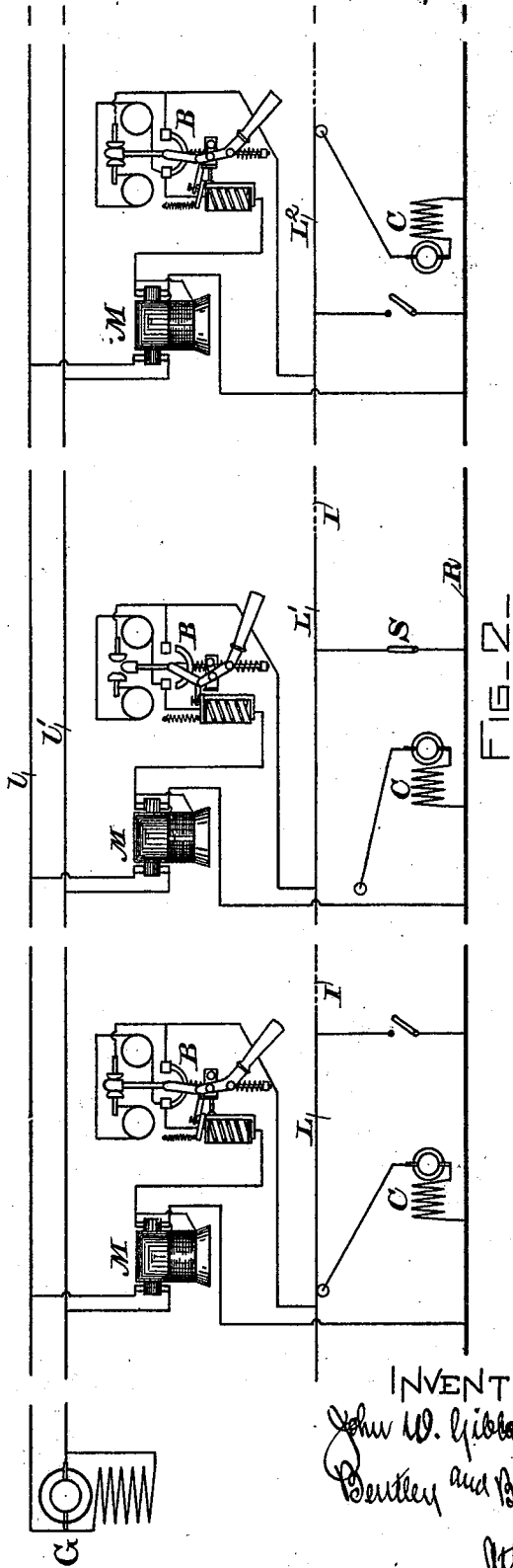
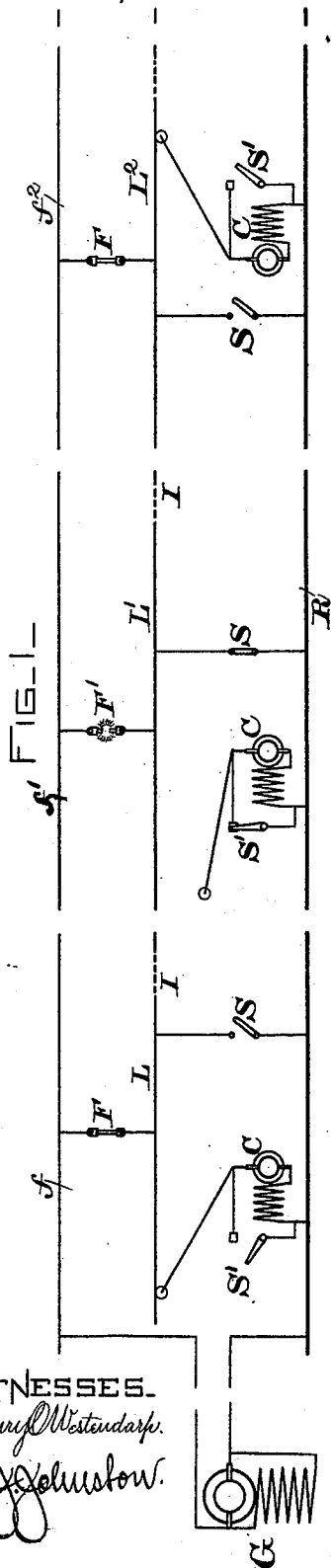


BLOCK SYSTEM FOR ELECTRIC RAILWAYS.

