3 Sheets—Sheet 1.

E. E. BEAN.

ELECTRIC RAILWAY-SIGNAL.

No. 169,509. Patented Nov. 2, 1875.

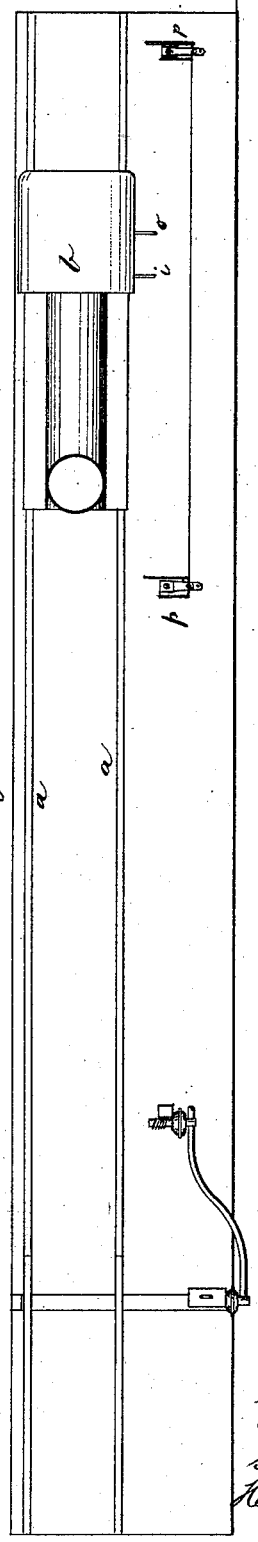

Fig. 1.

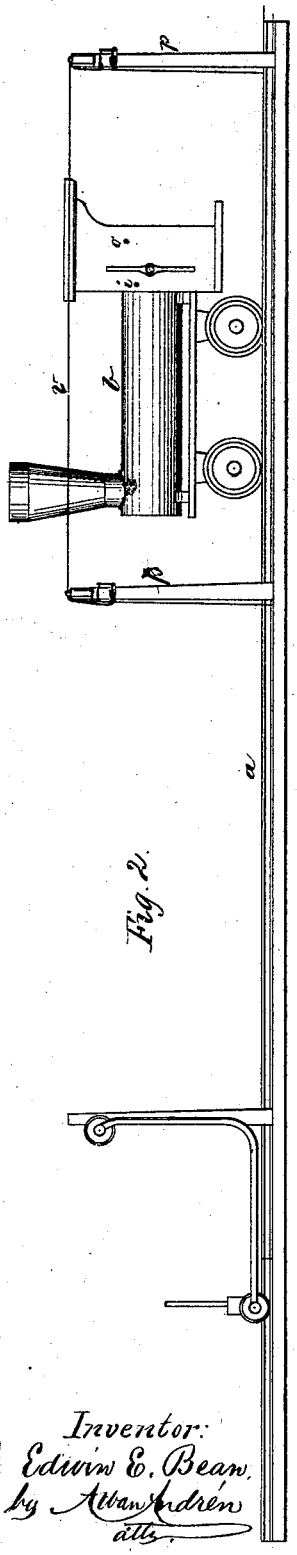

Fig. 2.

