AN IMPROVED ELECTRIC RAILWAY SIGNAL.

The rails of the track serve as continuous electric conductors, and between them are the electrical conductors, *c c*, which may be wires, metal rods, or straps of metal, and which are insulated from the ties. Fig. 5 shows the conductor made of wire, secured to a strip of wood by staples. At certain intervals, which may be any distance desired, the continuity of the separate conductors is broken, and they are connected by cross communications as shown in Fig. 2, which is a plan view of the track. Fig. 3 is a cross section through the locomotive cab. Each engine carries a battery and two electro-magnetic signaling instruments, *a b*, one of which is provided with an attachment for giving a special additional signal when acted upon by the combined power of the batteries. There is also upon the engine an arrangement for making contact with the conductors. Figs. 3 and 4 are contact devices, the latter being made in the form of a deeply serrated wheel, the edges being sharp so as to cut through any light coating of snow, ice, or dirt. These wheels are supported by arms which are hinged to and insulated from upper frames.

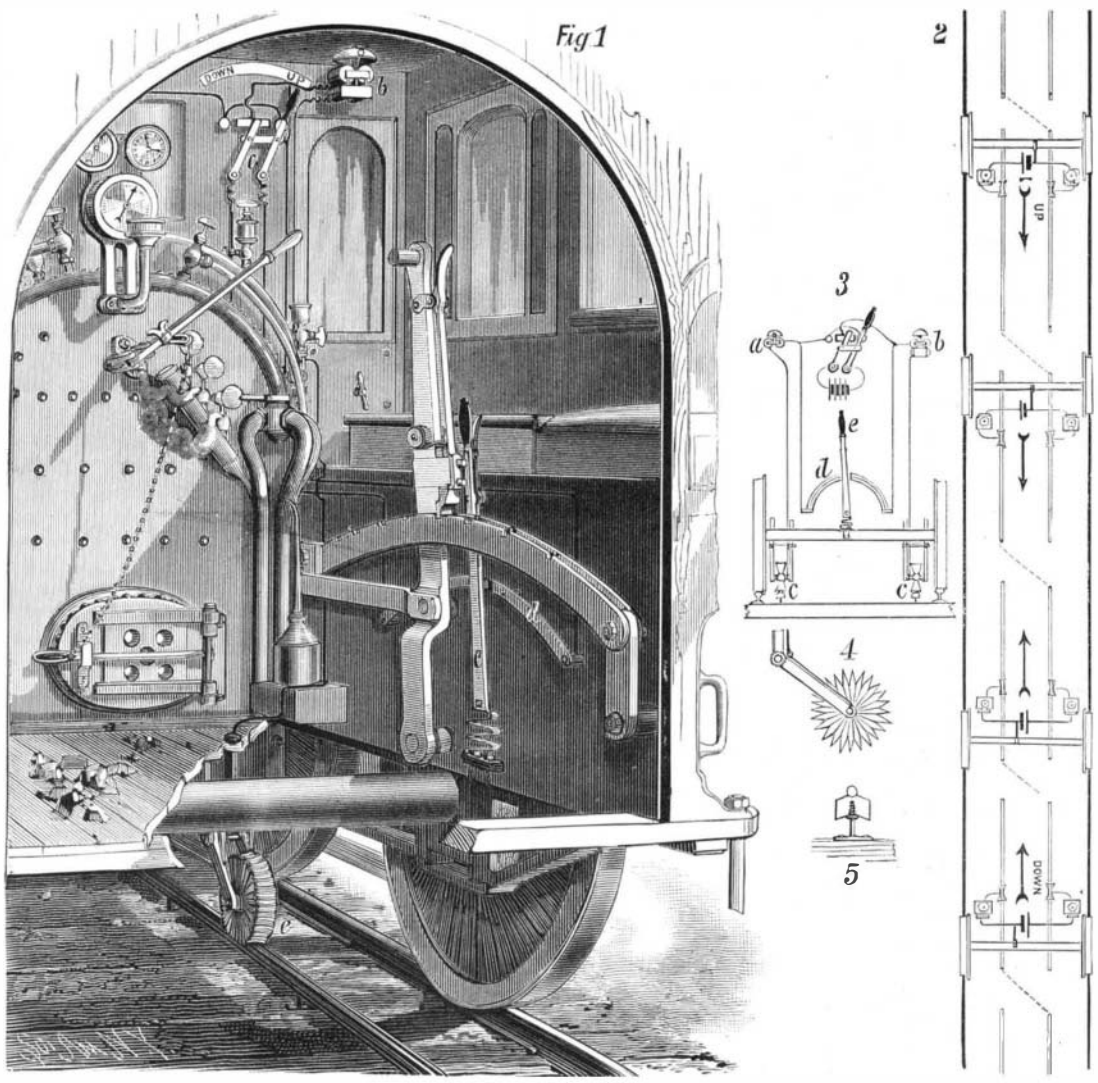
The batteries produce a current of considerable quantity at low potential, so as to work the signals with a good degree of force and lessen the tendency to leakage in wet weather. All the batteries have like poles in the same direction relative to the conductors, *c c*. For this purpose, in connection with each battery there is a reversing switch of any suitable construction. The arrangement of such a switch is plainly shown in the upper part of Fig. 3, and at *c*, in the front of the cab. This reversing switch is only moved when the engine is turned upon a turntable, that is to say, it is reversed only when the heading direction of the engine is changed, not the running direction, in order that the zinc pole may always remain in connection with the same conductor. With any change in the running direction of the engine the position of the batteries is changed automatically by the movement of the reversing lever of the engine. At the side of the reversing lever are two segmental bars which are connected with the sides of the reversing device by wires. A lever electrically connected with the axle and moved by the reversing lever of the engine is in contact with these bars. If desirable, the engine lever may be arranged so as to connect with the segmental bars.

