

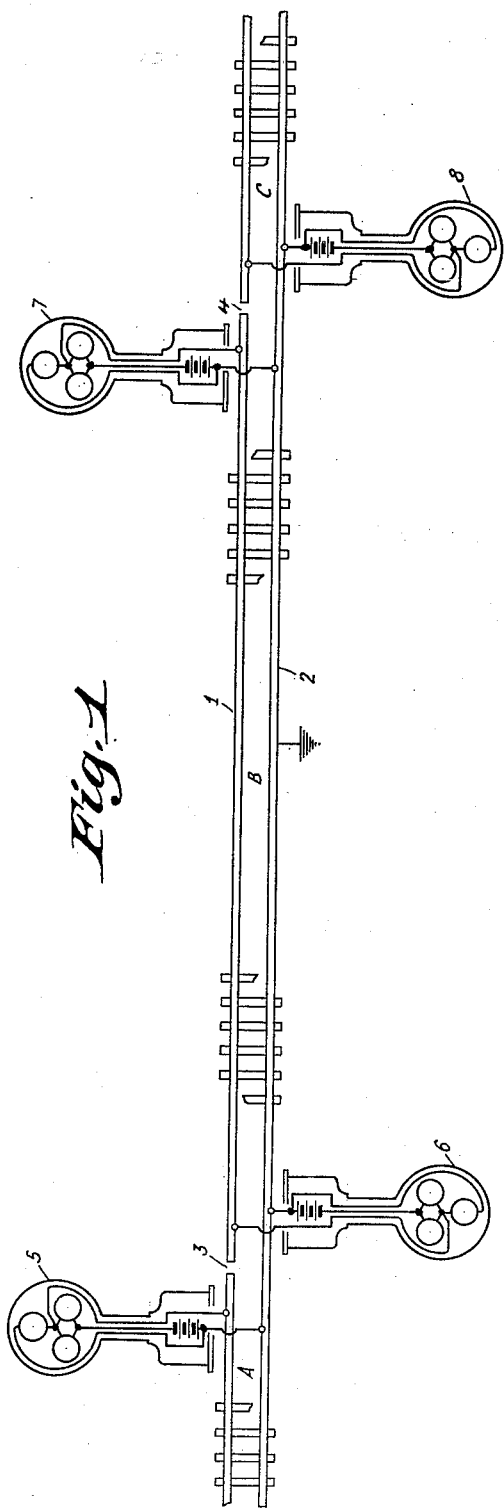
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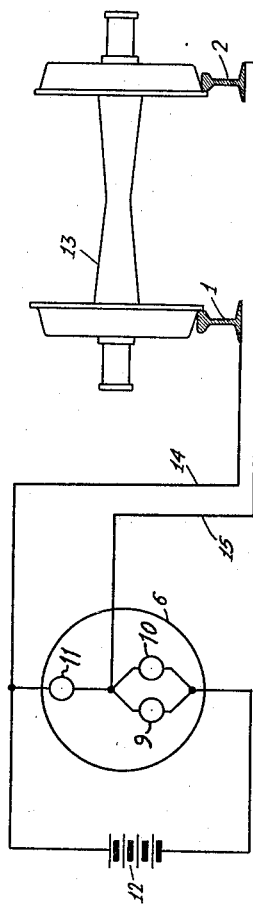
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RAILWAY ELECTRIC SIGNAL SYSTEM

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*Fig. 1*



*Fig. 2*

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## RAILWAY ELECTRIC SIGNAL SYSTEM

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The present invention relates to an electric railway signal system and more particularly to a system which is foolproof, easily incorporated in existing installations and which has comparatively low initial and maintenance cost.

An object of the invention is to provide a novel and efficient railway signal system having no moving parts.

Another object of the invention is to provide a railway signal system in which no interconnecting wires are required.

Another object of the invention is to provide a railway signal system in which signal target lamp failure in any signal target will not leave the corresponding block unprotected, but rather will give visible indication that lamp replacement is necessary.

Another object of the invention is to provide an electric railway signal system which may be used for one way or two way operation on the same track.

A further object of the invention is to provide an electric railway signal system which protects trains entering or leaving a block in either direction.

Still another object of the invention is to provide an electric railway signal system which protects any number of train sections having rights in the same block until all have left the block.

Another object of the invention is to provide an electric railway signal system which may be used to indicate at a central point the condition of a block.

Other objects and advantages of the invention will be apparent to those skilled in the art from reading the following detailed specification.

