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PROVISIONAL SPECIFICATION.

Improvements in Apparatus for Ensuring Safety on Single Lines of Railway.

I, EDWARD TYER, of Ashwin Street, Dalston, in the County of London, Engineer, do hereby declare the nature of this invention to be as follows:—

In my previous Specifications No. 1262 of 1878, No. 42 of 1888, No. 5928 of 1890, No. 1904 of 1891, No. 18603 of 1891, No. 2798 of 1892 and No. 12144 of 1893, I have described apparatus for ensuring safety of traffic on single lines of railway by electrically controlling the issue from a station of a tablet or staff to be carried by a train to a station beyond, thus providing against the admission of trains travelling in opposite directions into any section of the line.

My present invention has for its object to simplify the construction and operation of apparatus of this kind.

For this purpose, I provide at each of the two stations terminating a section, an apparatus for the reception and issue of tablets, operated in the following manner.

Denoting the two stations as A and B, assuming that the section is clear and that the electrical connections are such that A and B can communicate by the line wire—when A requires to issue a tablet to a train he proceeds as follows:

A first signals by bell to B by depressing a ringing plunger a pre-arranged number of times; B replies to this signal, and, by holding down his own ringing plunger causes a current to pass along the line wire to A, and through the coils of a polarized electro-magnet. The armature of this magnet, being thus moved, puts a local battery at A in circuit with a second electro-magnet at A. The armature of the latter electro-magnet being attracted raises a pawl which is engaged in a slot of a slide guided to travel under a receptacle containing a number of tablets and having a recess in which the lowest of these tablets is held. This slide being unlocked by the raising of the pawl, A can draw it out with the tablet in its recess, and can give the tablet to the departing train.

The slide, when thus drawn out turns a revolving commutator partly round and this reverses the polar connections of the instrument at A with the ringing plunger and also with the contacts of the relay and renders the operator at A incapable of transmitting to B any currents that would permit the withdrawal of a second tablet at B, and also preventing transmission of currents from B to A. When the operator at A inserts a tablet into his apparatus, the tablet as it passes to the receptacle again actuates the commutator and this by again reversing the polar connections places A again in communication with B. Thus the withdrawal or the insertion of a tablet, causes the commutator to reverse alternately the polar connections to the ringing plunger and polarized relay.

When the apparatus at A and B are at first in communication with each other, both have their ringing plungers in connection with, say the + terminal of the battery. When either A or B withdraws a tablet from his receptacle the distant apparatus remains in connection with the + terminal, but the apparatus from which the tablet is withdrawn is then automatically connected to the - terminal, the polarized relay being then brought into such a position as to prevent a second tablet from being withdrawn. When a tablet is then inserted at the distant end of the section, both apparatus are again put in communication, the

Tyer's Improvements in Apparatus for Ensuring Safety on Single Lines of Railway.

polar connections of the ringing plungers being now to the — terminal. Also when a tablet is inserted into the instrument from which it had been taken, the communication of A and B is again re-established as at first, their ringing plungers and polarized relays being again both connected to the + terminal.

Although I have described apparatus adapted for use with a tablet, it may readily be modified so as to suit it for use with a staff, the operation being the same as is above set forth.

Dated this 16th day of November 1895.

ABEL & IMRAY,
Agents for the Applicant. 10

COMPLETE SPECIFICATION.

Improvements in Apparatus for Ensuring Safety on Single Lines of Railway.

I EDWARD TYER of Ashwin Street Dalston in the County of London Engineer do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement :— 15

In my previous Specifications No. 1262 of 1878, No. 42 of 1888, No. 5928 of 1890, No. 1904 of 1891, No. 18603 of 1891, No. 2798 of 1892 and No. 12144 of 1893, I have described apparatus for ensuring safety of traffic on single lines of railway by electrically controlling the issue from a station of a tablet or staff to be carried by a train to a station beyond thus providing against the admission of trains travelling in opposite directions into any section of the line. 20

My present invention has for its object to simplify the construction and operation of apparatus of this kind. 25

For this purpose I provide at each of the two stations terminating a section, an apparatus for the reception and issue of tablets operated in the following manner.

Denoting the two stations as A and B, assuming that the section is clear and that the electrical connections are such that A and B can communicate by the line wire, when A requires to issue a tablet to a train he proceeds as follows :— 30

A first signals by bell to B by depressing a ringing plunger a prearranged number of times ; B replies to this signal, and, by holding down his own ringing plunger causes a current to pass along the line wire to A, and through the coils of a polarized electro-magnet. The armature of this magnet, being thus moved puts a local battery at A in circuit with a second electro-magnet at A. The armature of the latter electro-magnet being attracted raises a pawl which is engaged in the slot of a slide guided to travel under a receptacle containing a number of tablets and having a recess in which the lowest of these tablets is held. This slide being unlocked by the raising of the pawl A can draw it out with the tablet in its recess and can give the tablet to the departing train. 35 40