In Fig. 3 the circuit is from the left hand conductor to bell, *a*, to its segment and to the axle; from the other conductor to the bell, *b*, to center plate of reversing device, to battery and wire to second segment. Both instruments give a signal when the current from one battery passes through their magnets; the instrument, *b*, gives an additional signal when acted upon by two batteries. The instrument, *b*, always warns of danger from the direction of the cow catcher, while instrument, *a*, warns of danger from the direction of the tender, no matter whether the engine be running forward or backward.

It is impossible, in the space at our disposal, to minutely explain how the signals resulting from various conditions are obtained; we can only give the work which the device will do. By its use no two engines can come within a prescribed distance of each other without both receiving warning at the same moment. This distance may be anything desired. At the same time each driver will know whether the other engine is before or behind and in what direction it is running. This is all done automatically, and has the advantage over a visual signal that it requires no special care or attention on the part of the driver.

Each engine carries its own danger warning apparatus, and the driver's attention is attracted by the ringing of an alarm bell. It is economical, since there is no expenditure of electric power except in time of danger. In case of drawbridges, the engineer is warned of an open draw on coming within a certain distance; at the same time the bridge keeper is warned of the engine's approach. The act of closing the draw opens the circuit, so that the engineer will know when it is safe to proceed by the alarm bell ceasing to ring. In case the engine goes upon a siding, leaving train on main line, the latter can be protected by laying a piece of wire or metal across the track, close to the train, so as to touch rails and conductors.

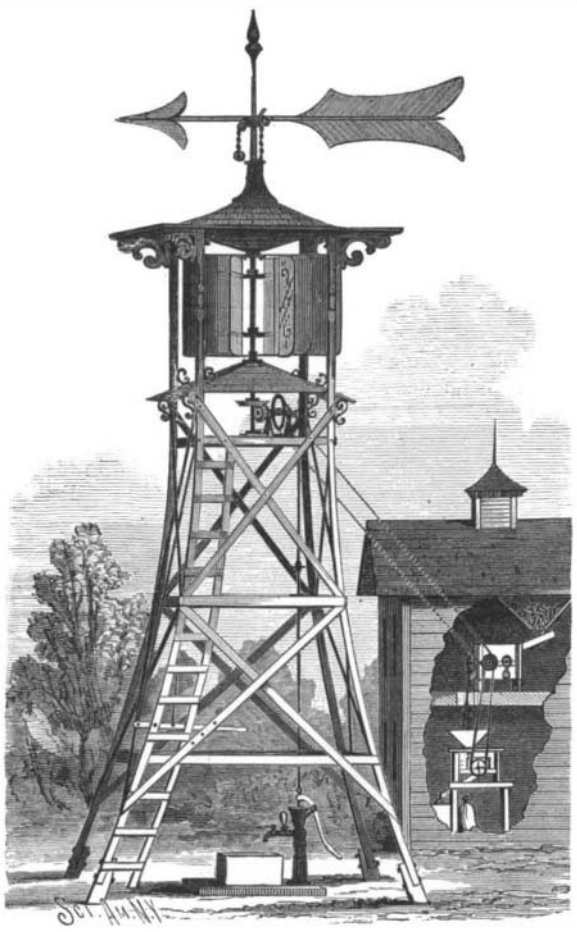
This invention has been patented by Messrs. J. C. Upham and J. P. Rogers, and further particulars may be obtained by addressing the latter at Truro, Nova Scotia.