No. 516,806.

Patented Mar. 20, 1894.



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FIG. 3.

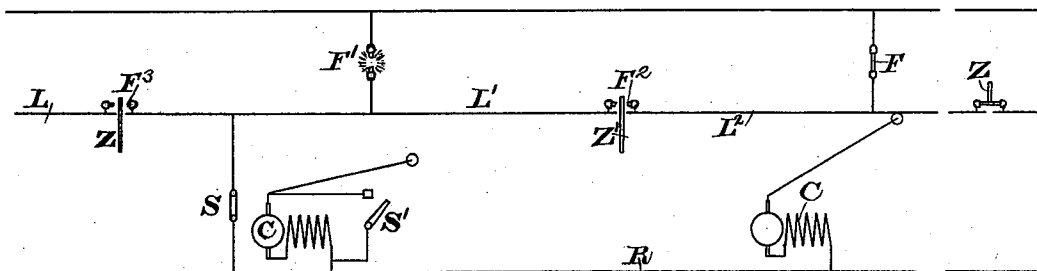


FIG. 7.

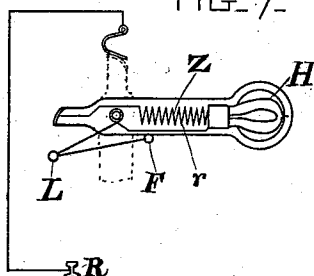


FIG. 4.

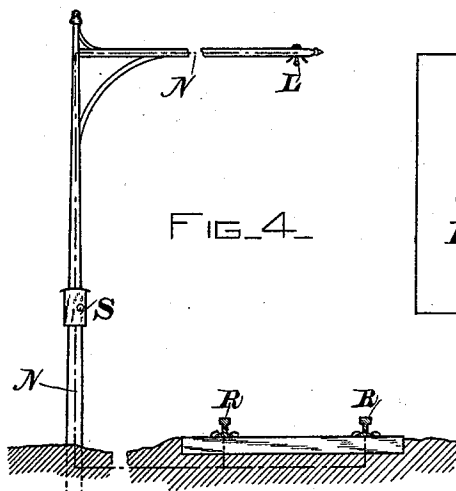


FIG. 6.

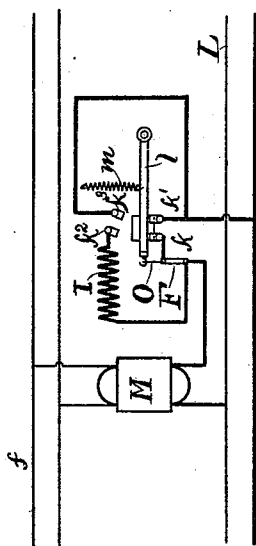
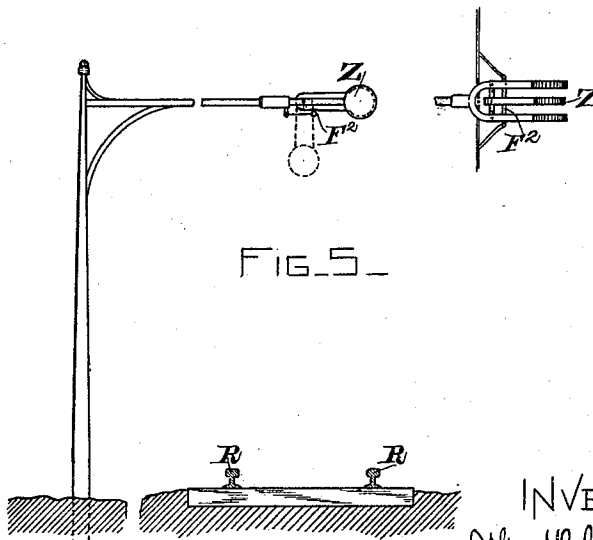


FIG. 5.



WITNESSES.

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BLOCK SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 516,806, dated March 20, 1894.