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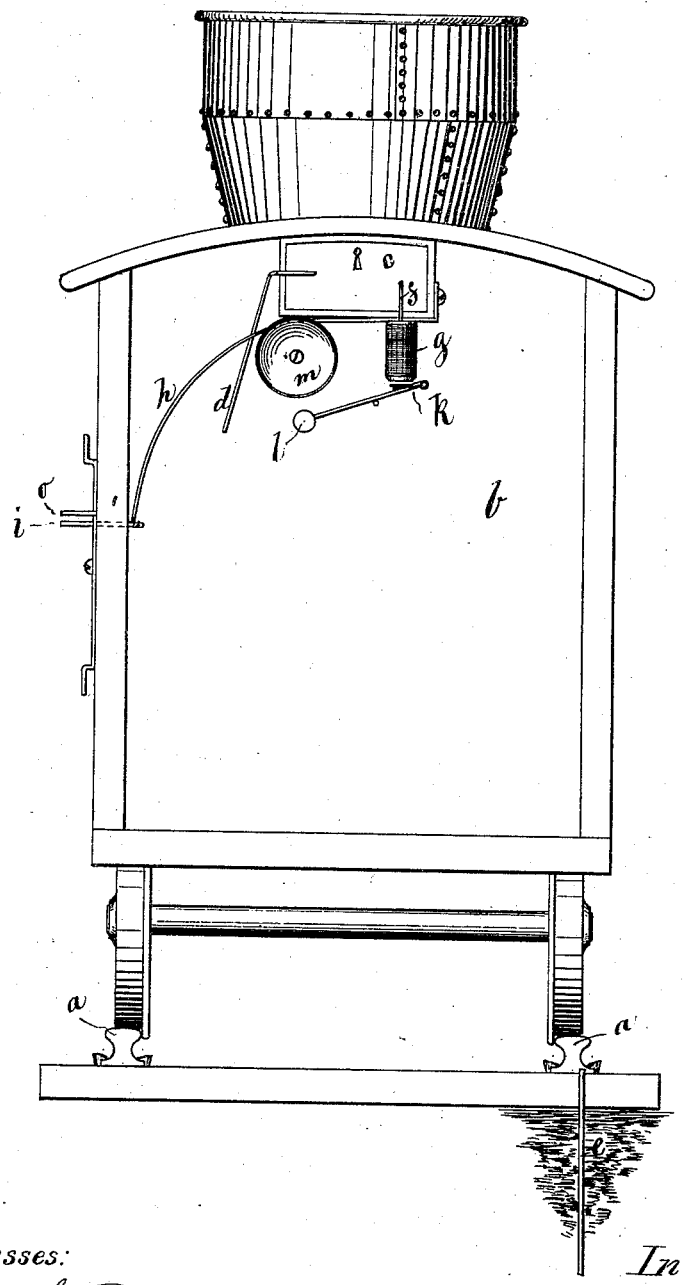
Fig. 3.



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3 Sheets—Sheet 3.

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ELECTRIC RAILWAY-SIGNAL.

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Fig. 6.

