

No. 737,094.

PATENTED AUG. 25, 1903.

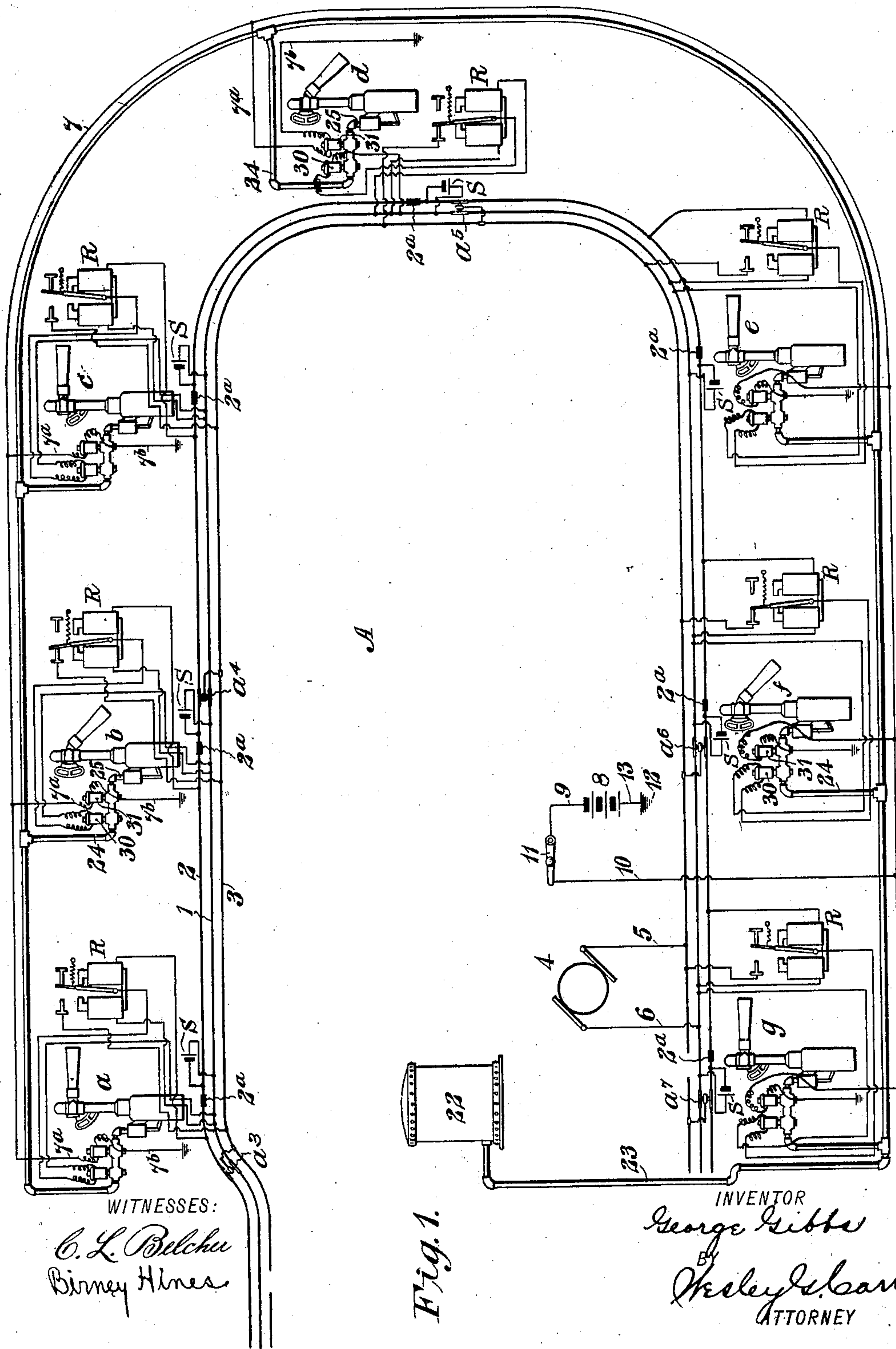
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CONTROLLING SYSTEM FOR RAILWAY SIGNALS.

