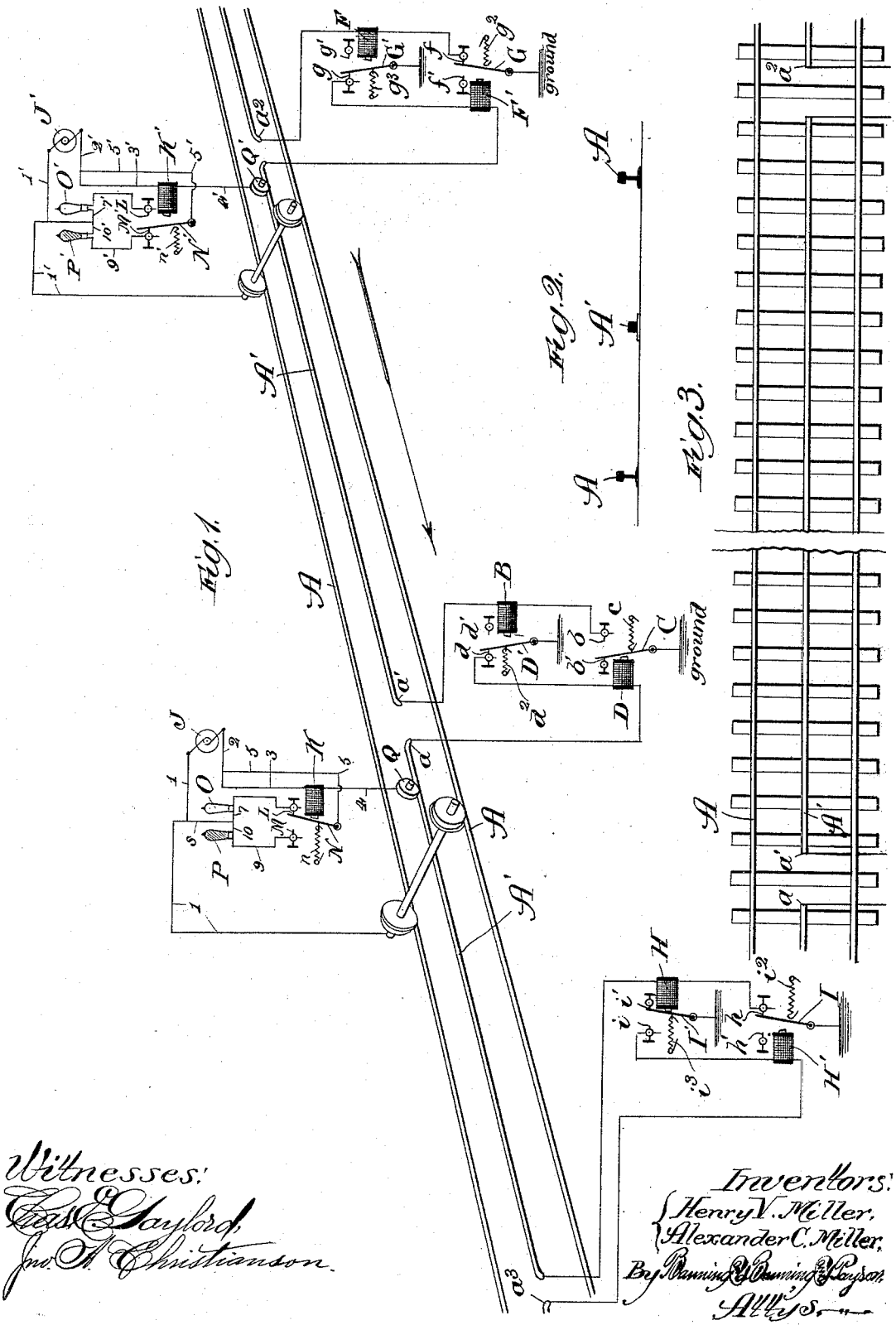
(No Model.)

H. V. & A. C. MILLER.

ELECTRIC RAILWAY SIGNAL.

No. 493,935. Patented Mar. 21, 1893



Witnesses:
Chas. E. Gaylord.
Jno. A. Christianson.

Inventors:
Henry V. Miller.
Alexander C. Miller.
By Pruning & Pruning & Payson.
Attys.

UNITED STATES PATENT OFFICE.

HENRY V. MILLER, OF BLOOMINGTON, AND ALEXANDER C. MILLER, OF AURORA, ILLINOIS.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 493,935, dated March 21, 1893.

Application filed November 8, 1892. Serial No. 451,484. (No model.)

To all whom it may concern:

Be it known that we, HENRY V. MILLER, of Bloomington, and ALEXANDER C. MILLER, of Aurora, Illinois, have invented certain new and useful Improvements in Electric Railway-Signals, of which the following is a specification.

The object of our invention is to provide an electrical signal for use in connection with railways, which is intended to warn the engineer or the trainmen of another train ahead of them, or any other state of existing affairs which the device is adapted to indicate, and that it is his duty to stop or diminish the speed of his train.

