

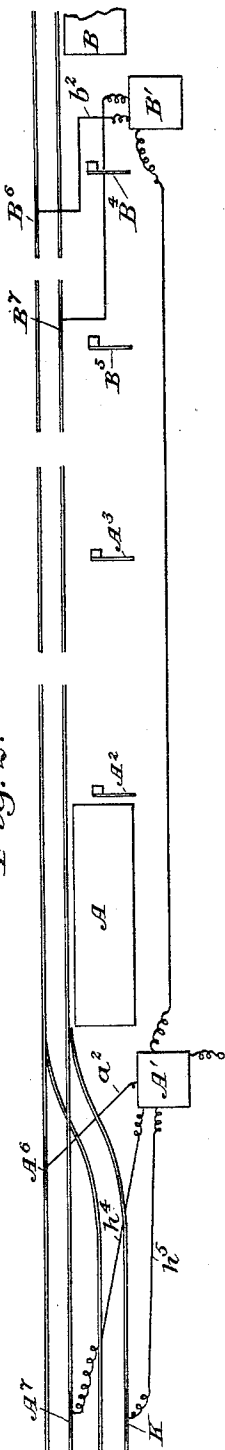
D. C. COOMBES & W. ROWE.

TELEGRAPH BLOCK SYSTEM OF RAILWAY TRAFFIC CONTROL.

No. 460,771.

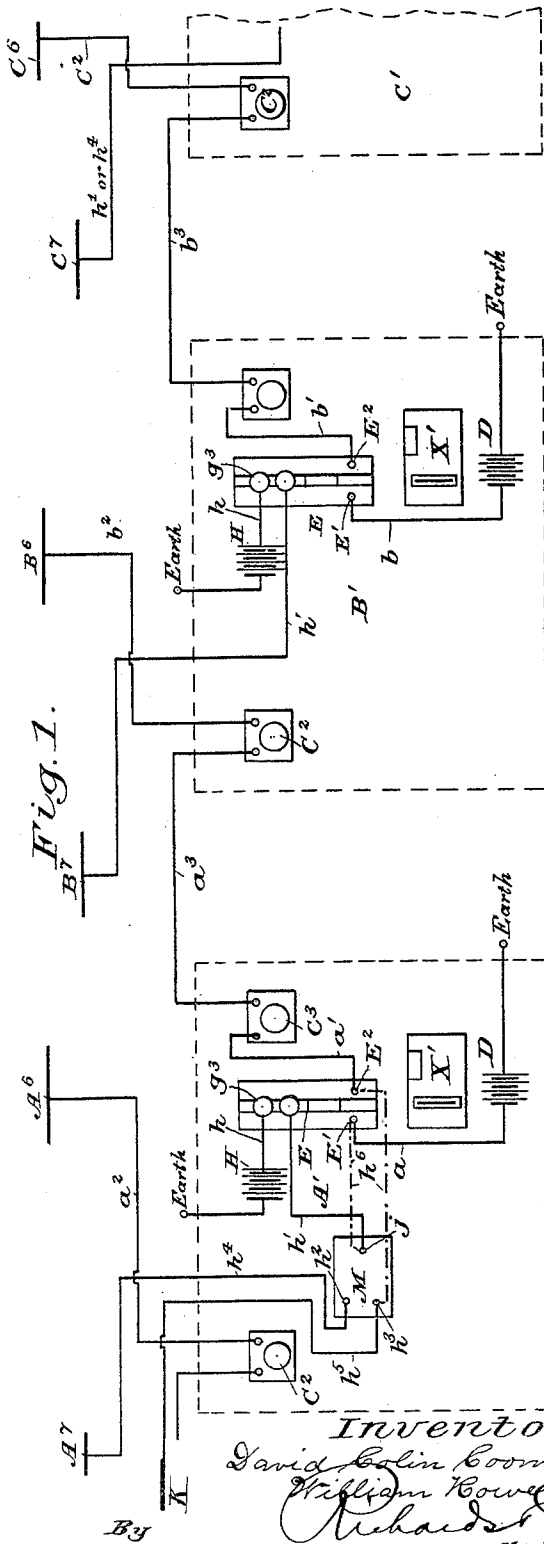
Patented Oct. 6, 1891.

Fig. 2.



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Fig. 1.