APPLICATION FILED MAY 11, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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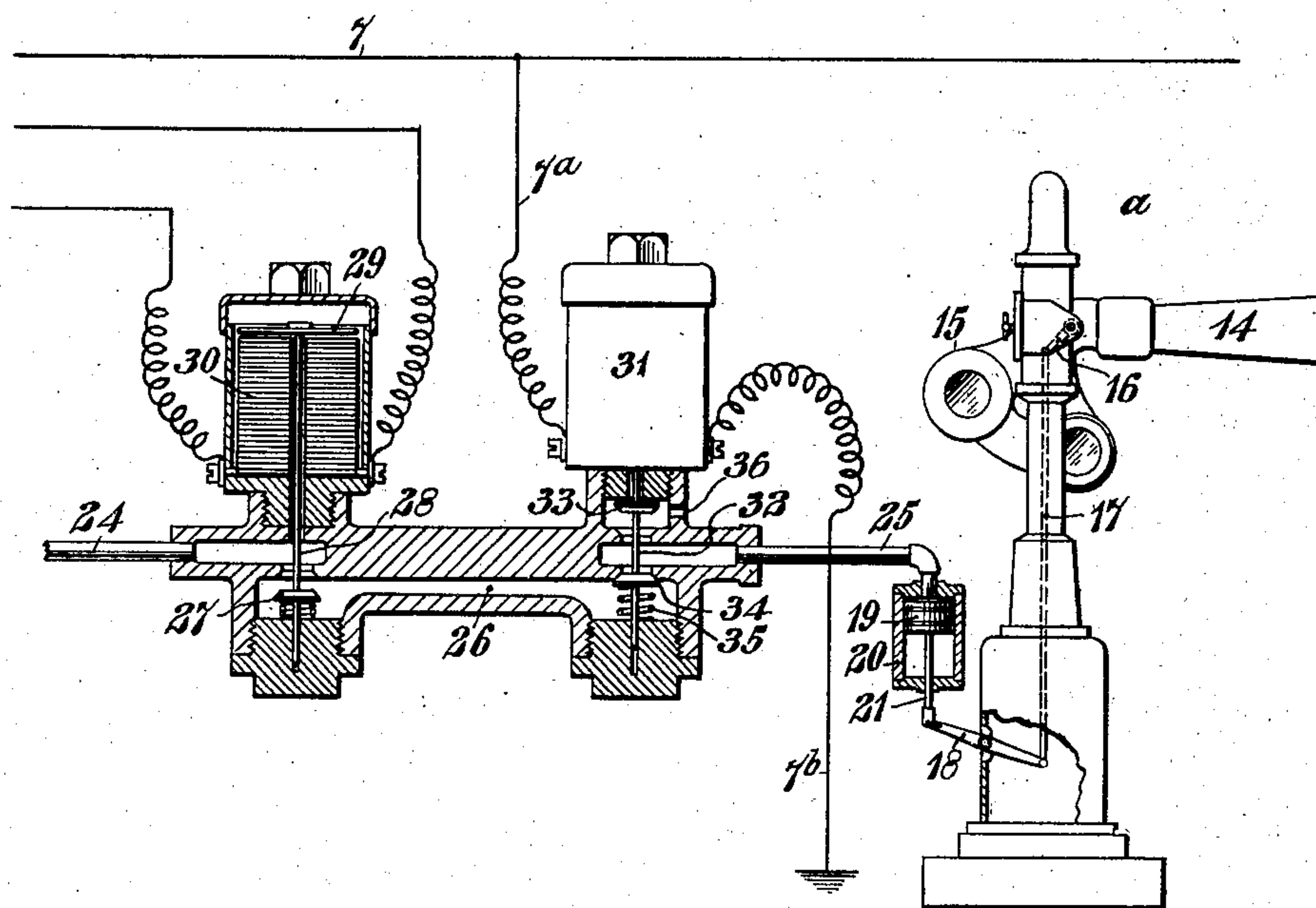
CONTROLLING SYSTEM FOR RAILWAY SIGNALS.

