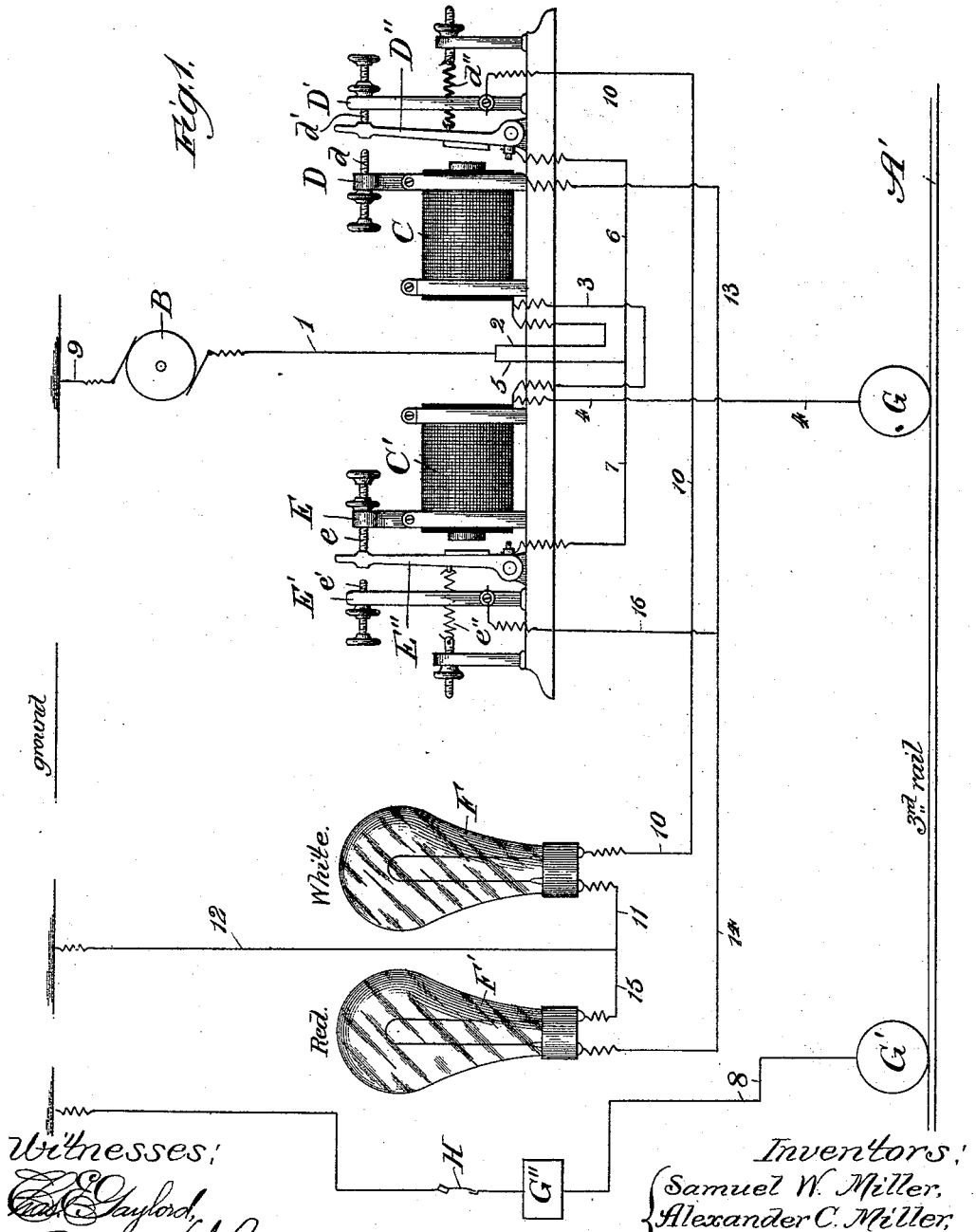
(No Model.) 2 Sheets—Sheet 1.

S. W., A. C. & H. V. MILLER.

ELECTRICAL RAILWAY SIGNAL.

No. 494,111. Patented Mar. 21, 1893.



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Inventors:
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(No Model.) 2 Sheets—Sheet 2.