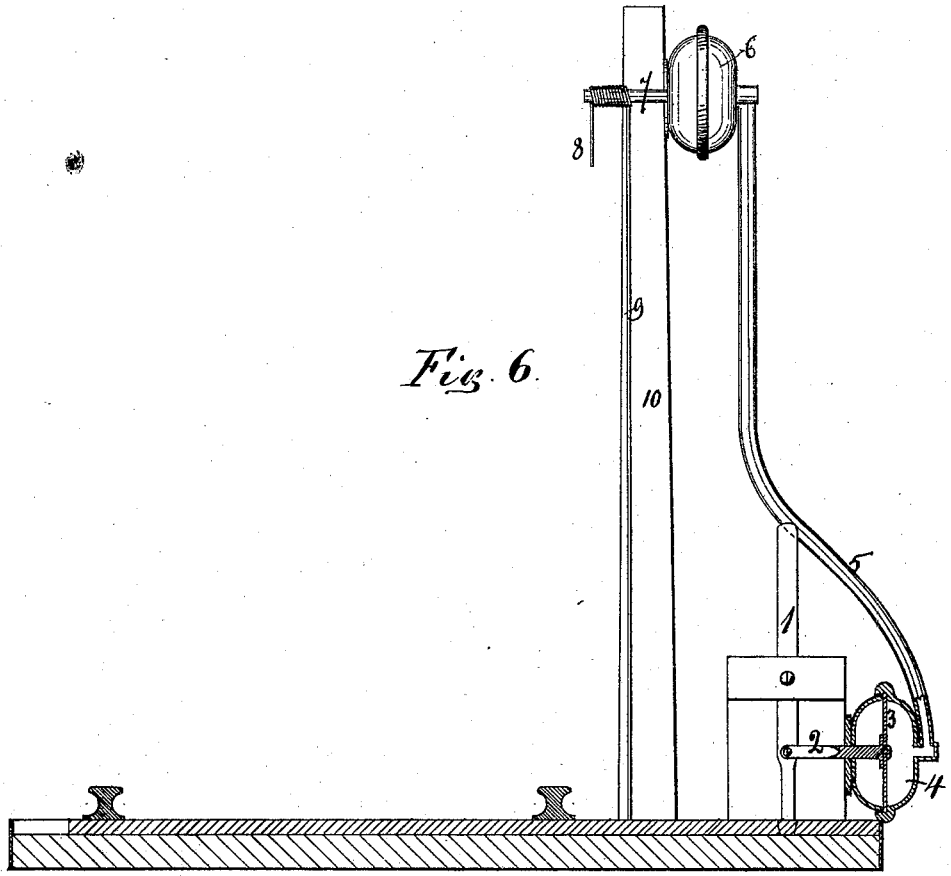


Fig. 4.

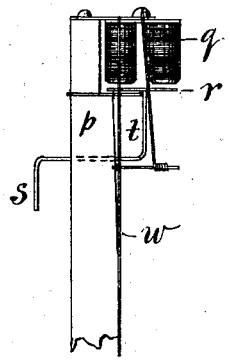
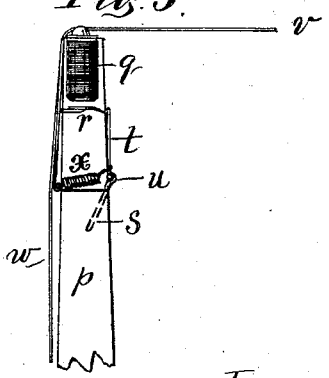


Fig. 5.



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UNITED STATES PATENT OFFICE

EDWIN E. BEAN, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC RAILWAY-SIGNALS.

Specification forming part of Letters Patent No. **169,509**, dated November 2, 1875; application filed January 26, 1874.

To all whom it may concern:

Be it known that I, EDWIN E. BEAN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Railroad-Signals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements on that class of electric railroad-signals in which a battery is carried on the train; and my invention consists, in combination with such battery, of stationary poles with electro-magnets stationed all along the road, which electro-magnets are provided with positive mechanically-operated levers, by which and a pair of projections on the moving train, of which the one constitutes an electric pole and the other a mere projection for the resetting of the signal, the signal is so operated as to give warning to one train of its close proximity to another, either in front or behind, as the case may be.

I do not claim as my invention any arrangement by which the signals on the posts are reset by means of electricity, as it is very difficult to do this in such a manner on account of the great and strong electric current required for this purpose, and the difficulty of practically sending such a strong current to perform such a great work from a quickly-passing train.

My invention also relates to an improved signal for switches, consisting in the employment, in combination with an electric battery carried on the train and its projecting pole, of an adjustable arm or lever operated by means of compressed air or vacuum in suitable receptacles, one of which is in connection with the switch-lever or other movable part of the switch, and the other in connection with the movable arm or lever on a suitable post placed at a desirable distance on one or both sides of a switch, said receptacles for the air being connected by means of a pipe. The said receptacles for the air may be made as pistons and cylinders, or chambers with flexible diaphragms, or in any other manner in which atmospheric pressure is conveyed from one place to another.

When a train passes such a post, with its arm or lever in advance of the switch, a communication is given by means of the battery on the train to the man in charge thereof as to the condition of the switch, when the engineer will have ample time to stop his train if the switch is wrong, as I intend that the post, with its tell-tale, should be at least one-half of a mile or more distance from the switch.

If desirable, I may so arrange the brakes, whistles, or reversing-levers, or other important parts on a locomotive or train, that such parts shall be automatically acted upon by the projecting arm or lever on the post in advance of the switch, so that the train may be stopped or slacked in its speed independent of the negligence of the engineer on the train.