By

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

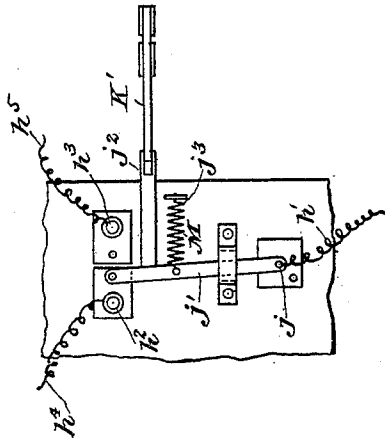


Fig. 6.

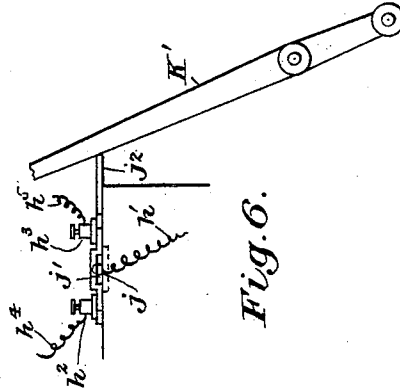


Fig. 3.

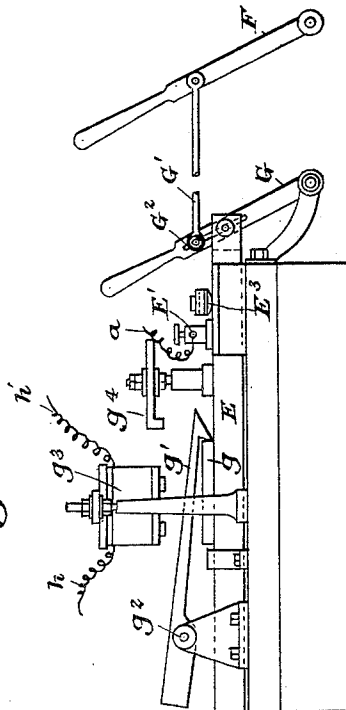
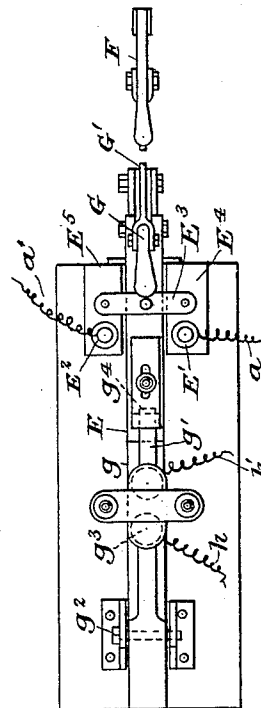


Fig. 4.



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TELEGRAPH BLOCK SYSTEM OF RAILWAY-TRAFFIC CONTROL.

SPECIFICATION forming part of Letters Patent No. 460,771, dated October 6, 1891.

Application filed June 19, 1891. Serial No. 396,809. (No model.)

To all whom it may concern:

Be it known that we, DAVID COLIN COOMBES, railway signal-man, a subject of the Queen of Great Britain, residing at Lewisham, near Sydney, in the British Colony of New South Wales, and WILLIAM ROWE, railway-interlocking-gear mechanic, also a subject of the Queen of Great Britain, residing at Marrickville, near Sydney, in the said Colony, have invented new and useful Improvements in Telegraph Block Systems of Railway-Traffic Control, of which the following is a specification.

This invention relates to the control of railway traffic by means of telegraph block systems, or those systems of control in which the railway-line being divided into sections the entry of a train or engine into a section is "blocked" by means of signals until a telegraphic message is received by the signal-man from the other end of such section intimating that the previously-entered train or engine has passed out of such section and that the line is clear.

This invention has been devised with the special objects, first, to provide an automatic alarm in the signal-boxes at either end of the block-section should a train or engine in error advance "against the block" and to provide an additional or error signal, which may be manipulated by either signal-man at the ends of the section to warn the driver of such a train or engine of the fault or error; secondly, to provide means by which the telegraph-signal transmitter or "block-instrument" is locked in position, so that after the train having been taken onto the section and the signal-man having given his telegraphic message to such effect said signal-man cannot give the telegraphic message "line clear" until the said train leaves his said section; thirdly, to provide means whereby upon movement of a points-lever so that the train will be shunted into a siding the lock of the block-instrument may be released by the advance of the train a predetermined distance into such siding, and, fourthly, where it is necessary for a train to cross over to the other line of rails to enable a following or through train to pass it, to provide means in such sections whereby alarms will be given in the signal-boxes should a

train enter said section before the waiting train has returned to its own line and resumed its journey, and this notwithstanding the following or through train has in passing out of the section released the electro-mechanical lock hereinbefore mentioned and made it possible to transmit the telegraphic signal "line clear" in error. By this invention railway-traffic may be controlled almost automatically and the liability to err on the part of signal-men, points-men, and drivers is reduced to a minimum.