The device to be described in the present application is an improvement upon, and a modification of that described and claimed in an application filed by us and Samuel W. Miller, of Aurora, on the 4th of April, 1892, Serial No. 427,691, allowed September 10, 1892. In that application the devices worked to give an alarm signal upon a decrease of resistance, while in the present application they work upon an increase of such resistance.

Various other modifications and alterations have been made, as will appear from the description following.

In the drawings, Figure 1 is a side elevation and diagrammatic view of our improved apparatus, Fig. 2 a sectional view of the track used in connection therewith and Fig. 3 is a plan of the track.

At any suitable point between the track rails, A, A, we place a third rail A′, which may be of any form and supported in any desired manner upon the ties, so long as it is suitably insulated. This track is divided into blocks or sections of any desired length, and the following apparatus is stationed at the joining of each of these blocks. We have shown three of these apparatuses, but will only describe in detail one, placed between the blocks *a*, *a′*. A magnet B is connected, as shown, with the rail *a′*, and also with a contact point *b*. Between this contact point and another similar point *b′* is placed a vibrating arm C, connected to the ground, as shown, and to which is attached a spring *c*, which spring serves to draw the arm into contact with the point *b*, to establish a connection with the rail *a′*. Adjacent to this arm is placed a magnet D, which, when energized, will draw the arm C over into contact with the point *b′*, against the resistance of the spring *c*. This magnet D is suitably connected with the rail *a*, and also with a contact point *d*, which is placed opposite a similar point *d′*. Between these points is located a vibrating arm D, similar to the arm C, and provided with a spring d^2, which tends to normally draw it away from the magnet B into contact with the point *d′*, but which is overcome when the magnet B is energized, the arm being then drawn into contact with the point *d*. At the right hand of the drawing, and at the other end of the rail *a′*, are placed magnets F, F′, contact points *f*, *f′*, *g*, *g′*, and arms G, G′, provided with springs g^2, g^3, the magnet F, being connected to the section a^2, and the magnet F′ to the section *a′*, the other connections being the same as those already described, when speaking of the magnets B and D. At the left hand end of the figure are placed magnets H, H′, contact points *h*, *h′*, *i*, *i′*, vibrating arms I, I′, provided with springs i^2, i^3, the magnet H being connected to the section *a*, and the magnet H′ to the connection a^3, the other connections being the same as that already described.

On the locomotive is placed the following apparatus, and for the sake of clearness in the description, we shall describe two locomotives, each provided with substantially the same apparatus. These locomotives will be understood as running in the direction indicated by the arrow, or toward the left, so that the apparatus shown in the left hand one in the drawing will be in the forward locomotive, and the other upon the rear. It should be understood, however, that these locomotives may be running in the opposite direction, or that they need not both be running in the same direction, one being shown in one block and one in the other. That is, we have merely described the two locomotives running in the same direction toward the left, for the sake of clearness and brevity. Furthermore, these devices may be placed upon any other part of the train desired, although we prefer they should be upon the locomotive.

Proceeding, then, to a description of the devices upon the forward locomotive, at any

suitable point upon this locomotive, are situated a dynamo or other suitable source of electricity, J, of any desired construction, a magnet K, contact points L and M, a vibrating arm N, provided with a spring n, a white light O, and red light P. Beneath this locomotive, at any suitable point, is placed a wheel or brush, or other suitable connector, Q, which travels upon the third rail to make an electrical connection therewith. These devices are further connected as follows: The dynamo J is connected with the ground by a wire 1. From the other brush of the dynamo runs a wire, 2, which branches, one branch, 3, running to the magnet K, and thence by a wire 4, to the wheel, brush, or other traveling connector Q. The other branch of the wire, 2, numbered 5, connects with vibrating arm N. From the point L a wire 6 runs to the white lamp, whence the current may be grounded by wires 7 and 8, the latter wire preferably connecting with the wire 1. From the contact point N a wire, 9, runs to the red light P, from which the current may pass to the ground through wires 10, 8 and 1. It should be understood that the precise manner of making these connections is not important, and that the lamps may be directly grounded without being connected with the wire 1, which grounds the dynamo, and that we have described this particular method as one which has attained good results. The parts upon the rear or right hand locomotive are similarly constructed and connected, and in the drawings are indicated by the same letters and numbers, with the addition of a prime mark to each of such letters or numbers.