In the drawings I have shown the alarm to be given the engineer in case everything is all right and without obstructions; but it will easily be perceived that the alarm can easily be reversed, so as to inform the man in charge of the train if anything is wrong.

In connection with the battery carried on the train a dial may be used, so as to show how the engineer has run his train relative to other trains on the same track.

On the drawing, Figure 1 represents a ground plan of my invention, and Fig. 2 represents a side elevation of the same. Fig. 3 represents an end view of the locomotive, with the electric battery and alarm carried on it. Fig. 4 represents an end view of one of the posts, with the electro-magnet and lever placed thereon; and Fig. 5 represents a side elevation of Fig. 4. Fig. 6 represents a partial section and end elevation of a switch and its atmospheric tell-tale and regulator.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

a represents an ordinary railroad-track, and *b* a locomotive or other moving part of a train. On the locomotive or other part of a train I place, in a receptacle, *c*, a suitable electric battery, wet or dry, as may be desired. One of its poles, *d*, is connected to some suitable metallic part of the train, such as, for instance,

the boiler, shafts, or other part communicating with the wheels, and from them to the rails *a*, from which connection may be had to the ground by means of one or more conductors, *e*, secured to one or both rails, and projecting deep enough into the ground, so as to be sure of making a perfect ground-connection from the battery at all times. The other pole *f* from the battery is connected to a suitable electro-magnet, *g*, from which the current is conveyed by means of the conductor *h* to a pole, *i*, projecting on one or both sides of the locomotive or other part of the train, according to the demand, in case a single or double track is operated upon. The drawings show the invention as intended for a double track. Underneath the electro-magnet *g* is placed an ordinary anchor or armature, *k*, to which is attached a hammer, *l*, that strikes the bell *m* as soon as a current of electricity passes through the electro-magnet *g*, and attracts the anchor or armature *k*. But I wish distinctly to state that I do not confine myself to this kind of an alarm, as I may to equal advantage use a gong, whistle, index, dial, or any suitable signal that will attract the senses of the man in charge. A secondary projection, *o*, is also placed on the locomotive or other part of the train, a little higher than the pole *i*, as shown in the drawings, the object of which will hereafter be explained. At suitable distances on the side of the track I place posts *p p'*, supporting electro-magnets *q q'* and anchors or armatures *r r'*, as fully shown in Figs. 4 and 5. Said posts *p p'* may be so secured to a prolonged sleeper or peculiar shoe or saddle that the exact distance from each post to the nearest rail shall always remain permanent. Each post *p p'* also supports a movable lever, *s t*, that is made to swing partially around a fulcrum, *u*. The lever *s t* is partially operated by means of a coiled spring, or its equivalent, and partially operated by the projection *o* on the locomotive. A wire, *v*, is led from one of each levers to the electro-magnet on the following post, and is provided with a ground-connection, *w*, for the purpose of establishing a complete circuit of the current when the pole *i* comes in contact with the lever *s*.

The operation of my invention is, therefore, as follows: When a train passes a certain post, *p*, the projecting pole *i* on the train touches the lever *s*, and moves it slightly on its pivot *u*, and sends a current of electricity from the battery on the train to the electro-magnet on the next post, in advance or behind the train, or both, as may be required in different circumstances, thereby attracting the armature or anchor *r* to the electro-magnet on said post in advance or behind the train, when the spring *x*, Fig. 5, acting on the lever *t*, moves the lever *s t* on said post to such a position that the pole *i* of a succeeding train will come in contact with the lower part of the said lever *s*, and thus establish a current from the battery carried on the train.