These improvements in telegraph block systems of railway-traffic control consist, first, in a novel method of combining and operating known mechanisms so that the entry of a train into a blocked section will cause an alarm to be sounded in the signal-boxes at both ends of such section, and so that an error-signal may be caused to be exhibited by either signal-man.

They consist, secondly, in the combination and arrangement, with the telegraph-signal transmitter or block-instrument, of electro-mechanical devices in communication with an insulated rail at the forward end of the section, such device being adapted to lock the block-instrument lever handle knob or "switch" in a normal position, denoting "line blocked," and to release the lock upon the passage of a train over the said forward insulated rail.

They consist, thirdly, in the combination and arrangement, with an electro-mechanical device (such as that just before described) in connection with the switch of the block-instrument, an insulated rail at the forward end of the section, an insulated rail in a siding, and a points-lever, of an electrical switch adapted to cut out from the circuit the main-line insulated rail and to join up in such circuit the siding insulated rail, and vice versa.

They further consist in the particular combinations and arrangements of electrical and mechanical parts hereinafter described and claimed.

But in order that this invention may be clearly understood reference will now be made to the drawings herewith, in which—

Figure 1 is a diagram of part of a railway-line worked on the telegraph block system

according to these improvements. Fig. 2 is a diagrammatic plan of the same; but in order to save confusion these figures show the details only of the "down" line of rails, the "up" line section of single-line section having parts arranged identically the same. Figs. 3 and 4 are elevation and plan, respectively, of the electro-mechanical lock (combined with a switch or contact maker and breaker) for the operating device or switch of the block-instrument. Figs. 5 and 6 are plan and elevation, respectively, of an electric switch attached to or connected with a points-lever.

According to this invention each "section" of a railway controlled by a telegraph block system has between stations or platforms A and B, or between signal-boxes A' and B', (and, as in Fig. 1, between signal boxes B' and C',) the usual home-signal, A², distant-signal A³, start-signal B⁴ (and, if necessary, an advance start-signal, as B⁵) on their respective semaphores, as well understood. It also has a joint-control additional signal, hereinafter called an "error-signal," either upon an independent semaphore in a convenient position or, say, in the form of an additional arm of arbitrary color or configuration half-mast high upon the distant semaphore A³. The section on the rails terminates in insulated rails A⁶ and B⁶, connected up by insulated electric wires to apparatus in the respective signal-boxes A' and B'. Each signal-box has the usual signal-levers and the usual telegraph block-instruments for each section controlled therefrom, consisting of the interlocking signal-levers and an electric bell, a transmitter or switch, a miniature semaphore X', a battery, and line-wire connections, all as well understood, and in addition each box has for each section controlled therefrom an electrically-controlled alarm or error bell C² or C³, a battery D, and an electrical cut-out or contact maker and breaker or switch E, attached to or operated by the switch or operating device of the transmitter or block instrument—say, as shown in the drawings, a lever F. One pole of the battery D is connected to earth, while the other is joined up by wire a to binding-post E' of the switch E, whose other post E² is connected by wire a' to the electric-controlled alarm or error bell C³. Insulated rail A⁶ is connected by wire a² to bell C² in box A', while wire a³ connects bell C³ in box A' to bell C² in box B', and insulated rail B⁶ is connected by wire b² to bell C² in box B'. The sliding piece E³ is adapted to electrically connect binding-posts E' and E² by taking onto insulated bases E⁴ and E⁵ of posts or terminals E' and E². This piece, as shown in Figs. 3 and 4, is carried by sliding bar E (forming part of the electro-mechanical device for locking the switch or block instrument, although it might be a separate and distinct movable connecting-piece.) The bar E is connected to lever G, which has links G', (adjustably fastened in slot G²), connect-

ing to the operating device of a telegraph-transmitter—say to the lever F of a block-instrument such as those usually employed.