Application filed October 12, 1893. Serial No. 487,914. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. GIBBONEY, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Improvement in Block Systems for Electric Railways, of which the following is a specification.

My invention relates to block systems for electric railways, and has for its object to provide a means for cutting out sections of such railways upon which an accident has occurred, or a train has become disabled from any reason, whereby the current is interrupted and following trains cannot proceed upon it until the break caused by the cut-out has been repaired.

To attain the ends pointed out I preferably divide the railway into sections, each of which is supplied with current through a separate feeder, in a way commonly practiced. Between the feeder and each section I insert a fuse adapted to break the circuit upon an excessive flow of current; and I provide a suitable switch or other circuit-closing means, whereby the section may be short-circuited to the track or other ground return, thus blowing the fuse and cutting out the section. I may provide such a switch at suitable points along the track, disposed on the poles, or I may, and prefer to do so, provide a switch upon the car or locomotive, which shall give a short-circuit from the trolley to ground without passing through the motors.

In the accompanying drawings hereby referred to and made part of this specification, like letters refer to like parts throughout.

Figure 1 is a diagrammatic representation of my invention in its simplest form. Fig. 2 is a similar diagram showing a modification applicable either to continuous or alternating currents. Fig. 3 is a diagram illustrating another form which includes a signaling device. Fig. 4 shows the switch box upon the pole. Fig. 5 is a side elevation and plan of the signaling device. Fig. 6 is a modification showing a circuit changing switch operated by the burning out of a fuse, and Fig. 7 shows a construction where an electric lamp is employed in connection with a semaphore.

Referring to Fig. 1, G is a generator, L, L',

L² are the sections of the railway, f, f', f², are the feeders which supply current, connected directly to the generator. F, F' are fuses connecting the feeders with the trolley lines. C, C, C, are the motors. S, S are switches adapted to short-circuit the sections of the trolley line L, L', &c., to the track R. These switches are, as already pointed out, disposed at suitable points along the track. S', S', &c., are switches carried upon the cars and adapted to short-circuit the current from the trolley to ground without its passing through the motor C. At F' I show a fuse which has been blown by the closing of the switch S; it is supposed that the motor C has been disabled and the train brought to a stand. In this case the current upon the line L' will cease and no train can enter this section except by its own momentum, the power ceasing as soon as it passes the line-insulator I. In such case the train may still be run up to the disabled train to afford assistance by opening the switch S and inserting a new fuse in place of the one blown.

In Fig. 2, I show how circuit-breakers may be arranged to take the place of the fuses F, F', &c.; therein l, l' are high potential lines serving to feed the trolley line L, L', &c. M, M are motor-generators, transforming current to a proper potential, and B, B, are the circuit-breakers which may be of any suitable pattern. The operation of this arrangement will be manifest from the drawings. It is briefly, that upon the closing of the switch S the rush of current through the circuit-breaker B opens the circuit in a way well understood in the art. In place of the motor-generators, in an alternating current system of transmission, transformers may be employed, operating to reduce potential in the same way.

Figs. 3 and 5 show the details of the signaling arrangement which I may employ. Therein Z, Z' are semaphores held in position by fuses F², F³; these fuses serve to unite the sections L, L', L², of the trolley line and to hold the signaling apparatus at "safety" positions; upon closing the switch S the fuse F' blows, and thereupon the fuses F², F³ being also put under a strain, will blow and drop the semaphores Z, Z', thus giving

warning to an approaching train in either direction. It is manifest that in this case also the switch S' upon the vehicle may be employed in place of the switch S . The danger position of the semaphore is shown by dotted lines in Fig. 5.

Fig. 4 illustrates the arrangement of the box with its short-circuiting conductor N ; it is disposed upon one of the poles adjacent to the track and the ends of the conductor are carried to the terminals of the switch inclosed in the box.

In the operation of the semaphores it is desirable that a fuse be employed which is capable of withstanding some little mechanical strain; I have found the fuse described in the patent granted Elihu Thomson, No. 502,330, dated August 1, 1893, peculiarly adapted to the purposes of my invention.

