end of the valve-rod N, instead of pushing it. One method of so arranging the magnet is shown in Fig. 1, where the end of the rod N is shown as continued into the center of a helix, and of course is acted on by the electro-magnetic force generated by the current passing through the said coil, such a device being in this connection the evident equivalent of an ordinary electro-magnet—such as P in Fig. 4.

The coupling L, by means of which the wire-conduits H and I of each car are united with the wires of adjoining cars, consists of spring-sockets *l′* and pins *l*. These are secured on the ends of the wires extending out of the ends of the cars, said wires in this place being of course covered with a flexible insulating-covering and preferably made of different lengths, as shown in Fig. 2, one of the coupling devices being in each case attached to the long wire and the other to the short one—as, for instance, as shown, the socket *l′* is on the long wire and the pin *l* on the short one. The purpose of this is that when the wires hang down, as shown at the left of Fig. 2, the uninsulated ends of the conduits will not come in contact and thus close the circuit.

The socket-piece *l′* is preferably divided by one or more longitudinal cuts, L′, as shown in Fig. 7, and centrally bored out, as shown at L², to receive the pin *l*. I prefer to make a curved annular projection in the pin *l* and a corresponding socket in the socket-piece *l′*, as is shown at *l²*, Fig. 3. This device insures that the elastic arms of the socket-piece shall grip the pin even if they do not fit snugly along the whole of their length.

It is desirable, of course, that in case of the breaking of a train the whistle should be blown automatically. Various devices might be used to accomplish this result. In Fig. 2 I have shown a very simple one—viz., a cord, *k′*, attached to the actuating-cord *k* and to the flexible ends of the wires I and H, said cord *k′* having a slack somewhat less than that of the wires, which should, of course, be arranged to permit all usual motions of the cars and have a little slack in addition to that necessary for this purpose. By this device, as the two cars part, the slack of the wires will be straightened out; but before they are actually straight the cord *k* will be stretched taut and will pull upon the cord *k* and close the circuit. Of course the grip of the spring-socket *l′* on the pin *l* must be tight enough to give this pull—a result easily accomplished in the construction shown.

The construction and mode of operation of my invention will be readily understood from the above-described details. The pipe D is of course secured in the engine, and the governor E, valve F, and whistle G are secured to it at any convenient points. The electro-magnet P must, of course, be also upon the engine and secured in a fixed relation to the valve-stem N, upon which it acts either directly or indirectly, as aforesaid.

The position of the battery J is not essential. It may be placed within the cab of the engine or on the tender, which practically forms a part of the engine, and of course the battery might be situated on any of the cars. In case of long trains, indeed, it would be useful to have one or more batteries or generators on the cars to re-enforce the main battery. The wires H and I running through each car should, of course, be insulated, and might well be covered by some of the wood-work. The circuit-closing device K may be placed at any convenient point within the car, and any desired number may be used. When the wires I and H are connected by the action of any of the circuit-closers K, the current from the battery passes into the electro-magnet P, and the armature O′ is drawn toward the magnet, and by its movement opens the valve F either through a lever, O, or by acting directly on the other end of the valve-rod N, as is indicated in Fig. 1. When the valve is opened, the air from the reservoir C passes through the conduit D, being, however, checked and its pressure diminished by means of the regulator E, and the whistle G is sounded. The spring *m* returns the valve to its seat when the armature is released by the breaking of the circuit.

By using a balanced valve such as is shown at M, Fig. 4, a great advantage is gained, as the magnet has only to overcome the resistance of the spring *m* to open the valve, and this resistance can of course be adjusted to a proper degree relative to the power of the magnet; but it is not essential to balance the valve, and the pressure in the conduit D may, in case of an unbalanced valve, be used to keep it closed and return it to its seat after being opened, instead of a spring, *m*.

From what I have said it will be understood that the particular construction of the devices shown are given by me as showing what I think the best mode of applying my invention, and therefore as the best illustration of the same, and that, excepting in the particulars especially pointed out in the claims, I do not intend to limit myself to the details shown, which details, as I have explained already, may be varied in some respects without departure from my invention.

