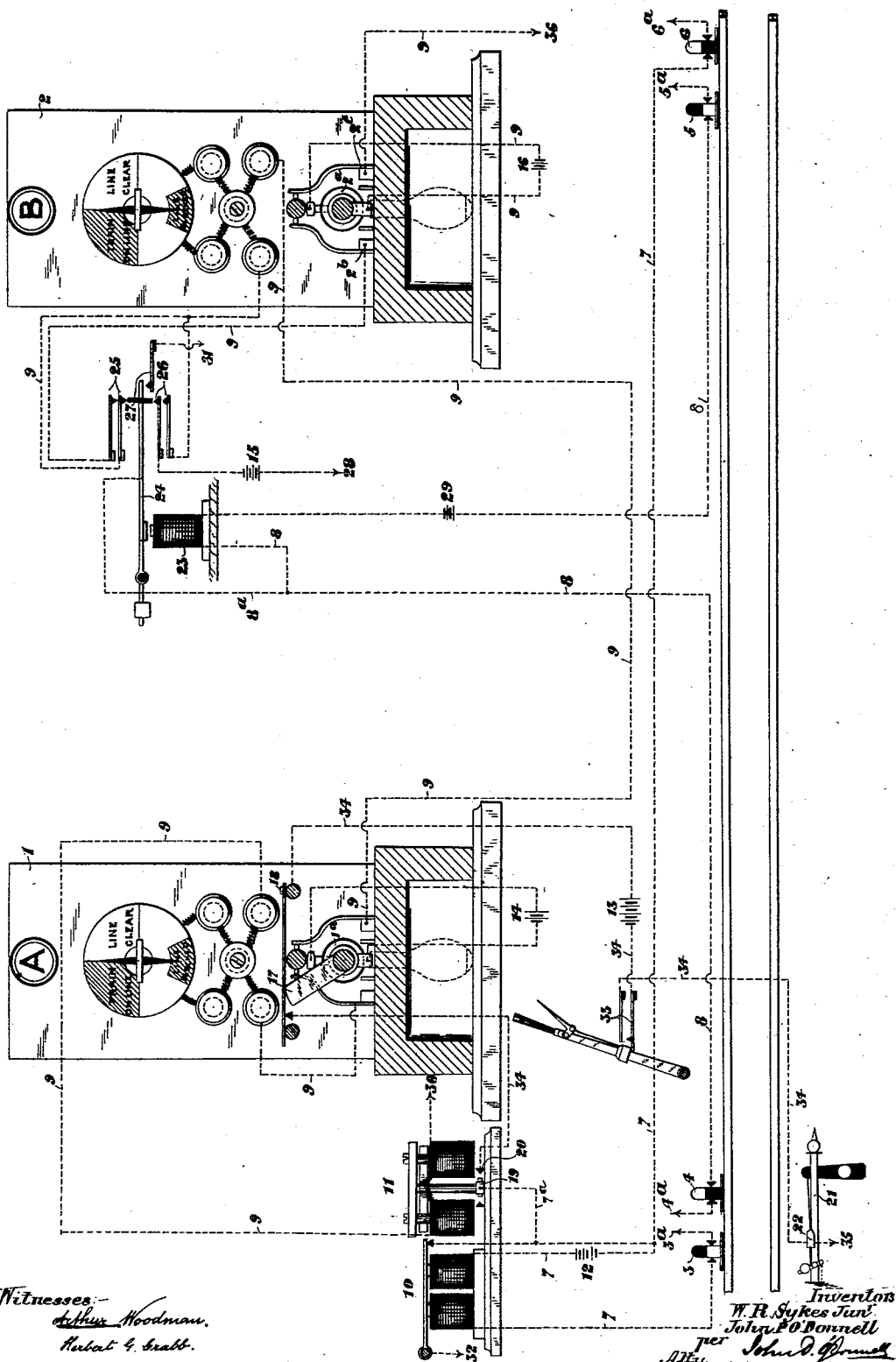


(No Model.)

W. R. SYKES, Jr. & J. P. O'DONNELL.
LOCK AND BLOCK SIGNALING ON RAILWAYS.

No. 568,993.

Patented Oct. 6, 1896.



UNITED STATES PATENT OFFICE.

WILLIAM ROBERT SYKES, JR., AND JOHN PATRICK O'DONNELL, OF LONDON, ENGLAND, ASSIGNORS TO REGINALD BREADALBANE ANNESLEY, OF LIVERPOOL, AND EDWIN BLAKEY, OF BRADFORD, ENGLAND.

LOCK-AND-BLOCK SIGNALING ON RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 568,993, dated October 6, 1896.

Application filed February 6, 1895. Serial No. 537,534. (No model.) Patented in England January 18, 1895, No. 1,245.