The electro-mechanical locking device consists of the sliding bar E with connections to the switch-lever F, such as those before described, carrying a stop-piece g under a catch g', hinged at g², said catch g' forming the armature of an electro-magnet g³ in electrical connection with a battery H and with, preferably, additional insulated rails A' and B' just within the sections. The bar E also carries a permanent magnet g⁴, adapted to be unable to lift the armature g', above which it is set, but on the cessation of an electrical current through the electro-magnet g³ to hold the armature g' (which such electro-magnet g³ has lifted) free of the stop-piece g until the sliding bar E has been moved to give a telegraphic signal, and so has drawn the magnet g⁴ away from above the armature g'. The wire h is led from one pole of the battery H to one end of the coil of electro-magnet g³, and from the other end of said coil the wire h' is led to insulated rail B' or to pivot-pin j of switch M. The switch has hinged bar j' with arm j², against which the points-lever K' is always pressing when in its normal position, and thus keeps said bar j' against contact-piece on binding-post h². When said points-lever K' is moved, the spring j³ pulls said bar j' over insulated piece and holds it against contact-piece on binding-post h³, and thus alters the electric circuit from h' to h² to h' to h³. From post h² a wire h⁴ connects to rail A', and from post h³ a wire h⁵ connects to insulated rail K, in the siding of which the lever K' controls the points where the section contains a "cross-over" and has no siding. As an absolute check against error an additional switch—such as that before described and marked h², h³, j, j', j², and j³—is placed behind the cross-over points-lever, and further connection (marked by dotted lines h⁶) made by wire from one post h² or h³ to one post E' or E² of the switch E, which post is already connected to the electric alarm-bell C³.

In operation, with the trains traveling down, or from B to A, when signal-man in box B' receives the message "line clear" on his miniature semaphore X' he allows the next train to pass his start-signal B⁴ or his advance start-signal B⁵, and thereupon transmits "train on" by means of the lever F of his "switch-instrument" to miniature semaphore X' in box A', and in doing so moves lever G and sliding bar E, so that connecting-piece E³ takes upon the bases E⁴ and E⁵ of terminals E' and E². Signal-man A' makes a like-connection by the same means in giving the answering message "train on." Now should a train, advancing in error, pass onto insulated rail B⁶ an earth connection is at once made through the first vehicle and the non-insulated rails to earth, and an electric circuit from the earth connection of battery

D, through that battery by wire a , terminal E' , base E^4 , connecting-piece E^3 , base E^5 , bell C^3 , bell C^2 , wire b^2 , and rail B^6 to earth, causing both error-bells C^3 and C^2 , in respective boxes A' and B' to ring, and thus warn the signal-men of the error or fault from whatever cause arising. On hearing the sound of the error-bell either signal-man may throw up the joint-control error-signal, (which is of known construction,) and the train is stopped in time to prevent accident. Should either signal-man neglect to transmit his message "line clear" in giving or taking a train "on," the connecting of the piece E^3 with bases E^4 and E^5 in but one of the signal-boxes will allow of the completion of the electric circuit when a train passes onto rail B^6 , and will cause the ringing of the error-bells C^2 and C^3 in both boxes A' and B' . The electro-mechanical lock gives a further security against error, for signal-man in box B' , having given the train "on," and signal-man in A' having taken it on, it is impossible for the latter to give a further message until in passing out of the section the train joins up insulated rail A^7 with earth. In taking the train on the transmission of the message to miniature semaphore X' on box B' necessitates the placing of the switch-lever F and the attached device in the position shown in Figs. 3 and 4, and armature-catch g' taking over stop-piece g prevents a further movement of lever F until the electro-magnet g^3 lifts the armature-catch g' . On the train leaving the section it must pass over rail A^7 , and in doing so the circuit is completed from earth to battery H , through that battery-wire h , electro-magnet g^3 , wire h' , insulated rail A^7 , the vehicle, to the other rails, to earth. This current exciting the electro-magnet g^3 , it lifts the armature-catch g' onto the field of the permanent magnet g^4 , which attracts and holds said armature to itself after the circuit is broken, when the train leaves rail A^7 . The lever F can now be moved to transmit the message "line clear" to box B' , and in being so moved it slides bar E and draws permanent magnet g^4 away from armature-catch g' , thus causing said catch g' to fall above the stop-piece g , ready to again take over said stop g , when the lever F is again restored in the transmission of "train on" to the position shown in Figs. 3 and 4. Where a siding is in use, the signal-man would be prevented from giving "line clear" when required to take a train following the one which traveled into the siding unless provision were made for the completion of an electric circuit through electro-magnet g^3 , so as to release his stop-piece g . This is effected by placing an insulated rail at a predetermined distance within the siding and attaching to the points-lever of such siding a switch such as that shown in Figs. 5 and 6. When the points-lever is in its normal position, (pressing against bar j^3 and keeping bar j' on base of terminal h^2), with the points closed, so that