It is not altogether essential, in practicing my invention, that the trolley line for a predetermined distance each side of the scene of the accident should be entirely disconnected from the supply circuit, as it is evident that the semaphores Z, Z' , of Fig. 3, may be operated by an electro magnet when there has been purposely established a short circuit between the trolley line and the track, such magnets being adjusted not to act for any heavy current flow for a short time to a train and, as shown in Fig. 6, the establishment of such short circuit may, by means of a magnet, fuse, or other device responsive to the excessive current, automatically weaken the current fed to the trolley line for a certain distance each side of the injured train, allowing other trains to approach at a low rate of speed, the semaphores above mentioned, or the diminished current itself, indicating the condition of things ahead. Thus, the motors connected between the conductors L, R would usually receive current from the potential reducing transformer M by way of the compound fuse FO and the contacts k, k' . When, however, the safety short circuit is established, as above described, the fuse FO melts and the switch lever l , under the influence of the spring m , or its equivalent, completes the circuit to the railway conductors through an alternative circuit including a counter-electro-motive-force device or resistance I , through the contacts k^2, k^3 , and any train on the track can now proceed only at a reduced speed. If desired, also, the semaphores may be arranged to be illuminated so as to be readily seen by night, as by lamps connected into circuit when the semaphore moves. This is shown in Fig. 7, where L is the trolley line, and F the fuse which holds the semaphore Z in its position of safety. When the fuse F melts the semaphore drops to the position indicated by dotted lines, and the lamp H is connected in circuit between the trolley line L , including a resistance r , and a contact plate connected with the track R , as indicated. The resistance r takes up any excess of voltage over that which is required to properly

illuminate the lamp, and it may, of course, be other lamps connected in series with the lamp H , or in case the system were operated by alternating currents, could be a self inductive coil.

I am aware that it has been proposed to insert fuses between feeder-wires and the trolley lines; but such fuses have been employed so far as I know only to protect the apparatus from accidental excess of current and have not been used intentionally to cut out the trolley from the feeder as a safety precaution, nor has any means been shown or employed to purposely short-circuit the feeder sections upon the track, as designed in my invention. I do not therefore claim broadly a fuse between the feeder wire and the trolley line, but

What I claim as new, and desire to protect by Letters Patent of the United States, is—

1. A safety cut-out for electric railways comprising a trolley line divided into sections, feeders conveying current to the sections, circuit-interrupting means between the feeders and the sections, and short-circuiting means between the sections and the ground return adapted to operate the current interrupting means.

2. In a safety cut-out for electric railways, a trolley line divided into sections, feeders conveying current to the sections, fuses between the feeders and the sections, and means adapted to short-circuit the sections upon the track or ground return, and thereby rupture the fuses.

3. A safety cut-out for electric railways comprising a trolley line divided into sections separated by fuses, signaling apparatus held at safety positions by the fuses and arranged to show danger when the fuses blow, feeders supplying current to the sections, fuses between the feeders and the sections, and short-circuiting means between the sections and the ground return.

4. A safety cut-out for electric railways, comprising trolley lines divided into sections, feeders supplying current to the sections, fuses between the feeders and the sections, and a switch adapted to short circuit the sections to the ground return and carried upon the car or locomotive.

5. A safety cut-out for electric railways comprising a trolley line divided into sections separated by fuses, signaling apparatus held in safety positions by such fuses, feeders supplying current to the sections, fuses between the feeders and sections and a switch arranged to short-circuit the trolley line to the track and carried upon the car or locomotive.

6. The combination with the supply conductors of an electric railway line, of current responsive devices included therein adjusted or selected so as to operate upon the flow of an abnormally heavy current in said circuit and not to operate by the current required to propel a train, and means for connecting said supply conductors and causing such heavy

current to flow, thus actuating the current responsive devices to interrupt the circuit or operate appropriate signals.

5 7. The combination in an electric railway system, of supply conductors extending along the track, danger signaling apparatus and circuit opening or current weakening mechanisms or devices located at intervals along the track adapted to operate upon the flow of ab-
10 normally heavy currents in said conductors,

and means for establishing a circuit of extremely low resistance between the said conductors whereby such heavy currents can flow.

In witness whereof I have hereunto set my hand this 10th day of October, 1893.

JOHN W. GIBBONEY.

Witnesses:

BENJAMIN B. HULL,

HENRY O. WESTENDARP.