It is well known that the block signal systems as at present employed in railway work are very complicated and are subject to failure with the result that accidents in which human life is lost are a common occurrence.

The failure of signal systems as now employed is undoubtedly due to the great number of moving parts which are employed to make up the system. It can, therefore, be seen that while a railway signal system with few moving parts is greatly desired, a railway

signal system with no moving parts whatever is the great desideratum.

To this end this invention embodies a method of railway signalling which utilizes simply the phenomena of resistance and shunted electrical circuits for its accomplishment.

The invention is adapted for embodiment in electric, steam and internal combustion types of railway practice as well as in any other type which utilizes rails as the roadway.

The invention will be set forth in the following detailed description taken in connection with the accompanying drawings in which:

Figure 1 illustrates the invention as applied to a long length of track in which several blocks are shown; and,

Figure 2 illustrates diagrammatically a cross-section through the tracks at a signal point and the connections of the two rails to the signal proper.

Referring to Figure 1 of the drawings, 1 and 2 illustrate the two rails of a track. Rail 2 is constructed so as to be electrically continuous, whereas rail 1 is divided into blocks of convenient lengths electrically insulated from one another as is common in the railway signal art. In the drawings three blocks A, B and C are shown insulated from each other at the points 3 and 4. The system as illustrated in Figure 1 covers the case where a single track is used for two way traffic which for convenience will be called westbound and eastbound. In such an instance it is necessary to protect any given block against both eastbound and westbound trains. For this purpose at the west end of each block a signal target must be placed facing west so as to protect that block against eastbound trains and at the east end of each block a signal target must be placed facing east to protect that block against westbound trains.

Signal targets so placed are shown by 5, 6, 7 and 8 in Fig. 1.

For a detailed discussion of the signal target reference will now be had to Fig. 2, wherein 1 represents a cross-section of the

rail arranged in insulated blocks and 2 represents a cross-section of the electrically continuous rails.

The signal target 6 comprises three lamps 9, 10 and 11 of which 9 and 10 are preferably red and 11 is green. A source of current 12 is adapted to supply current for said lamps 9, 10 and 11. The two red lamps, namely 9 and 10, are arranged in parallel and the circuit comprising the two parallelly connected lamps 9 and 10 is in series with respect to the source 12 with lamp 11. It will thus be evident that current from source 12 must of necessity flow partly through 9 and partly through 10 whereas all of it flows through 11. An electrical conductor 14 connects one side of lamp 11 to rail 1, and a conductor 15 connects the other side of lamp 11 with rail 2. A portion of one truck of a car is diagrammatically illustrated and generally represented as 13.

The truck must be so constructed as to form an electrical conducting path between rails 1 and 2. In other words when a car enters a certain block lamp 11 must be short-circuited by conductor 15, rail 2, truck 13, rail 1 and conductor 14 with the result that not enough current flows through lamp 11 to light it.

The various resistances of the lamps and track must be so chosen that when lamp 11 is not short-circuited not enough current flows through either of lamps 9 and 10 to light them whereas the sum of the currents passing through 9 and 10 is sufficient to light up lamp 11.

However, when lamp 11 is short-circuited enough current will flow through both lamps 9 and 10 to light them both.

The device operates as follows:

A train in a given block short-circuits the one green lamp in each of the signals protecting this block thus extinguishing these green lamps but providing a direct path for the flow of current from the source 12 of each signal target to light up the two red lamps connected in parallel in each signal.

When the train leaves the block the short-circuit caused by the wheels and axles of the train across the rails no longer exists and the green lamp in each signal is again lighted by the current which flows through the double path afforded by the two red lamps in parallel. In this latter case, the filaments of the red lamps pass sufficient current to illuminate the single green lamp, although the filament of the red lamps do not heat up sufficiently to cause a visible glow. Thus when there is no train in the block each signal protecting that block indicates "clear" by showing one green light whereas when the block is occupied by a train each of the signals protecting that block indicates "danger" by means of two red lights.

Of course, the color combination may be

arranged as desired and the signals may be arranged to give the necessary indications by means of lamp positions rather than lamp colors or by both.

It will be noted that for one way operation of traffic only one signal is necessary which signal is placed at the entrance of each block and it faces against traffic direction.