the train will travel right through, the electric circuit (when earth connection is made through rail A^7) will be from earth to battery H , electro-magnet g^3 , wire h' , bar j' , terminal h^2 , wire h^4 , rail A^7 to earth, and when the points-lever is pulled over to open the points, so that the train will enter the siding, the spring j^3 causes bar j' to leave base of terminal h^2 and take upon base of terminal h^3 , so that the electric circuit will be, (when the train reaches the rail K , which is placed at such a distance within the siding as may be required to allow of a train standing on such siding clear of the through line,) as before, from earth to battery H , electro-magnet g^3 , wire h' , and bar j' ; but thence to terminal h^3 , and by wire h^5 , rail K , and through the train to earth. The current passing through the electro-magnet g^3 , as before described, releases the stop-piece g until a further message is transmitted by lever F .

Where a "cross-over" is used, the cross-over points-lever has in connection with it a similar switch to that just described, and illustrated in Figs. 5 and 6, and in the opposite line of rails, similarly to that in the siding, an insulated rail is placed having similar connections to the electro-magnet g^3 , so that when a train crosses over onto the other line it advances as far as the insulated rail, and thus joins up circuit and releases the stop-piece g , so that "line clear" may be transmitted to allow of the taking on on his section by the signal-man of a following train.

It is possible, but hardly likely, that after the release of the stop-piece by the earth connection through the following through train the signal-man A' might give "line clear" before the waiting train has recrossed to its own line to signal-man B' ; but in this case, connection being made through similar connections to those shown by dotted lines h^6 , but through a distinct switch M in connection with the cross-over points-lever, the error-bells would ring on another train reaching rails B^6 .

Of course in the opposite line upon which the train must wait provision is made by means of the insulated rails and alarms, &c., as before described, for the sounding of the alarms should an oppositely-traveling train seek to enter the section upon which the train is waiting.

Having now particularly described and explained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In telegraph systems of railway control the combination, with the operating device of the telegraph-transmitter or block-instrument, with insulated rails at either end of a block-section, and with an additional or error signal, of make-and-break connections, electric alarms, electric batteries or generators in the signal-boxes, and line-wire connections between the parts, all arranged and adapted to complete an electric circuit and give alarms

on the entry of a train into a blocked section, substantially as herein described and explained.

2. In a railway-section for the purposes set forth, the combination and arrangement, with the signals, the telegraphic block-instruments and connections, and with an additional or error signal, of insulated rails, such as A⁶ and B⁶, electric bells, such as C³ and C², batteries, such as D, connections, such as a E' E² a' a³ b², and a connecting-piece adapted to connect the terminal, such as E' and E², on movement of the operating device of the transmitter or switch of the block-instrument, substantially as herein described and explained, and as illustrated in the drawings.

3. In a railway-section for the purposes set forth, the combination and arrangement, with the telegraph-block-instrument-operating device—say such as lever F—and with an insulated rail, such as A⁷, of a sliding bar, such as E, carrying stop-piece, such as g, and permanent magnet, such as g⁴, an electro-magnet, such as g³, a hinged armature-catch, such as g', a battery, such as H, and connections, such as h' and h⁴, substantially as herein described and explained, and as illustrated in the drawings.

4. In telegraph block systems of railway-traffic control, the combination, with the block-instrument having an electro-mechanical lock and with points-levers, of an insulated rail at the forward end of a section, an insulated rail in a siding or opposite line of rails, and electric switches adapted to cut out connection with the former and make connection with one of the latter, substantially as set forth.

5. In a railway-section for the purposes set forth, the combination and arrangement, with a line-wire, such as h', making connection between an electro-mechanical lock and a forward insulated rail in the main line, with an additional insulated rail in a siding or a cross-over, and with a points-lever, such as K, of the electric switch, marked j j' j² j³ h² h³ h⁴, and the wire h⁵, substantially as herein described and explained, and as illustrated in the drawings.

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