(No Model.)

J. FRANK.

ELECTRIC RAILWAY SIGNAL.

No. 531,919. Patented Jan. 1, 1895.

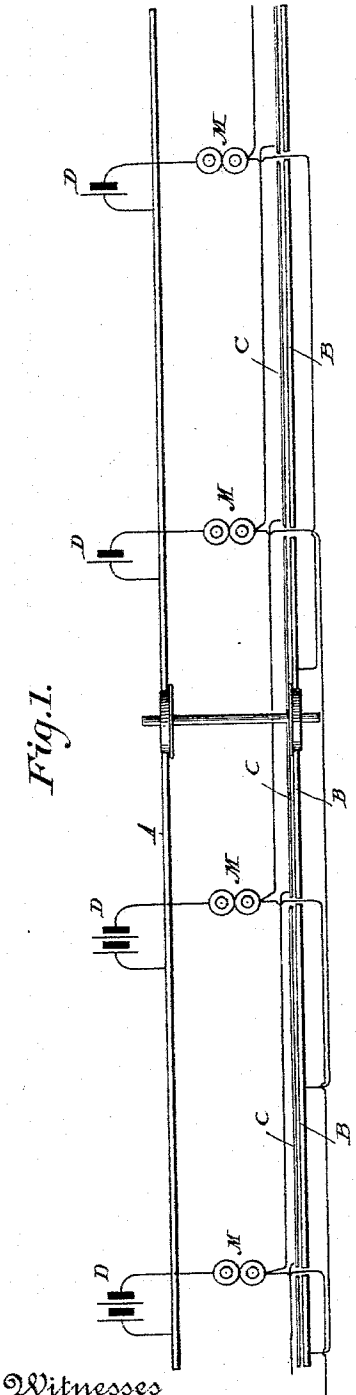

Fig. 1.

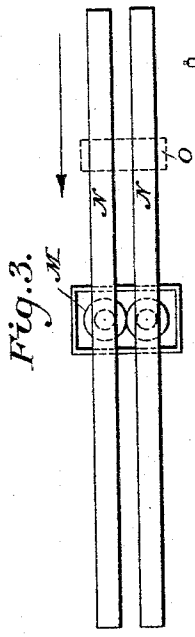

Fig. 3.

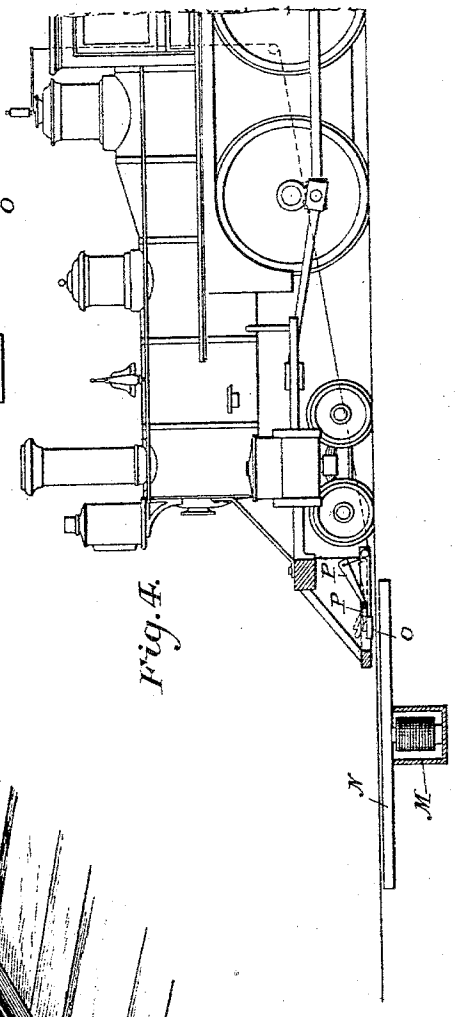

Fig. 4.