To all whom it may concern:

Be it known that we, WILLIAM ROBERT SYKES, JR., residing at 43 Kent House Road, Beckenham, London, in the county of Kent, and JOHN PATRICK O'DONNELL, residing at 70 and 71 Palace Chambers, Bridge Street, Westminster, London, in the county of Middlesex, England, subjects of the Queen of Great Britain and Ireland, have invented new and useful Improvements in Signaling on Railways and Means Therefor, (for which we have obtained a patent in Great Britain, No. 1,245, bearing date January 18, 1895,) of which the following is a specification.

Our invention has reference to improvements in what is known as "lock-and-block" signaling on railways; and it consists in the novel combination of the parts hereinafter fully described and claimed.

The drawing shows a diagram of the apparatus.

In the illustration four treadles are shown, two at desired spots in advance of A's starting-signal and, correspondingly, two doing similar duty in advance of B's starting-signal.

It should be understood that, although the contacts perform different results, yet they may be in one treadle or they may be in two treadles. This description refers to the treadles in advance of A's starting-signal, and the same description also refers to the treadles in advance of B's starting-signal.

1 is the ordinary block instrument in signal-cabin A. 2 is a similar instrument in signal-cabin B.

3 and 4 are treadles in advance of the starting-signal at A. 5 and 6 are similar treadles in advance of the starting-signal at B.

7 is the circuit from treadle 6, through relay 10, to treadle 3.

8 is the circuit through treadle 5, relay 23, and treadle 4.

9 is the ordinary block-circuit through instruments 1 and 2, and also passing through polarized relay 11 to earth 30.

10 is an ordinary relay.

11 is a polarized relay whose tongue 19 makes contact with 20 when the block instruments are pegged over to "line clear."

12 is a battery in circuit 7.

13 is the battery in circuit 34.

14 is the block-instrument battery at A.

15 is a powerful battery which deflects the needles in block instruments at A and B to "train on line" when relay 23 is energized.

16 is the block-instrument battery at B.

17 is an insulated arm fixed to the axle of block instrument at A which raises spring 18 when the handle of the instrument is moved to "line clear." The object of this is to prevent a permissive current being sent through polarized relay 11 by signalman at A when the line is blocked or the section occupied by a train.

21 illustrates the starting-signal in advance of A's signal-cabin.

22 is the arm-replacer or electric slot fixed in the upright rod between the balance-weight lever and the signal-arm.

23 is a relay placed in signal-cabin at B, or any desired spot, the object of which is to send a current into the instruments at A and B, indicating on the dial "train on line" when the treadle 4 is depressed.

24 is the armature of relay 23, shown in the normal position, that is, making contact with two contact-pieces 25.

26 are the contacts below the armature which are made when the relay-magnet 23 is energized.

27 is another contact placed below armature 24, which leads to earth 31.

28 is an earth-wire leading to battery 15, and 29 is a battery in the circuit 8.

30 is the earth-wire attached to polarized relay 11.

32 is the earth-wire attached to armature of relay 10.

33 is a trigger-contact on starting-signal lever at A, which is normally broken, but is made when the catch-handle is raised.

34 is the replacer-circuit.

35 is the earth-wire leading to replacer 22 on the starting-signal at A, and 36 is the earth of block instrument at B.

The working of our invention is as follows: The drawing illustrates the various magnets and treadles after the passage of the first train over the railway. The action set up by the passage of the train is as follows: As sanction

must be given by the cabin in advance, B, before any train can leave A, that is, before A's starting-signal can be lowered, it is obvious that some action must be performed on the treadle at B in order that B may start the first train from A. Therefore let it be assumed that the treadle at B has been operated, so that B can give sanction to A. The action of the treadle 6 being deflected is as follows: The armature of relay 10 is away from its contact before the treadle 6 at B has been depressed, but immediately upon the depression of treadle 6 the contacts, which are normally broken, are made. This sets up a current on line-wire 7 from the battery 12, energizing magnets 10 and attracting armature of same. Immediately on the train passing clear of treadle 6 it resumes its normal position, that is to say, the circuit at the treadle being broken, but the armature of 10 being attracted and held, has set up a local circuit, (which we will call 7^a for the purpose of distinction from the main circuit 7,) holding the armature in the worked position. This circuit is from the battery 12, through wire 7 to the coils of the magnets 10, through the treadle 3 to earth 3^a, from earth 3^a to earth 32, through the armature of 10 and its contact and the wire 7^a to battery 12, thus completing the circuit. There is now no current flowing through the main wire 7 from its junction with 7^a to the treadle 6. The effect of this last current flowing through 10 from battery 12 and treadle 3 is that upon the signalman moving his catch-handle the contacts 33 are made and a current is set up from battery 13, through wire 34, to the electric slot or replacer 22 on the starting-signal 21, through the coil of the replacer to earth 35, from earth 35 to earth 32, through the armature of magnet 10 and its contact to the tongue 19 of polarized relay 11, to contact 20, (which must be made by the signalman at B pegging the needle of his instrument to "line clear," moving the tongue 19 to contact 20, which will be described hereinafter,) along wire 34 to spring 18, and from thence back to battery 13. The signal-arm can now be moved to the "safety" attitude. Upon the train passing out of A's section treadle 5^a is operated, contact being broken, armature of relay 10 moves away from its magnets thus breaking down circuit through the slot 22 on the starting-signal 21. By this action the arm 22 assumes the "danger" attitude. This starting-signal at A cannot be lowered to the "safety" attitude until the current which was previously broken down by the action of treadle 5^a is again set up, which latter cannot take place until treadle 6 has been depressed, which action is hereinbefore described.