An advantage of my device is that a visual indication as to whether the signal is operative is always had. Thus if a red lamp has burned out both red and green lights will be on when the block is unoccupied; if the green light burns out then no lights will be on unless a train is in the block in which case the red lights will be on and the block protected; if both red lamps are burned out then no lights will be on at any time; and lastly if all three are burned out no indication will be given. The failure of any single lamp in a signal does not leave the block unprotected, but does give indication of the necessity for lamp replacement.

It is to be clearly understood that I have shown individual sources of current for each signal solely for the purpose of simplifying the description and that a single source and/or any power supply network as for instance alternating or direct current generators may be employed without in any way affecting the invention.

The invention as herein described shows the least number of lamps advisable for simple and cheap construction. However, additional lamps may be connected in parallel to augment these lamps, thus, reducing the possibility of lamp failures effecting the indicating and adding to the factor of safety. In this case the ratio of 2 to 1 for red and green should be maintained. This invention may be embodied in other forms without departing in any wise from the spirit of this invention the scope of which is defined in the appended claims.

I claim:

1. In a railway signalling system, an insulated block section, means for indicating the condition of said block comprising a clear signal indicator, an occupied signal indicator and a current source all thereof forming a series circuit, means whereby only one of said indicators is affected perceptibly when said block section is unoccupied, and means for short-circuiting said last mentioned indicator for decreasing the resistance of said series circuit whereby the other indicator is rendered operative.

2. In a railway signalling system, an insulated block section, a clear signal indicator device and an occupied signal indicator device therefor, a source of current for said indicator devices, said indicator devices and said source being arranged all electrically in series, the resistances of said indicator devices being so chosen that only one of said

indicator devices is affected perceptibly when current from said source is flowing through both, and means when said block section is occupied for rendering said last mentioned indicator device inoperative and thereby reducing the resistance of said series circuit whereby the other indicator device becomes operative.

3. In a railway signalling system an insulated block section, a clear and occupied signal indicator device at each end thereof, a source of current for each of said devices, each of said indicator devices comprising a clear signal indicator and an occupied signal indicator both arranged electrically in series with the said source of current and with each other, the resistances of said indicator device being so chosen that only one thereof is affected perceptibly when current from said source is flowing through both, and means when said block section is occupied for short-circuiting the indicator affected when current is flowing through both whereby said indicator is rendered inoperative and the other indicator device is rendered operative.

4. In a device for indicating the condition of an insulated block section of a railway system, a circuit comprising an occupied signal indicator device, a clear signal indicator device and a source of current all electrically in series, the respective resistances of said indicator devices being so chosen that only said clear signal indicator device is affected sufficiently so as to be perceptible when current from said source is flowing through both, and means for short-circuiting said clear signal indicator device whereby the resistance of said circuit is reduced to such an extent that said occupied signal indicator device is rendered operative.

5. In an electrical railway signalling device a clear signal indicator and an occupied signal indicator said occupied signal indicator comprising a plurality of parallel paths, and a current source, said indicators and current source being arranged all electrically in series, the resistance of said clear signal indicator device being so chosen that if short-circuited the resistance of the series circuit is so reduced that the occupied signal indicator device is rendered operative.

6. In a railway signalling system an insulated block section, a clear signal indicator device and an occupied signal indicator device therefor, a source of current for said indicator device said source of current and indicator devices being arranged all electrically in series, said occupied signal indicator comprises a plurality of parallel paths for passing current from said source, and means when said block section is occupied for short-circuiting the clear signal indicator device, the resistance of the circuit comprising the source and the two indicator devices in series

being so chosen that not enough current passes through any of said above mentioned parallel branches to affect the occupied signal indicator but enough current passes through the clear signal indicator device for affecting it and when said clear signal indicator is short-circuited the resistance of said above mentioned circuit is so reduced that enough current passes through the occupied signal indicator for perceptibly affecting it.

7. In a device for indicating the condition of a block section in a railway system, a circuit comprising an occupied signal indicator device, a clear signal indicator device and a source of direct current all electrically in series, the respective resistance of said indicator devices being so chosen that only said clear signal indicator device is affected sufficiently to be perceptible when current from said source is flowing through both said indicator devices, and means including the rails of said railway system for short-circuiting said clear signal indicator device whereby the resistance of said circuit is reduced to such an extent that said occupied signal indicator device is rendered perceptibly operative.

8. In a railway track condition indicator system, a signal target means having an internal series circuit comprising a clear signal indicator, an occupied signal indicator and a source of current, and an external circuit including the rails of said track and a rail bridging means, said external circuit being adapted to short-circuit one of said signal indicators for rendering the other thereof operative.

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