APPLICATION FILED MAY 11, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

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CONTROLLING SYSTEM FOR RAILWAY-SIGNALS.

SPECIFICATION forming part of Letters Patent No. 737,094, dated August 25, 1903.

Original application filed May 22, 1902, Serial No. 108,532. Divided and this application filed May 11, 1903. Serial No. 156,645. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GIBBS, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Controlling Systems for Railway-Signals, of which the following is a specification, this application being a division of my application Serial No. 108,532, filed May 22, 1902.

My invention relates to electric railways, and particularly to railways of this class which are provided with block-signal systems.

The object of my invention is to provide means whereby the number of vehicles or trains of vehicles which may be in motion upon a section of track or tracks of a railway may be regulated in emergency conditions by holding one or more block-signals in danger-indicating position, even though the corresponding block section or sections be clear of obstructions.

In the operation of railways such as have frequent train movements and trains passing each other, either in the same or in opposite directions, it is desirable in case of an accident to any car or train to immediately warn and stop approaching trains in either direction on adjoining tracks, so that they may be kept out of the zone of danger. Under the conditions stated it may happen that the accident will result in wreckage which will obstruct the adjoining track or tracks, or it may happen that the passengers may become panic-stricken and alight from the train to which the accident occurs and be thereby in danger by reason of trains which may approach upon another track or tracks. In cases where the block-signals on such railways are set very close together and between passenger-stations and where the headway of the trains is close there may be no time to warn approaching trains by sending out flagmen and no other means of communicating with such trains as may have passed the next adjacent passenger-stations.

In my present invention I propose to utilize an auxiliary switch-controlling circuit, suitable operating and controlling devices for such of the signals as may be connected to

such circuit, and one or more switches located at a suitable point or points whereby an attendant may by manual manipulation of such switch or switches hold the block signal or signals which may be adjacent to the point of accident at "danger" as long as may be desirable, and thus stop any trains which may be approaching from either direction.

My invention is obviously susceptible of use in connection with any one of various types of signaling apparatus, and its combination with any one of such systems may be made by means of any one of a variety of mechanisms. I desire it to be understood, therefore, that the systems and operating devices shown in the drawings and hereinafter described so far as details are concerned are merely illustrative of any suitable operative means for embodying the principle which underlies my invention.

As illustrated in the drawings, Figure 1 is a diagram of a plurality of consecutive block-sections supplied from a substation and auxiliary means for controlling all of the signals of said blocks. Fig. 2 is a view, partially in section and partially in elevation, of an electropneumatically-operated signal and part of the controlling means therefor.

I have here illustrated my invention as applied to an electric railway equipped with electropneumatically-operated signals of which the division A of the railway is represented by two track-rails 1 and 2 and a third rail 3, which is the positive conductor for conveying the power-current along the portion of the road that is supplied from one substation in the usual manner. The substation for supplying energy to the division A of the railway is represented by a generator 4, which may be either a main generator or a rotary converter or other suitable source of energy and is connected to the insulated third rail 3 and to the grounded track-rail 1 by conductors 5 and 6. As here indicated, for illustrative purposes and without any intention of imposing any limitations as regards the particular source of supply of electrical energy, the length of the portion of road supplied from each individual source, the number of block-sections comprised in such portion, or the means whereby the cur-