It will be understood that where the pipe D is connected with a storage-tank having but a low pressure in it it would not be necessary to use any pressure-regulator.

I am aware that prior to my invention whistle-valves have been actuated by a com-

bination of springs and electro-magnets; but in the earlier plans the springs were so combined with the valve-rod as to act to open the valve, a permanent magnet being employed to hold the valve seated, and the electro-magnet serving to counteract the permanent magnet and permit the springs to open the valve. These earlier devices were intended and adapted to give the alarm in case of unforeseen accident, and not intended for ordinary train-signaling, for which my device is especially intended.

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

1. In a railway-train signal, a pipe leading from a steam or air receptacle to a whistle situated on the engine, in combination with a valve situated in said pipe, a spring or its equivalent acting to keep said valve seated, and an electro-magnet included in a normally-open circuit and having an armature connected with the valve, the movement of attraction of said armature being transmitted to the valve in a direction opposed to the spring, the electro-magnet circuit consisting of an electric generator, electric conductors extending through the train, and circuit-closers situated in the cars composing the train, whereby when the magnet circuit is closed the magnet-armature will be attracted and the valve raised against the pressure of the spring, substantially as and for the purposes specified.

2. In a railway-train signal, a pipe leading from a steam or air receptacle to a whistle situated on the engine, in combination with a valve situated in said pipe, a spring or its equivalent acting to keep said valve seated, a pressure-regulator situated in the pipe between the steam or air receptacle and the whistle, and an electro-magnet included in a normally-open circuit and having an armature connected with the valve, the movement of attraction of said armature being transmitted to the valve in a direction opposed to the spring, the electro-magnet circuit consisting of an electric generator, electric conductors extending through the train, and circuit-closers situated in the cars composing the train, substantially as and for the purposes specified.

3. In a railway-train signal, a pipe leading from a steam or air receptacle to a whistle situated on the engine, in combination with a valve situated in said pipe, a spring or its equivalent acting to keep said valve seated, a pressure-regulator situated in the pipe between the steam or air receptacle and the valve, and an electro-magnet included in a normally-open circuit and having an armature connected with the valve, the movement of attraction of said armature being transmitted to the valve in a direction opposed to the spring, the electro-magnet circuit consisting of an electric generator, electric conductors extending through the train, and circuit-closers situated in the cars composing the train, substantially as and for the purposes specified.

4. In a railway-train signal, a pipe leading from a steam or air receptacle to a whistle situated on the engine, in combination with a balanced valve situated in said pipe, a spring or its equivalent acting to keep said valve seated, and an electro-magnet included in a normally-open circuit and having an armature connected with the valve, the movement of attraction of said armature being transmitted to the valve in a direction opposed to the spring, the electro-magnet circuit consisting of an electric generator, electric conductors extending through the train, and circuit-closers situated in the cars composing the train, substantially as and for the purposes specified.

5. In a railway-train signal, a pipe leading from a steam or air receptacle to a whistle situated on the engine, in combination with a balanced valve situated in said pipe, a spring or its equivalent acting to keep said valve seated, a pressure-regulator situated in the pipe between the steam or air receptacle and the whistle, and an electro-magnet included in a normally-open circuit and having an armature connected with the valve, the movement of attraction of said armature being transmitted to the valve in a direction opposed to the spring, the electro-magnet circuit consisting of an electric generator, electric conductors extending through the train, and circuit-closers situated in the cars composing the train, substantially as and for the purposes specified.

6. In a train signaling device, substantially as specified, the combination, with a railway-car, of conductors I and H, running through the car and terminating in flexible ends having couplings adapted to engage with similar conductors on adjoining cars, circuit-closing devices connected with the conductors, as described, an actuating-cord, *k*, running through the car and attached to the actuating-handle of the circuit-closers, and a cord, *k'*, attached to the flexible end of one of the conductors and to the actuating-cord *k*, said cord *k'* having less slack than the flexible conductor, all substantially as and for the purpose specified.

ALBERT C. GRIGGS.

Witnesses:
HUXLEY HARVEY,
ISAAC NORRIS, 3d.