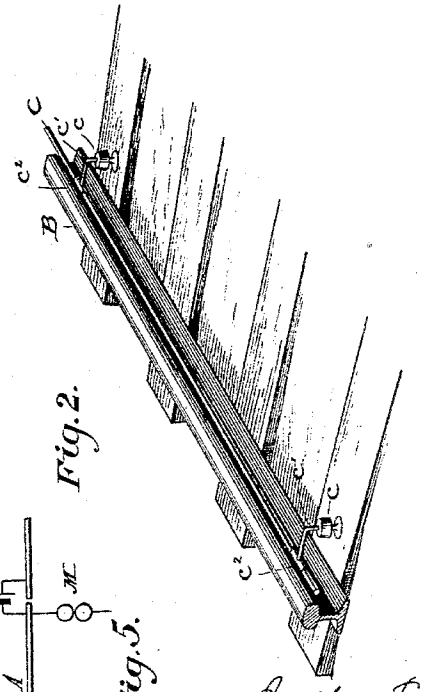

Fig. 2.

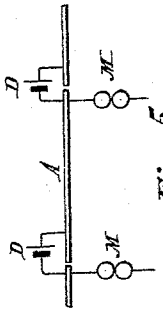

Fig. 5.

Witnesses
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UNITED STATES PATENT OFFICE.

JAKE FRANK, OF NEW YORK, N. Y.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 531,919, dated January 1, 1895.

Application filed November 27, 1893. Serial No. 492,170. (No model.)

To all whom it may concern:

Be it known that I, JAKE FRANK, of New York, county of New York, State of New York, have invented new and useful Improvements in Electric Railway-Signals, of which the following is a full and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to electric railway signals of that class in which the wheels of a moving train close circuits which act to energize alarm actuating devices located at points on the track ahead of, and in the rear of the moving train.

In carrying the invention into effect, I provide at intervals along the track electro magnets, preferably having extended pole pieces adapted to be energized by the closing of the circuit, and to attract an armature pivotally carried upon the locomotive of a train. This armature operates an alarm carried by the locomotive, and is preferably constructed to operate the whistle of the same, as shown in the drawings.

Referring to the drawings—Figure 1 is a plan view of a number of sections of track wired in accordance with my system. Fig. 2 is a perspective view of a section of the rail and conductor; Fig. 3, a plan view of one of the magnets with the extended pole pieces; and Fig. 4, a diagram partly in section, illustrating the action of the magnet upon the alarm device carried by a locomotive. Fig. 5 is a slight modification of the arrangement of the batteries relating to the system.

Referring to Fig. 1, A is a continuous rail; B, B, B, &c., a second rail of the track formed in sections which may be of any convenient length, say one mile, and C, C, C, &c., sections of insulated conductor placed in close proximity to the rails B, and in such position that the passing wheels of the train will make contact both with the rail and with the conductor. The rails themselves may be, and are preferably insulated so as to form good conductors.

To the continuous rail A, is attached one pole of the series of batteries D, corresponding in number to the number of sections in the conductor B.

Located centrally between the tracks are a series of electro magnets M, likewise equal in number to the number of sections in the rail B. The conductor from the opposite pole of the batteries C, is carried to and through each of the electro magnets M, and after passing therethrough is divided; one end of the conductor being carried forward and connected to the sectional conductor C of the section of track ahead of the one in which the magnet is located; the other being carried backward and connected with the sectional rail B on the section in the rear to the one in which the magnet is located. The result of this arrangement of circuits is that the passing wheel of the train, as shown in Fig. 1, forms a cross connection between the positive and negative poles of the battery and through the conductor C forms a loop, including the alarm section and magnet ahead of the train, and a second loop through the rail B and its conductor to the alarm section and magnet in the rear of the train. It follows from this that any approaching train either side of the occupied section, will receive through the electro magnet, an alarm indicating that the next section is occupied and that a train in passing over a track provided with this system, will be at all times protected ahead and in the rear, by an energized alarm section capable of transmitting an alarm to any approaching train.