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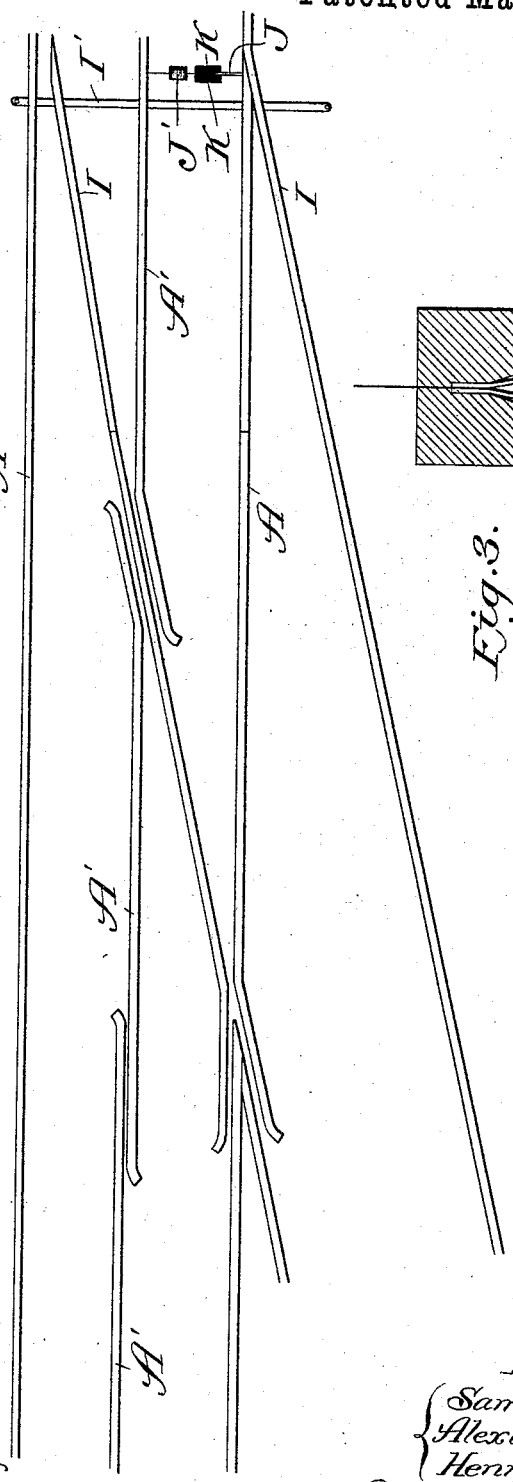

Fig. 2.

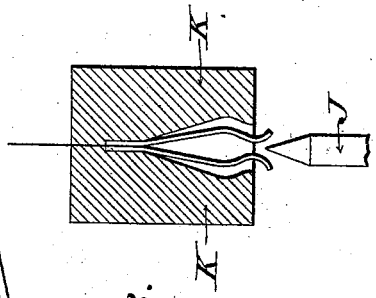

Fig. 3.

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UNITED STATES PATENT OFFICE.

SAMUEL W. MILLER AND ALEXANDER C. MILLER, OF AURORA, AND HENRY V. MILLER, OF BLOOMINGTON, ILLINOIS; SAID SAMUEL W. MILLER ASSIGNOR TO SAID ALEXANDER C. MILLER AND HENRY V. MILLER.

ELECTRICAL RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 494,111, dated March 21, 1893.

Application filed April 4, 1892. Serial No. 427,691. (No model.)

To all whom it may concern:

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

The object of our improvement is to provide a signal adapted for use in connection with railways, which is intended to give warning to the engineer or other train man either of another train ahead of him in the same block or division of the system of the same road, or that a switch has been left open, or that there is any other state of affairs existing which the device is adapted to indicate, and that it is his duty to stop the train, and, stated generally, in providing means, preferably placed upon the locomotive, for igniting one or the other or both of a pair of electric lights, and our invention consists in the features and details hereinafter pointed out in the claims.

In the drawings, Figure 1 is a side elevation diagrammatic view of our improved apparatus, and Fig. 2 is a plan view illustrating the arrangement of the track when used in connection with such device, and Fig. 3 a detail view showing the construction of the contact points.

At any suitable point between the ordinary track rails A, A, we place a third rail A′, which may be supported upon the ties in any suitable manner, so long as it is insulated therefrom to prevent the grounding of the circuit used in connection with this device. This third rail is preferably so constructed that the sections thereof overlap to some extent at the end of each division of the block, the rails of the two divisions being insulated from each other at the overlapping point.