rent is collected by the vehicles and delivered to the motors, the division A of the road is divided into six blocks, at the entrance to each of which is a signal, these signals being marked, respectively, *b*, *c*, *d*, *e*, *f*, and *g*, a signal *a* for a block in advance of the division A being also shown. For the purpose of this description it may be assumed that these signals are operated or controlled either in whole or in part by any one of the systems known in the art and that the track-rail 2, which is divided into sections corresponding to the respective blocks by suitable insulators 2^a, is utilized as a sectional conductor for operating, controlling, or interlocking purposes, or for all three, according to the character of the signaling system which is employed. In the use of such systems, as is well understood, the movement of each train or independently-operated vehicle is controlled in accordance with the condition of the immediately preceding block-section and, if the signaling system is automatic in its operation, a signal cannot be moved to safety-indicating position unless the system is in perfect operating condition and the preceding section is free from obstruction. It follows, therefore, that each independently-operated train or vehicle is stopped at the entrance to each block-section on which is another train or independently-operated vehicle and is held at that point until the clearing of the signal indicates that the block-section ahead is free from all obstruction. As here indicated, each of the signals is provided with a controlling device, to be hereinafter described, which is supplementary to the controlling device of the main system and serves to prevent clearing such signal, even though the preceding block be clear, provided the conditions are such as to render the supplementary devices operative for that purpose. These governing devices are connected to a control-wire 7, which extends along the division A and constitutes part of an auxiliary circuit, which may be a shunt to the main power-circuit or an independent circuit supplied by its own generator. As here shown, the control-wire 7 is connected by a branch wire 7^a to one terminal of a controlling-magnet (to be hereinafter described) for each signal, the other terminals of these magnets being connected to the ground by wires 7^b, and current is supplied to the control-wire by a battery 8 through conductors 9 and 10 and a circuit making and breaking device 11, the negative terminal of the battery being connected to the ground 12 by a conductor 13. The closing of the auxiliary control-circuit will serve to allow the movement of the signals to safety position by the means shown in Fig. 2, which will be now described. The signal, which may be for convenience designated as the "signal" *a*, has the usual pivoted member, comprising an arm 14 and a counterweight 15 for automatically moving

the arm 24 to horizontal or danger position when it is released and free to act. The means for rocking the arm 14 to the inclined or safety position comprises a lever 16, a link or rod 17, a lever 18, and a piston 19, operating in a cylinder 20 and having a stem 21, having a slot-and-pin connection to one end of the lever 18, all as is usual in the Westinghouse electropneumatic signal system.

The compressed air for operating the piston 19 is supplied to the cylinder 20 from a reservoir 22 through a conduit comprising pipes 23, 24, and 25 and a passage 26, said conduit being opened and closed by means of a spring-seated valve 27, the upper end of the stem 28 of which is provided with an armature 29, that is moved downward when the signaling-circuit is closed by means of an electromagnet-coil 30.

The auxiliary controlling device, which is governed by the apparatus shown in Fig. 1, comprises a magnet 31, having an armature, (not shown,) which may be like the armature 29 of magnet 30 and which has a depending stem 32, provided with two valves 33 and 34. A spring 35 acts in opposition to the pull of the magnet, so as to cause the valve 34 to cut off the supply of compressed air and at the same time to cause the valve 33 to exhaust the cylinder 20 to the atmosphere through the port 36. The coil of the magnet 31 is connected between the controlling-wire 7 and the ground by means of wires 7^a and 7^b, so that when the auxiliary circuit is broken by the controlling device 11 the clearing of the signal cannot be effected, even though the preceding block may be clear and the valve 27 in open position, as indicated in Fig. 2, because the valve 34 is closed as the valve 33 is opened, thus cutting off the air from the cylinder and exhausting that which may have been in it prior to the moving of the valves to the positions indicated. On the other hand, if the circuit is closed by means of the controlling device 11 the valve 34 will be held in open position and the valve 33 in closed position, irrespective of whether the preceding block is occupied or clear, and the signal system is in condition to operate in its normal manner.

It will be understood that the auxiliary controlling means may be applied to less than the whole number of signals pertaining to any given section of road and that whether applied to one or more than one of such signals the opening and closing device or devices for the auxiliary circuit or circuits may be located at any desired point or points therein, it being my intention to utilize such auxiliary controlling means to effect the movement of any signal or set of signals to danger-indicating position and to hold such signal or signals in such position whenever and during such period as emergency may demand, the manually-operated switch being located at the power-house, at an adjacent

signal, or at any other point more or less remote from the controlled signal where the emergency condition is likely to be known.