IMPROVED ELECTRIC RAILWAY SIGNAL.

A NEW WIND ENGINE.

The accompanying engraving represents a new wind motor, which consists of a horizontal wind wheel partly surrounded by a semi-cylindrical shield. The shield is connected with the vane above by a vertical shaft that is independent of the wheel shaft. A novel governing device is attached to, and is directly opposite, the shield. When the engine is in working order the full force of the wind is utilized, as one half of the wheel is shielded. When unshifted, the wheel is completely shielded from the wind. It is not necessary for the wheel to unshift in a storm, since when a sudden gust of wind strikes the governor it causes the shield to move around and cut off a part of the wind. As soon as the gust is past, the vane causes the shield to resume its normal position. This to and fro movement of the shield tends to make the wheel revolve at a uniform rate of speed. The governor is very simple, a plane board constituting the whole device.



A NEW WIND ENGINE.

The weight of the wheel is all on one bearing, consisting of a hardened steel step box, cup shaped, and one filling of oil lasts a long time. Oil cups are placed at the other bearings. A small horizontal shaft is connected to the wind engine. A crank, for operating a pump, is placed at one end of this shaft, which also carries a sheave to be used for running machinery, as illustrated in the cut. The vane and all other exposed parts are made of iron, and as the wheel is under cover, durability may justly be claimed as one of the principal advantages. When working, three (there are six in all) of the large plane sails are exposed to the wind. The large area of these sails gives them a powerful leverage, even in a light wind. As the wheel is inside of a part of the tower, it cannot blow down unless the tower goes with it. The funnel shaped opening in which it is placed greatly increases the effect of the wind. The wheel requires very little attention, and is adapted for the use of florists, dairymen, etc., for farm and household purposes generally, and for compressing air in the storage of power, to which attention has been recently directed.

Further particulars may be obtained from the manufacturer, Mr. D. H. Bausman, P. O. Box 163, Lancaster, Pa.

How the "Best" Butter is Made.

A Berkshire County, Mass., farmer writes: "My object has always been to make *the best butter*—not the most profitable, necessarily, but the best. Having this object in view, I have been compelled to discard oil meal, and thus reduce the quantity of my butter and the value of the manure. I have been obliged to take the cows out of all basement cellars, and have consequently received less butter for a given amount of food. I have been forced, instead of dropping the manure into a convenient cellar below the cows, to give up this cellar and wheel the manure into a shed. I have been obliged to discard deep setting, and to content myself with the open, shallow method, which is more expensive, and requires more attention, and returns less butter. I have been obliged to reject all feeds except corn, wheat, hay, beets, and carrots. I have been obliged to give up using the milk of cows that have calved too recently or too remotely. I have, for a dozen years, carefully and faithfully tried to make butter as good as it could be made; this has been the first consideration, profitableness has always been secondary. The result has been that for many years this butter has brought a higher price than any butter in the county of Berkshire, where much good butter is made, and it has taken the first prize over the county. It has been in such constant demand at 65 cents a pound, the year through, that when making 100 pounds a week there have been unfilled orders for 25 to 50 pounds more.

Independent Cut-off Valves for Locomotives.

Mr. W. Barnet Le Van, in his paper entitled, "Sixty Miles in Sixty Minutes on our Present Roadbeds," argues for the use of independent cut-off valves for locomotives. Reasoning from analogy, he says that the benefits to the stationary engine, derived from the independent cut-off, can also be applied to the locomotive.

It is well known, he says, that an engine may be run with an admission of steam to a shorter length of the stroke—in other words, with an earlier cut-off—when an independent variable expansion valve is used than with the link alone. This being admitted, the question again comes up, "What is the advantage of the link used in addition to the cut-off?"

Its advantage is simply as follows:

First.—The link is the simplest and readiest means of reversing.

Second.—While the cut-off is being run at, say, one-fourth or three-eighths stroke, the link may be worked to *vary the exhaust*. It is found to be less advantageous to hold on to the steam as long, when cutting off close, as when following for a greater length of the stroke. Let an engine, having both a link and a separate cut-off valve, have the latter set at one-quarter stroke, the engine meanwhile running along at a corresponding speed. The link, which is supposed to be working the main valve at full throw, may not be pulled up notch by notch. With each rise of the link and consequent shortening of the throw of the main valve, whereby the exhaust is released earlier and earlier, the engine will be found to quicken its speed. This result Mr. J. Snowden Bell informs me was the case with locomotive No. 27, of the Baltimore and Ohio Railroad, built from designs of Mr. Ethan Rogers, of the Cuyahoga Works, Cleveland, Ohio; in the exact words of Mr. Bell, she was "lightning."