J. F. WEBB, Jr.

TRAIN STOPPING SYSTEM.

APPLICATION FILED FEB. 3, 1909.

932,926.

Patented Aug. 31, 1909.

2 SHEETS—SHEET 1.

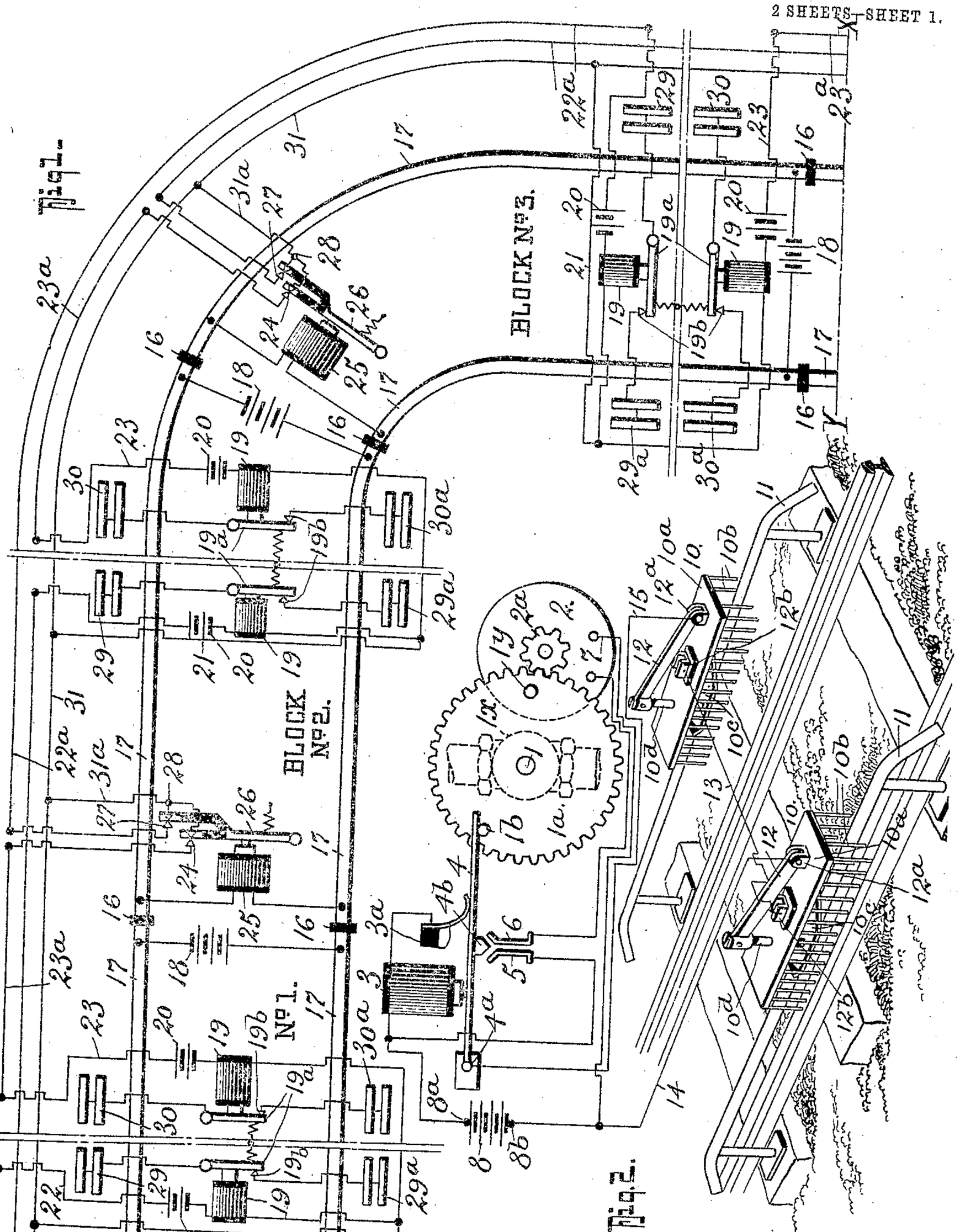

Fig. 1.

Fig. 2.