The slide, when thus drawn out turns a revolving commutator partly round and this reverses the polar connections of the instrument at A with the ringer plunger and also with the contacts of the relay and renders the operator at A incapable of transmitting to B any currents that would permit the withdrawal of a second tablet at B, and also preventing transmission of currents from B to A. When the operator at A inserts a tablet into his apparatus, the tablet as it passes to the receptacle again actuates the commutator and this by again reversing the polar connections places A again in communication with B. Thus the withdrawal or the insertion of a tablet causes the commutator to reverse alternately the polar connections to the ringing plunger and polarized relay. When the apparatus at A and B are at first in communication with each other, both have their ringing 45 50

Tyer's Improvements in Apparatus for Ensuring Safety on Single Lines of Railway.

plungers in connection with, say the + terminal of the battery. When either A or B withdraws a tablet from his receptacle the distant apparatus remains in connection with the + terminal but the apparatus from which the tablet is withdrawn is then automatically connected to the - terminal, the polarized relay being then brought into such a position as to prevent a second tablet from being withdrawn. When a tablet is then inserted at the distant end of the section, both apparatus are again put in communication, the polar connections of the ringing plungers being now to the - terminal. Also when a tablet is inserted into the instrument from which it had been taken the communication of A and B is again reestablished as at first, their ringing plungers and polarized relays being again both connected to the + terminal.

Although I have described apparatus adapted for use with a tablet, it may readily be modified so as to suit it for use with a staff, the operation being the same as above set forth.

For operating as above described with tablets, the apparatus at each of the stations is constructed as I shall now explain referring to the accompanying drawings.

Figure 1 is a longitudinal section, Figure 2 is a side elevation partly in section, Figure 3 is a transverse section on X X Figure 1, Figure 4 is a plan on Y Y Figure 1.

A is the casing on the apparatus having on the top a pair of signalling plungers *a* and a semicylindrical casing B containing a pivotted semicylinder *b* which can be turned partly round by an external handle *b*¹. When *b* is in the position shewn in Figure 1, a tablet can be introduced into its slot as far as permitted by a stop *b*² and then it can be turned partly round bringing its slot in line with the inclined way *b*³ down which the tablet slides to the receptacle C in which a number of the tablets can be accommodated. The tablet in sliding down the incline *b*³ moves aside a counterweighted lever D, carrying a pawl *d* which on the return stroke of D, effected by the counterweight, turns a ratchet wheel *d*¹ one tooth round thereby turning partly round a commutating wheel *d*² against which bears the finger *d*³ of a loaded bell crank lever. This lever carries insulated springs *d*⁴ which when the parts are in the position shewn in Figure 1 bear against upper contacts *d*⁵ and when they are as shewn in Figure 2 bear against lower contacts *d*⁶.

Under the receptacle C is arranged the horizontally sliding plate E, having a recess *e* of such depth as to receive one tablet T and no more. The slide E when pushed in as in Figure 1 is held by a hook pawl *e*¹ attached to the armature of an electro-magnet *e*², so that the slide E cannot be drawn out. But when a current of electricity excites the magnet *e*², as determined by the action of the signaller at the other station, its armature is attracted raising the hook *e*¹ and leaving the slide E free to be drawn out along with a tablet in its recess *e*. The operator can take out the tablet and hang it on a pin *t* ready to be delivered to a train going from the station. On the slide E is fixed a bracket F having two laterally projecting pins *f* *f*¹ between which is situated an arm of a lever G carrying a pawl *g* which acts on a ratchet wheel *g*¹ on the same axis with the ratchet wheel *d*¹ and with the commutating wheel *d*². When the slide E is pulled out to withdraw a tablet the pin *f* moves the lever G so that its pawl turns the commutating wheel partly round altering the contacts at *d*⁵ and *d*⁶. When the slide E is pushed in to be again held by the hook *e*¹ the pin *f*¹ pushes back the lever G causing its pawl to take a position ready to act on another tooth of the ratchet wheel *d*¹. Thus when a tablet is put in at B and slides down to C the commutating wheel *d*², as already explained is turned so as to alter the contacts *d*⁵ and *d*⁶ and also when the slide E is drawn out to take out a tablet, the commutating wheel is turned so as to alter these contacts. Thus the introduction of a tablet or the removal of a tablet alters through the contacts *d*⁵ and *d*⁶ the current communicating with the next station from + to - and then from - to + and so on alternately. Under the slide E is pivotted a counter-weighted lever H the front end *h* of which, if the

Tyer's Improvements in Apparatus for Ensuring Safety on Single Lines of Railway.

slide were partly pushed in with a tablet in its recess *e*, would catch the edge of the tablet and so prevent the slide from being pushed farther in. Thus the slide cannot be pushed home with a tablet in its recess. When the slide *E* without a tablet is pushed home, it makes contact by a bridge piece with two spring pins at *K* thus establishing electrical communication by the line; but when the slide is drawn 5 out or pushed only partially in, there is no contact at *K* and consequently there can be no communication by the line wire. A tappet *L* projecting down from the slide *E* meets at each end of the stroke stops *ll* which determine the stroke of the slide and are preferably faced with wood or other deadening material.

Having now particularly described and ascertained the nature of my said invention 10 and in what manner the same is to be performed I declare that what I claim is:—

Apparatus for ensuring safety on single lines of railway constructed and operating substantially as described with reference to the accompanying drawings.

Dated this 1st day of August 1896.

ABEL & IMRAY,
Agents for the Applicant. 15