I may support the conductors C in any suitable manner, but prefer to support them upon insulated standards c' as shown in Fig. 2, mounted upon cross ties of the road bed. These standards are provided with horizontal projecting arms c' and clips c^2, preferably brazed or soldered to the conductor, and the conductor itself, as previously stated, is within such proximity to the rail that the flange of the wheel of a passing car will make contact with both the conductor and the rail, and they are preferably elastic or yielding.

As the trains pass the electro magnets at a high rate of speed, I prefer in order to extend the field of operation of the magnets as much as possible, to provide the magnets with extended pole pieces, such as are shown in Fig. 3, in which N is the magnet, and N N, two bars or rods, preferably of soft iron mounted thereon in such position as to lie parallel to the direction of the track and flush with the surface of the ties.

Referring to Fig. 4 in which the action of

the alarm is shown, it will be seen that the locomotive carries preferably underneath the cowcatcher, a pivoted armature O, carried upon an angular iron non-magnetic lever P, and provided with a weight p' by which it is returned to its normal position. The end of this lever is connected to an operating line running underneath a pulley, and rearward to the cab of the engine where it is connected to the lever which operates the whistle. As the engine approaches one of the energized electro magnets, the armature is momentarily drawn down, the cord pulled through the action of the lever and the whistle operated.

In the operation of this system, or of any other system, it will frequently happen that through wreckage, washouts, or accident to the road bed it would be desirable to stop an approaching train. In order to provide for such contingencies as this, the circuits are so arranged that the contact between one of the sectional conductors and one of the rail sections will operate to close the circuit through the magnets of the two adjacent sections, in such manner as to operate the alarm. In order to provide for this action the batteries attached to the magnet circuits are disposed in alternate groups of two, each alternate group being of double power, or of larger power than the next group. This is done for the reason that the batteries located in each end of the loop would have a tendency to neutralize each other, and prevent the operation of the signal. By making an uneven balance in the two ends of the loop, the extra force of the larger battery acts to operate the signal in the usual manner.

I may substitute any ordinary form of alarm, but prefer to use that shown and described.

I believe myself to be the first to combine in a system of this kind, a normally open circuit having two branches in each of which is a signal operating device, and to utilize the passing wheels of the train to close a loop by which both branches are energized, and to operate the signal carried by the moving train by means of the magnets.

I also believe myself to be the first to provide an electro magnetic alarm actuating device having an extended actuating surface by means of which a certain action of the apparatus may be secured in combination with an alarm carried by the moving train.

While I have shown the preferred construction of the alarm and conductor supports, these details may be varied within reasonable limits, without departing from my invention.

I sometimes make the second rail sectional, instead of continuous, connecting the ends of each section through the battery, and one end of each section to the signal operating magnet, as shown at Fig. 5.

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

1. In an electric railway signal, signal operating magnets, each connected on one side to a common rail and on the other side in divided circuit to rail sections in front and rear of the magnets, and a vehicle carrying a signal controlling armature and in turn adapted to close the circuit of the magnets.

2. In a signaling device for railway systems the combination of a continuous rail, a series of batteries, one terminal of which is attached thereto, a series of electro-magnets attached to the opposite terminal of the battery, a series of insulated rail sections equal in number to the magnets, branches leading from the magnets to rail sections in advance of the magnets, sectional conductors located adjacent to the rails, and branches leading rearward from the magnets to the next section of insulated conductors, said conductors forming double loops adapted to be closed by the passage of a railway train, substantially as described.

3. In a railway signal system the combination of an insulated rail and an insulated conductor mounted adjacent thereto on flexible supports, independent signaling devices connected with the rail and with the conductor and adapted to be operated by the passage of the car wheel between the conductor and the rail.

In testimony whereof I have hereunto set my hand this 21st day of November, A. D. 1893.

JAKE FRANK.

Witnesses:
L. L. JOHNSON,
GEO. W. MANKIN.