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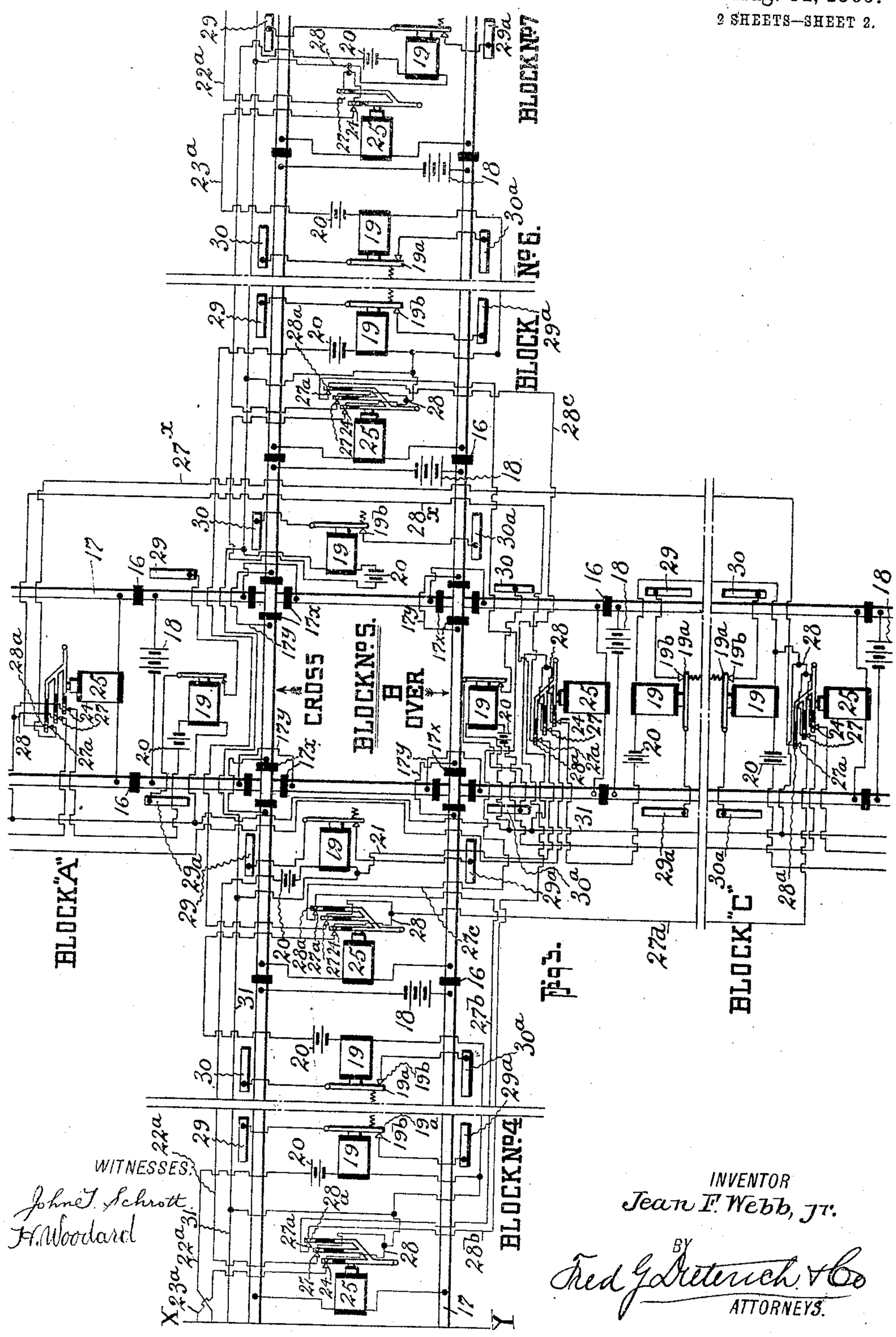

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UNITED STATES PATENT OFFICE.

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TRAIN-STOPPING SYSTEM.

932,926. Specification of Letters Patent. Patented Aug. 31, 1909.

Original application filed September 1, 1908, Serial No. 451,227. Divided and this application filed February 3, 1909. Serial No. 475,843.

To all whom it may concern:

Be it known that I, JEAN F. WEBB, Jr., residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Train-Stopping Systems, of which the following is a specification.

This application, which is a divisional part of my copending application, filed September 1, 1908, Serial No. 451,227, discloses one form of my improved train stopping system, and the present invention embodies an improved track circuit to coöperate with closed circuit train carried stopping mechanism of the type disclosed in my copending application before referred to.

In this application I have disclosed an improved construction of contact maker, but I make no claim *per se* thereto in this application as such contact maker forms the subject-matter of another application filed August 26, 1908, Serial No. 450,367. I have also disclosed a special form of train carried train stopping mechanism which acts in conjunction with the track circuit herein disclosed, and I make no claim *per se*, to such train carried mechanism in this application, as such forms a part of the subject-matter in my original application aforesaid.

In the drawings, Figure 1, is a diagrammatic view of my improved track circuits. Fig. 2, is a diagrammatic view of the train carried mechanism that coöperates with the track circuit, a part of the track and track contacts being indicated. Fig. 3, discloses my track circuits for crossed tracks and may be read in connection with Fig. 1, by joining the lines X—Y of Figs. 1 and 3, together.

