(No Model.)

F. L. POPE.

ELECTRIC VISUAL SIGNAL FOR RAILROADS.

No. 303,590. Patented Aug. 12, 1884.

Fig. 1.

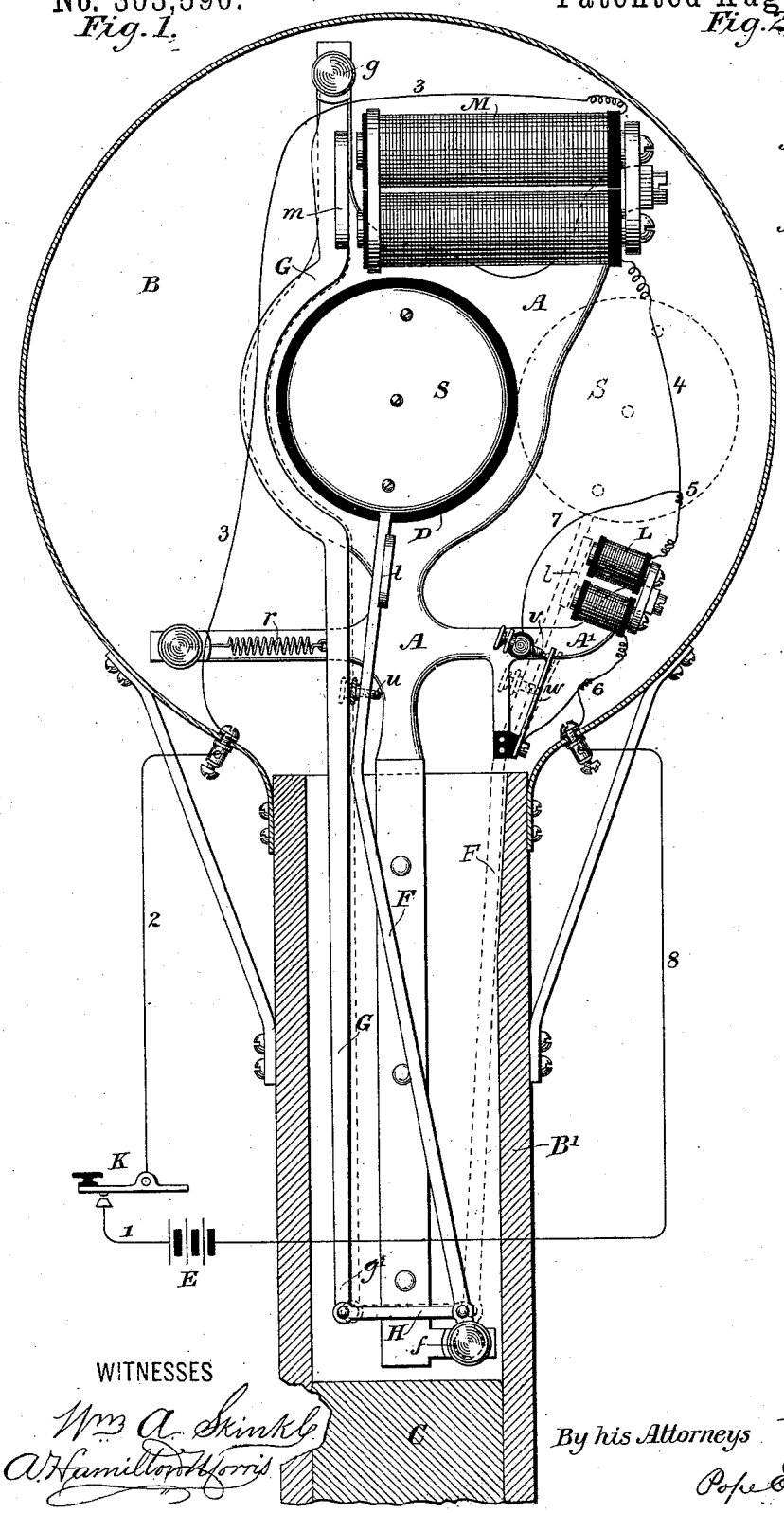
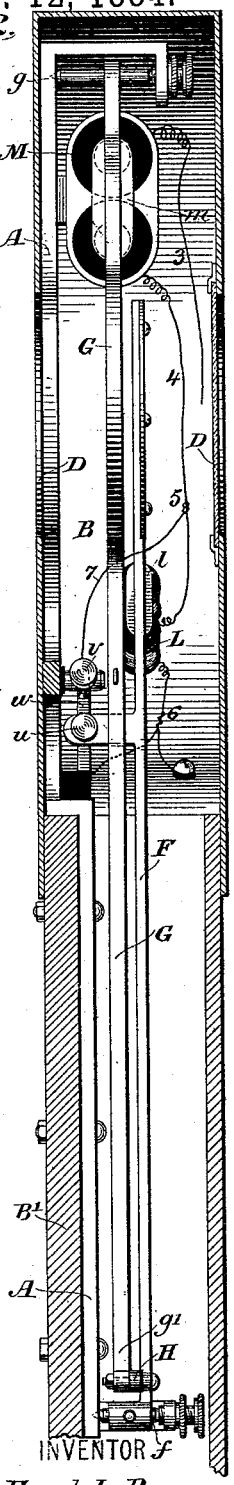