At any suitable point on the locomotive is placed a dynamo B, adapted to be revolved by any suitable means, and furnishing the current necessary for our device, or in lieu thereof an electrical battery can be used.

In the cab of the locomotive are placed two electro-magnets C, C′, of any desired dimensions. Adjacent to the magnet C, are posts D, D′, provided with contact points *d*, *d′*, and between these posts is a vibrating lever or arm D″ normally retracted by the spring *d″*, until it is in contact with the point *d′*. Similar posts E, E′, provided with points *e*, *e′*, are placed adjacent to the magnet C′. Between these latter posts is placed a vibrating lever E″, having a spring *e″* tending to draw it toward the point *e′* but which spring is so weak as to be normally overcome by the action of the magnet C′, as hereinafter stated.

At any suitable points in the cab of the locomotive are placed electrical lights F, and F′, the former being provided with a white globe, and the latter with a red one. Attached beneath the engine at any suitable points are small wheels or brushes G, G′. These wheels or brushes run upon the third rail, and make an electrical contact therewith.

G″ is a resistance coil, interposed at any suitable point of the circuit for the purpose of regulating the current thereof. These devices are electrically connected as follows: A wire 1 runs from one of the poles of the dynamo or battery and divides into two branches. One of these branches connects with the magnet C. This magnet is connected by means of a wire 3, with the magnet C′, and this latter magnet is connected with the wheel G by means of a wire 4. The other branch of the wire 1, (No. 5 in the drawings) again divides into two branches, 6 and 7—6 running to the vibrating arm D″ and 7 to the vibrating arm E″. The wheel G is in connection with the wheel G′ by means of the third rail, and the latter is connected with the ground by means of a wire 8, which passes through the resistance coil, and switch H, the ground being connected with the other pole of the dynamo or battery by means of a wire 9. The post D′ is connected with the light F, by means of a wire 10, and this light is connected with the ground by means of wires 11 and 12. The post D is connected with the red light F′ by means of wires 13 and 14, and this light with the ground by means of wires

15 and 12. The post E′ is connected with the red light by means of wires 16 and 14.

The parts being constructed and connected as above set forth, the operation of the device is as follows, supposing the train to be running along in a division of the block in which there is no other train and no switch open. The current passes from the dynamo through the wire 1, then branching, a portion of it runs through both magnets to the wheel G, along the third rail to the wheel G′, thence to the ground and back to the other pole of the dynamo. The other portion of the current runs through the wire 5, whence it is prevented from passing through the wire 7, since the force of the magnet C′ has drawn the arm into contact with the point on the post E, and this latter post not being connected with anything, the circuit is broken, affording no means for the passage of the current. The current can, however, pass through the wire 6, and thence into and through the arm D″, the post D′, the wire 10, into the white light, which it illuminates, and thence to the ground. It does not pass into the red light, because the circuit through the wires 13 and 14 is broken at the post D. Therefore when the train is running along with everything in proper condition, the white light will alone be burning. But let us suppose that another train similarly equipped happens to be in the same block. The current then passing into the wheel G, will be free to go to the ground, not only through the wheel G′ and the resistance coil, but also through the wheels on the train ahead. The effect of this will be to afford a ready outlet for the electricity, and sufficiently to cause a greater quantity to pass through the magnets more strongly energizing them. The tension of the spring d'' will then be overcome, drawing over the arm D″, breaking the contact with the post D′, and making it with the post D. The current will then pass from this post through the wires 13 and 14, into the red light, illuminating it, and thence to the ground, to wires 15 and 12, the white light going out. By this means the engineer will be immediately notified of the presence of the train ahead by the going out of the white light and the illuminating of the red, and will be required to stop the engine and avert an accident. It may happen, however, that the connection with the wheels G, may be broken, and in this case no current will pass through such wheels, and the magnets will cease to be energized. When this happens, the spring e'', which is normally overcome by the power of the magnet C′, will withdraw the arm E″, breaking the contact with the point e, and making the contact with the point e'. With the parts in this position the electricity will not only flow through the wire 6, the arm D″ the post D′, and the wire 10, into the white light, and thence to the ground, but will also flow through the wire 7, the arm E″, the post E′, and the wires 16 and 14, into the red light, illuminating it, and thence to the ground, so that both lights will be simultaneously burning, thus warning the engineer that the device is out of order, and not to be depended upon for the purposes of signaling.