Whenever the pole *i* strikes a lever, *s*, on a post, *p*, a signal is given to the engineer in charge, either by the bell *m* or suitable signal that will attract his attention, that everything is all right ahead or behind him, as the case may be; or the signal may be so arranged as to attract his attention when the track is obstructed. After the projecting pole *i* has passed by the lever *s* the latter comes in contact with the secondary projection *o* on the train, whereby said lever is placed in a position, as shown in Fig. 5, so as to be ready to fall into position for contact with the pole *i* of a succeeding train as soon as the preceding train has passed safely the next post and sent a current back to the post in the rear, thereby attracting the anchor to its electro-magnet, and resetting the lever *s t* to its proper position, indicating safety to a succeeding train.

For the purpose of making a sure contact between the lever *s* and the projecting pole *i*, I may make the latter extended a suitable distance in a horizontal direction. In every case, however, it is needless to say that the pole *i* must be insulated from the locomotive or train.

If a train passes a post on which the position of the lever *s t* is as shown in Fig. 5, the pole *i* on the train will not touch said lever *s*, and, consequently, no connection with the battery on the train will be obtained, and the engineer in charge will then know that the track is obstructed ahead.

From the above it will be seen that the person in charge of a railroad-train is always informed, automatically, of the position of a preceding or succeeding train, and can thus prevent a great many accidents that might otherwise occur, even with the best of care.

The electric and pneumatic switch-signal is arranged and operated as follows: 1 is a switch-lever, by which the switch is operated by hand. To the lever 1 I attach a rod, 2, that operates a flexible diaphragm, 3, in the case 4, as shown in Fig. 6. From the case 4 leads a connecting-pipe, 5, to another case or chamber, 6, containing a secondary diaphragm, to which is attached a movable rod, 7, provided with a metallic pole or lever, 8, and a ground-connection, 9, as shown in Fig. 6.

The operation of this my improved switch-signal, that is to equal advantage useful in connection with draw-bridges, gates, crossings, &c., is as follows: We will presume that the positions of the different parts, as represented in Fig. 6, show the switch, draw, crossing, or gate of a railroad unobstructed for the free passage of a train. As the train passes the pole or lever 8 the electric pole *i*, on the locomotive or other part of the train, comes in contact with the projection 8, whereby an electric alarm, as heretobefore has been described, is given automatically to the man in charge of the train as to the condition of the switch, draw, gate, or crossing that is located at a suitable distance from the projection 8, to allow the engineer to stop his train if he should be informed by the alarm that

the road is obstructed. If the switch is left accidentally or on purpose open, the atmospheric air in the chamber 4 is attenuated by the action of the rod 2 and diaphragm 3, or their equivalents, which, being communicated by means of the connecting-pipe 5 to the chamber 6, containing a similar diaphragm connected to the rod 7, operates the said rod 7, with its projecting pole 8, in such a manner that the pole *i* on a locomotive or train will not come in contact with the said projection 8, and, by the absence of any electric alarm, inform the person in charge of the train that the road is obstructed.

I may, if so desired, reverse the apparatus, so as to give an electric or other alarm if the road is obstructed, and to give no alarm if the road is clear, as may be required under different circumstances, so as to, as far as possible, conform to existing rules and regulations on different railroads to which employés have been accustomed.

If so required, I may arrange the brakes, reversing-levers, or whistles on a locomotive in such a manner as to be automatically operated by the projection 8, independent of the engineer, in case the road should be obstructed, in addition to giving an alarm, as above stated.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In combination, with a battery, its projecting pole *i*, and the operating-levers *s t*, as described, an additional projection, *o*, on the engine or other moving part of a train, for the purpose set forth and described.

2. The stationary posts *p p'*, with their electro-magnets *q q'*, armature *r r'*, rocking levers *s t s t*, springs *x x*, or their equivalents, and wires *v w*, in combination with a movable battery, as and for the purpose set forth.

3. The combination, with a switch or other movable part of a railway, of connections 2 7, receptacles 4 6, with their flexible diaphragms, support 10, and connecting-pipe 5, or their equivalents, as and for the purpose set forth and described.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of January, 1874.

EDWIN E. BEAN.

Witnesses:
ALBAN ANDRÉN,
GEORGE E. PHELPS.