As has already been stated, the signals which are here illustrated are of the well-known Westinghouse electropneumatic type and the electrical controlling system shown in connection therewith, with the exception of my auxiliary controlling system and circuits, is illustrated and described in Patent No. 590,600, granted September 28, 1897, to The Union Switch & Signal Company as assignee of Jacob B. Struble. The apparatus and circuits here shown comprise a polarized relay R for making and breaking the circuit between the supply-conductor 3 and each magnet 30 and a battery S for energizing each relay-magnet when the block immediately in advance of it is clear. The representation of trains, track conditions, and signals in Fig. 1 is such that in each case where a vehicle or train occupies a block it serves to short-circuit the corresponding battery, and thus permit the relay which is located at the entrance to that block to break the circuit of the corresponding magnet 30, and thereby insure movement of the corresponding signal to danger-indicating position and its retention in that position until the track is again cleared, so that the current from the corresponding battery will pass through the relay-coils. Trains a^3 , a^4 , a^5 , and a^6 are shown as serving, respectively, to hold the signals a , c , e , and g at "danger" in the manner above indicated.

It will be understood by those skilled in the art that the auxiliary control apparatus may be so arranged that the controlling action will be exerted when the auxiliary circuit is closed instead of when it is open, if desired, this being a mere reversal of what is shown.

As has already been indicated, my invention is susceptible of use in connection with any signaling system known in the art, whether the operation of the signals be automatic, semi-automatic, "controlled-manual," or manual.

The original application, of which this is a division, discloses signals pertaining to certain of the above-mentioned systems, and the adaptation of the present invention to such signals and systems may be readily understood by reference thereto, provided any illustration and description in addition to what is here given are required.

In order to simplify the disclosure, I have here illustrated my invention as applied to a single-track road; but it is to be understood that the invention is applicable to roads having two or more main tracks supplied with electrical energy from the same source or from separate sources and that in such cases the specially-controlled signals may pertain to one or more of the tracks, according to the existing conditions.

As has already been stated in substance, the illustration and description of apparatus and systems are not intended to restrict the scope of the invention to details or to specific systems, but are intended merely to afford adequate disclosure of suitable operating means for practicing the invention, and it is to be therefore understood that the invention is not restricted, except as limitations may be imposed by the prior art and specified in the claims.

I claim as my invention--

1. In a block-signal system for electric railways, the combination with a series of signals located at intervals along the railway and means for controlling each of said signals independently in accordance with the condition of the preceding block, of an independent auxiliary circuit, a switch for opening and closing the same located at a more or less distant point and means governed by said circuit and switch to hold one or more of said signals at danger-indicating position when desired, even though the corresponding block or blocks be clear.

2. In a block-signal system for electric railways, the combination with a series of signals located at intervals along the railway and means for controlling each of said signals independently in accordance with the condition of the preceding block, of an independent electric circuit, signal-actuating means connected to said circuit and to each of one or more of said signals and means located at a given point for opening and closing said circuit to so govern said actuating means as to prevent the clearing of said signal or signals when required, even though the corresponding block or blocks be clear.

3. In a block-signal system for electric railways, the combination with a series of signals located at intervals along the railway and means for controlling each of said signals independently in accordance with the condition of the preceding block, of an independent electric circuit, signal-actuating means connected to said circuit and to each of one or more of said signals and a manually-operated means for opening and closing said circuit to govern said actuating means independently of track conditions.

4. In a block-signal system for electric railways, the combination with a plurality of signals and means for moving each of them to safety-indicating position when the preceding block is clear, of an auxiliary controlling-circuit, means controlled thereby for moving each of a plurality of said signals to danger-indicating position and a manually-operated switch for opening and closing said circuit.

5. In a block-signal system for electric railways, the combination with a plurality of signals located at intervals along the railway and means for controlling each of said signals independently in accordance with the

condition of the preceding block, of an independent controlling means for controlling all of said signals simultaneously comprising an auxiliary electric circuit, actuating means
5 for each signal operatively connected to said circuit and a manually-operated switch located at a given point in said circuit.

In testimony whereof I have hereunto subscribed my name this 7th day of May, 1903.

GEORGE GIBBS.

Witnesses:

W. L. MURRAY,
W. E. SPRAGUE.