The device having been constructed and connected as above described, operates in the following manner: Let us suppose first that the rearward engine is omitted and the forward engine is running along over the block a. The current will then pass from the dynamo J, through the wires 2 and 3, the magnet K and wire 4 and the connector Q, and thence into the third rail A'. Here it will divide, running in both directions. That portion of the current which runs forward will pass through the magnet H and arm I into the ground, energizing the magnet H and drawing the arm I' into contact with the point i'. That portion of the current which runs backward in the track will pass through the magnet D and arm D', into the ground, energizing the magnet D and drawing the arm C into contact with the point b', breaking the connection with the point b. Under these conditions the amount of current passing through the magnet K should have sufficient strength to draw the arm N against the tension of the spring n into contact with the point L thereby making connection with and igniting the light O, thus indicating that everything is all right. If, now, a train similarly equipped enters the block a' the current, when it reaches the rail, will be prevented from passing to the ground through the arm C, the connection being broken at the point b. It will have, therefore, to pass backward to the ground through the magnet F' and arm G'. This will increase the resistance and diminish the force of the magnet K' to such an extent that the spring n' will draw over the arm N' into contact with the point M', thereby extinguishing the white light O', igniting the red light P' and giving notice of danger. When the forward engine passes out of the block a the magnet D will cease to be energized, whereupon the spring c will draw over the arm C into contact with the point b, thereby affording an additional escape to the current from the dynamo J' through this arm C, reducing the resistance and increasing the power of the magnet K', so that it will again draw over the arm N' to extinguish the red and ignite the white light, showing that all is safe. It will of course be apparent from the above description that when trains going in opposite directions enter adjacent blocks, the train which is last to enter one of these blocks will be the one that receives the danger signal, for the reason that the first train entering one of the blocks will have broken the connection with the other block.

This device may be operated not only by a train in the next block, but also by the fact that a switch has been left open ahead, as in the application above referred to, the difference being that inasmuch as this device works by reason of an increase in resistance, instead of a decrease, the contact points of the switch must be so constructed that when the switch is improperly opened the third rail shall be opened instead of grounded. This device will be readily understood from the above description and requires no further description.

Although we have already described more or less precise forms we do not intend to unduly limit ourselves thereto, but contemplate all proper changes in form, material, proportions and the substitution of equivalent members, as may be desirable or necessary as, if desired, the red light may be substituted for the white or the white for the red, and vice versa, so long as there are two lights provided, together with mechanism, substantially as described, for igniting one or the other of them as the circumstances and conditions vary.

We have not in this application shown any means whereby in the event of the breaking down of the device the red light will be ignited, such a mechanism being shown in the application above referred to, but it will be obvious that the herein described mechanism can be used in connection with such a device if desired.

We claim—

1. A railway signal comprising a magnet connected with a suitable source of electricity, a pair of contact points adjacent thereto, such points being each connected with an electric light, which lights are in an inde-

dependent circuit, a vibrating arm placed between such points and normally held in contact with one of them by the action of the magnet,—igniting the light connected therewith, and means whereby when the resistance to the current is increased the power of the magnet will be diminished and the arm be withdrawn therefrom into contact with the other post to ignite its light without cutting-out the magnet, substantially as described.

2. A railway signal comprising a magnet connected with the ground and with a suitable source of electricity, a pair of contact posts adjacent thereto, lights of different colors connected respectively to each of these posts, said lights being in an independent circuit, an arm vibrating between such posts and normally held by means of the magnet in contact with one post, whereby the light connected with such post is ignited, indicating safety, and means whereby, when the resistance to the current is increased, the consequently decreased power of the magnet will be overcome by a suitable mechanism and the arm withdrawn into contact with the other post, igniting the lamp connected therewith and extinguishing the lamp connected with the first post, thereby indicating danger, substantially as described.

3. In a railway signal, the combination of an insulated rail divided into blocks and equipped with contact points and magnets constructed and connected substantially as described, a magnet located on the train connected with such insulated rail and with a suitable source of electricity, a pair of contact posts adjacent thereto, each of such posts being connected with an electric light, a vibrating arm between such posts, and a spring connected to the vibrating arm, whereby under normal conditions when a train is running in one block and there is no train ahead, the current will ground through both ends of the block and the magnet will hold the arm in contact with one of the posts, igniting the light connected therewith, but when a train similarly equipped is in the block ahead the circuit will be broken at the forward end of the rearward block, thereby increasing the resistance and decreasing the power of the magnet on the train in this block, when the vibrating arm will be withdrawn by the power of the spring into contact with the other post igniting the light connected therewith and extinguishing the first light, substantially as described.

4. In an electric signal, the combination of a third rail divided into blocks or sections of any desired length, magnets connected with each end of such section and with a suitable contact post, contact posts adjacent to such magnets and connected with similar magnets forming a part of the adjacent blocks, and vibrating arms placed between such posts and connected with the ground, all arranged and operating substantially as described.

5. In an electric signal, the combination of a block or section of an insulated rail, a magnet on a train traveling on such section connected with such rail and with a suitable source of electricity, contact posts adjacent to such magnet, each of said posts being connected with an electric light, a vibrating arm placed between such posts and provided with a spring, magnets B and F′ connected with the respective ends of the block, contact points connected with such magnets, arms vibrating in proximity to such contact points, and magnets adjacent to such arms and connected to the adjacent block sections, whereby when there is no train in the block ahead the current will ground through both ends of the section and the magnet on the train will operate to hold its vibrating arm in contact with one of the posts, igniting the light connected therewith, but if there be a train in the block ahead the connection will be broken at the forward end of the section a', whereupon the resistance will be increased, the power of the magnet lessened, and the arm withdrawn by its spring into contact with the other post, igniting the light connected therewith and extinguishing the first light, substantially as described.

HENRY V. MILLER.
ALEXANDER C. MILLER.

Witnesses:
GEORGE S. PAYSON,
SAMUEL E. HIBBEN.