Fig. 2.



WITNESSES

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ELECTRIC VISUAL SIGNAL FOR RAILROADS.

SPECIFICATION forming part of Letters Patent No. 303,590, dated August 12, 1884.

Application filed September 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. POPE, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electric Visual Signals for Railroads, of which the following is a specification.

My invention relates to that class of visual signals which are adapted to be alternately displayed and concealed by the action of an electro-magnet and of a retractile spring or weight for indicating the condition of the track to the engineer of an approaching train upon a railway.

The object of my invention is to simplify the construction of such signals, whereby the moving parts may be made of less weight and the apparatus rendered not only exceedingly compact but at the same time capable of being actuated by a smaller electric force than has heretofore been the case, and also to enable the signal-disk to be maintained in position by an extremely feeble electric current, so that the materials of the battery are consumed but slowly, which end I attain by making use of an independent auxiliary electro-magnet, so placed as to act upon the signal-disk at a great mechanical advantage, which auxiliary magnet is brought into action only after the signal-disk has been brought into position by the main magnet.

In the accompanying drawings, Figure 1 is an elevation of my improved signal and its operating mechanism, the box or case containing the same being shown in section. Fig. 2 is a transverse vertical section of the same.

In the drawings, A represents a metallic frame upon which the various parts of the mechanism are mounted. This frame is secured within a suitable cylindrical case, B, mounted upon a rectangular box, B′, with which it communicates internally, and which is mounted upon a post or other convenient support, C. In the center of the cylindrical case B is a circular opening or window, D, covered with glass, so that the signal-disk S may be seen through it from the outside when in proper position for that purpose. The signal-disk S may conveniently be from fifteen to eighteen inches in diameter, and consists of a metallic ring or hoop covered with colored cloth or other light or thin material, so as to be distinctly visible at a distance. The disk S is supported upon the upper or free end of a long and light lever, F, the lower end of which turns upon a fulcrum at *f* upon the lower end of frame A. The lever F may with advantage be made tubular, so as to obtain the necessary rigidity with little weight.

G is a suspended lever, having its fulcrum at *g* at the top of the frame A, while its lower or free end, *g′*, is attached to the lever F near its fulcrum *f* by a jointed link, H.

The electro-magnet is secured to the upper part of the frame A, above the window D, and its armature *m* of soft iron is attached to the lever G, near its fulcrum *g*. An auxiliary electro-magnet, L, is fixed upon a bracket, A′, projecting from the frame A, and its armature *l* is fixed upon the lever F, near its point of attachment to the signal-disk S, the object of which arrangement will be hereinafter explained.