A train on passing over the contact 4, which may or may not be in a separate treadle from 3, sets up a current from battery 29, along the line-wire 8, through the coils of relay 23, and attracts the armature 24. This is held

locally by making contact with the contact 27, the earth 31 joining with earth 3^a. The effect of this is to bring battery 15 into operation. A powerful current is now flowing from the battery through contacts 26, through the dial of the instrument 2 at B, out again through line-wire 9, into the instrument 1 at A and its dial, finding earth 30 through the polarized relay 11. The needles are now pointing to "Train on line," and they remain in that position until the train arrives at treadle 5, which, being operated, breaks down the circuit 8, the armature 24 moves away from magnet 23, and the current releases the needles in both instruments, allowing them to assume their previous position.

A is powerless to lower the starting-signal 21, but only from the fact that B has not pegged his instrument to "Line clear," giving him authority to do so. B pegs the needle of his instrument to "Line clear," and a current is set up as follows: From battery 16 it goes to the reverser 2^a, to the left-hand line-spring 2^b, along line-wire 9, through contacts 25, back along line-wire 9, through the terminals and lightning-arrester, around the coils of the dial at B, and through the terminals on the right hand of the instrument, along line-wire 9 to the right-hand line-spring of the instrument 1 at A, across to the left-hand spring, from thence to the terminals and lightning-arrester in the instrument at A, through the coils of the dial, from the right-hand terminals along wire 9 to the coils of the polarized relay 11, through them to earth 30, from earth 30 to earth 36, along the wire 9 to the right-hand line-spring of the instrument at B, (this being in connection with the reverser 2^a), and from thence, through the line-wire 9, to the battery 16, completing the circuit. This current moves the needles on the dials of both instruments to "Line clear." It also moves the tongue 19 of polarized relay 11 into contact with contact 20.

An important feature of our invention, which is incidental to the working, is that if B, having given sanction to A to send a train from A to B and A has lowered his starting-signal to the "safety" attitude, and at this stage B wishes to suspend that sanction and prevent A from sending the train, B can, by restoring the handle of his instrument to the straight or normal position and the needle on the dial to "line blocked," replace A's starting-signal to the "danger" attitude independent of A, and indicate at A on A's dial that he has suspended the sanction by A's needle assuming the normal or "line-blocked" position.

The arm-replacer or electric slot, which is fixed in the upright rod intermediate between the arm and its balance-weight lever on the signal-post, may be of any of the various forms or kinds of electric slots or arm-replacers which are now in use, the method of operation being that, assuming it is A's starting-signal, A is powerless to operate the arm

to the "safety" attitude without previous sanction from B. If A moves his starting-signal lever, the balance-lever on the post is thrust upward, but no action takes place on the arm. For the arm to be deflected B must have given electrical sanction by pegging his instrument to "line clear," which, as described, sets up a current so that the armature in the electric slot on the post is attracted to the magnet, which makes a rigid connection, so that A, on operating his mechanical lever in the signal-box, can then deflect the arm to the "safety" attitude.

If desirable, an arm or other form of indicator might be attached to the armature of the relay 10, so that the movement of the armature would deflect a small semaphore-arm or a needle, as the case may be, indicating when a train has passed clear of B's section, that is to say, depressed treadle 6.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

In a system of signaling on railways, the combination, with the single-needle instruments 1 and 2 operatively connected together;

of a treadle 6, an electromagnet 10 provided with an armature, a battery 12, a treadle 3, and a wire 7 connecting the said treadles and electromagnet with the battery 12; a polarized relay 11 included in the block-circuit 9 of the instrument 1, a local circuit 7^a holding the armature in contact with the electromagnet 10 after the same has been energized, the contacts 33 and a signal catch-handle for connecting them, a battery 13, a wire 34, connected with the starting-signal and to the contacts 33 and battery 13; a tongue 19 connected with the relay 11, and a contact 20 connected to the wire 34, the said starting-signal not being free to be operated until after the treadle 6 has been depressed, energizing magnets 10, and the tongue 19 has been placed in contact with the contact 20, by means of the "line-clear" current from instrument 2, substantially as set forth.

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JOHN PATRICK O'DONNELL.

Witnesses:

CHAS. ROCHE,
HARRY PETER VENN.