It is frequently desirable to know a switch is open improperly or otherwise as that a train is ahead in the same block, and we have therefore devised means whereby the fact that such a switch is open will be signaled to the engineer this consisting of the following device. I, I, represent the switch rails, and I′ the rods connecting them. Attached to one of the rails is a contact point J, and attached to the third rail are contact points K, K, adapted to receive the point J between them, these points being provided with a suitable resistance coil to regulate the circuit. In their normal position, when the switch is set for the main track, so that a train will keep to such track, there will be no contact between these points, but when the switch is moved over to set it for the siding, the point J will enter between the points K, thus grounding the insulated rail. This grounding of this rail affords the same escape for the current therefrom as though another train were in the block, and consequently the current from the wheel G will not only pass back through the wheel G′, but also ahead through the points K and J, into the ground, thus affording two outlets, and increasing the amount of electricity passing through the magnets and the energy of such magnets, with the result that the white light will go out, and the red light be lighted, precisely as already described in speaking of the action of the device to indicate the presence of a train. These contact points are more particularly shown in Fig. 3.

From the above description it will be evident that when the white light alone is burning, the device is in order, and there is no danger ahead of the sort to be indicated by this mechanism, but when the white light goes out and the red one burns, there is either an open switch or a train ahead, the engineer being warned in either case in the same manner. When both lights burn, the signaling device is out of order in some way, the connection with the ground and the third rail being broken, and, finally, when both lights go out, the dynamo is out of order.

Although we have described more or less precise forms, we do not intend to unduly limit ourselves thereto, but contemplate changes in the form, proportions, and the substitution of equivalent members, as may be desirable or necessary, for example, brushes or other suitable connections can be substituted for the wheels G, G′, and when we use the word "wheels" in the claims, we intend to cover thereby any such connections. And, further, while we have described two conditions under which our device will act we have done this

merely for brevity and not as a limitation, inasmuch as we contemplate using it in any place for which it is adapted.

We claim—

1. A railway signal comprising a magnet connected with the ground and with a suitable source of electricity, a pair of contact posts adjacent thereto, a white light connected with one of such posts, and a red light connected with the other, both lights being in an independent circuit, and a vibrating arm placed between the posts and normally held in contact with the one connected with the white light, and means whereby, when the current, passing through the magnet, is increased, the arm will be withdrawn from the white light post and brought into contact with the post connected with the red light, thereby extinguishing the white light, and lighting the red one, substantially as described.

2. A railway signal comprising an insulated rail, wheels traveling upon such rail, one of such wheels being connected with the ground and the other with the electro-magnet, a suitable source of electricity connected with the ground and with such magnet, a pair of posts adjacent to the magnet and connected respectively with a white and red light, which lights are independently connected with the source of electricity, and a vibrating arm normally in contact with the post connected with the white light, but adapted to be withdrawn, as the current, passing through the magnet, increases, into contact with the post connected with the red light, thereby igniting the latter and extinguishing the white light, and giving warning, substantially as described.

3. In a railway signal, the combination of electro-magnets C, C′, connected with a suitable source of electricity and with the ground, two binding posts adjacent to the magnet C and connected respectively with a white and red light, which lights are in an independent circuit, a vibrating lever placed between such posts, and normally held in contact with the white light, but adapted to be withdrawn as the current of electricity increases to extinguish the white and ignite the red light, a post adjacent to the magnet C′, connected to the red light, and a vibrating arm pivoted between such post and magnet, normally withdrawn from the post, to break the connection with the red light, but adapted, when the current of electricity passing through the magnet ceases, to be withdrawn into contact with the post to ignite the red light, substantially as described.

4. In a railway signal, the combination of electro magnets C C′ connected with a suitable source of electricity and with the ground, two posts D D′ placed adjacent to the magnet C and connected respectively with a red and a white light, which lights are in an independent circuit, an arm D^2 between such posts normally held in contact with D′, a post E′ adjacent to magnet C and connected to the red light, an arm E^2 provided with a spring but normally held away from the post E′ against the tension of such spring by the power of the magnet C′, whereby under normal conditions the white light will alone be burning, but when the current through the magnets increases the arm D^2 will be drawn into contact with the post D, extinguishing the white and igniting the red light, and when the current through the magnet ceases, the arm D^2 will remain in contact with the post D′, and the arm E^2 will be drawn into contact with the post E′ igniting the red light, so that both lights will be burned simultaneously, substantially as described.

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