The compound leverage which is interposed between the armature *m* and the signal-disk S, in consequence of the construction which has hereinbefore been described, is such that the signal-disk S travels through a distance more than one hundred times as great as the movement of the armature *m*. Hence when the armature is attracted by the electro-magnet, the signal-disk will be moved into the position indicated by the dotted lines, and will be entirely concealed by the case B, so that it cannot be seen from the outside through the window D. But when the armature *m* is released it falls away from the electro-magnet M by the action of an antagonistic spring, *r*, for which a weight may be substituted, if preferred. The signal-disk S will then be displayed in front of window D, as shown in the drawings. By thus arranging the levers F and G within the case B, and its extension B′ in a direction parallel, or nearly so, with each other, as shown, the disk S is brought into close proximity to the electro-magnet H, and the apparatus is rendered much more compact than by any other possible arrangement.

The electric circuits (shown partially in dia-

gram) may be traced as follows: From the positive pole of the battery E by wire 1 to key K; thence by wires 2 and 3 to electro-magnet M; thence by wire 4 to the point 5, where the circuit divides into two branches, one passing through the coils of the auxiliary electro-magnet L to the point 6, and the other through the wire 7, adjustable contact-stop *v*, and insulated contact-spring *w*, to the point 6, from which the circuit returns by the wire 8 to the negative pole of the battery E.

The operation of the apparatus is as follows: When in its normal position, the key K being open and no electric current passing through the apparatus, the signal-disk S is exhibited in front of window D, as shown in full lines in Fig. 1. When the key K is closed, the current from the battery E passes through wires 2 and 3, electro-magnet M, wires 4 and 7, contact-stop *v*, and spring *w*, to the point 6, returning to the battery by wire 8, the auxiliary electro-magnet L being shunted or cut out by the contact-spring *w*. The electro-magnet M, being thus vitalized, attracts its armature *m*, and acting through the system of levers G and F, swings the signal-disk S into the concealed position shown by the dotted lines, which brings the armature *l* into the immediate vicinity of the poles of the auxiliary electro-magnet L. A pin or screw, *u*, is inserted in the lever F and so adjusted that it bears against the contact-spring *w* and separates it from the contact-stop *v* at the instant the signal-disk S has moved far enough to be entirely concealed. The interruption of the shunt-circuit between the parts *v* and *w* now causes the current to traverse the electro-magnet L, which instantly becomes vitalized, seizes the armature *l*, and thus maintains the signal-disk S firmly in position; hence the signal remains concealed so long as the circuit is closed at the key K; but when the circuit is interrupted the magnets L and M release their respective armatures, and the spring *r*, acting upon the lever G, restores the signal-disk to its original position.

The auxiliary electro-magnet L may with great advantage be provided with coils having a great number of convolutions of thin wire, so as to offer a great resistance to the current of the battery E, and in such case, even if the circuit is kept closed for the greater part of the time, the consumption of the material in the battery will be small. It is true that the attractive force of the electro-magnet L in this case will also be small; but inasmuch as its force is exerted upon the system of levers at a great mechanical advantage a comparatively feeble attraction is quite sufficient to hold the signal-disk in position so long as the current continues to flow.

I am aware that it is not new to make use of a system of two levers in which the long arm of one lever is linked to the short arm of the other, in combination with an electro-magnet acting upon the short arm of the first lever, a signal-disk carried upon the long arm of the second lever, and a retractor for withdrawing the second disk when the armature of the electro-magnet is released, and I therefore disclaim such an organization, broadly, and limit myself to the specific construction hereinafter claimed.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of an electro-magnet, a vertically-suspended lever carrying the armature of said electro-magnet, an upright lever parallel, or nearly so, to the suspended lever carrying a movable signal-disk at its upper and free end, a link connecting the short arm of the upright lever to the long arm of the vertically-suspended lever, and a retractor for withdrawing the signal-disk when the armature is released by the electro-magnet.

2. The combination, substantially as hereinbefore set forth, of a movable signal-disk, an electro-magnet whereby the same is moved into a concealed position, an independent electro-magnet for assisting the first-named magnet in holding said disk in its concealed position, and a circuit-breaker which is automatically actuated by the signal-disk when in such position, whereby said auxiliary magnet is rendered active.

In testimony whereof I have hereunto subscribed my name this 31st day of August, A. D. 1883.

FRANK L. POPE.

Witnesses:
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