In the drawings, in which like numerals and letters of reference indicate like parts in all of the figures, 1 represents the shaft of a rotary air valve, indicated in dotted lines on Fig. 2 of the drawings, which air valve is adapted to be connected to the air brake system, and is preferably located at a place not under direct control of the engineer, such, for instance, as under the seat of the engine cab.

To the valve shaft 1 a gear 1^a is attached, the gear 1^a meshing with the drive pinion 2^a of an electric motor 2.

3 designates a closed circuit magnet, preferably of high resistance, which coöperates with the armature 4 that is pivoted at 4^a and is adapted to be moved in one direction by a lug 1^b on the gear 1^a at predetermined times.

The armature 4 has a contact maker 4^b which, when the armature is dropped, is adapted to engage fixed contacts 5 and 6 to close the local motor circuit 7, which circuit includes a source of electrical energy 8, as indicated diagrammatically in Fig. 2, of the drawings. The source of electrical energy 8 has one of its terminals 8^a connected to one terminal of the magnet 3, while the other terminal of the magnet 3, connects with a contacting brush 3^a that bears against the armature 4 when in its normal position.

10—10 designate train carried brush and shoe contact members which are supported in any approved manner on the train to project laterally therefrom, and engage with track contact members 11, hereinafter again referred to. Each of the contact brush shoes 10 comprise a plate 10^a from which a series of metallic bristles 10^b project downwardly.

Beneath the plate 10^a is a shoe 10^c to engage the track contacts 11. The shoe is secured to a rod 10^d that projects through the plate 10^a and is in turn connected to a knife 12 of a switch, the stationary contact 12^b of which is insulated from but supported on the plate 10^a the knife 12 being pivoted at 12^a.

In practice the fixed contacts 12^b of each of the train carried shoes (the one at the one side of the train and the other at the other side) are electrically connected by a wire 13, as indicated in Fig. 2 of the drawings.

One terminal 8^b of the local or train carried source of electrical energy 8 is connected to one of the knife switch blades 12, while the knife switch blade of the other brush shoe is connected to the armature 4, which armature 4 is pivoted at 4^a, as indicated. A coil spring (not shown) on the rod 10^d beneath the plate 10^a keeps the switch normally closed.

So far as I have described, the manner in which the train carried part of my invention operates is best explained as follows: Assume the train to be passing along the track, carrying its brush shoe members 10—10 and a

local source of electrical energy 8, together with the magnet 3, motor 2 and air valve 1^x, and the coöperating parts; as soon as the train arrives at a pair of track contacts 11, the brush shoe contact makers 10 will engage such contacts and electrically connect therewith. At the same time the shoe 10^c will ride up on such contacts 11 and break the circuit between the knives 12 and the fixed contacts 12^b. Should the circuit be open between a pair of contacts 11, then as soon as the brush shoes 10 are in engagement with the track contacts 11 and the circuit broken between the knives 12 and the fixed contacts 12^b, of the knife switches on the brush shoes no current will flow through the magnet 3, and hence the armature 4 will drop, breaking the circuit between the brush 3^a and the armature 4, and at the same time closing the local circuit through the contacts 5 and 6, and thus energize the motor 2, which causes it to rotate to open the air valve 1^x. As soon as the valve 1^x has been opened the lug 1^b will engage the armature 4 and raise the same to break contact between the fixed contacts 5 and 6 of the motor circuit and at the same time will again close the circuit at the contact 3^a and the armature 4 for as soon as the brush shoes have left the track contacts 11 and the knife switches carried thereby have again closed the short-circuiting means, the current will, as soon as the armature 4 has been raised, again flow through the magnet 3 and hold the armature 4 in its raised position. As soon as the train has come to a stop the engineer may get out of his cab and return the valve 1^x to its closed position, by grasping the handle 1^y and turning the gear 1^a backward a predetermined distance.

The means for opening and closing the circuit between the several pairs of track contacts 11 is disclosed in Fig. 1, of the drawings, by reference to which it will be seen, I have, for convenience of illustration, illustrated several block sections, which have been marked on the drawings, "block No. 1", "block No. 2", etc., it being understood that any number of blocks of any desired length may be provided.

In practice I provide a pair of track contacts 29, 29^a, 30, 30^a disposed in pairs, one of each pair at one side of the track, and the other at the other side of the track, each pair of contacts 29, 29^a, and 30—30^a may be located at any desired position in the block, preferably slightly more than a train length from the beginning and from the end of the block.

At one end of each block, I bridge the track rails 17 (which are insulated from one another at 16 to form the blocks) by a connection containing a high resistance relay 25 having an armature 26 provided with two electrically connected contact points 28 to coöperate with a pair of fixed contacts 24 and 27.

The armature contact points 28 are electrically connected to a common line wire 31 by a lead 31^a, which line wire is electrically connected through leads 21 with one terminal of a series of auxiliary relay magnets 19, the other terminal of which connects to a battery 20. The battery 20 of a relay 19 at one end of the block, say the end of block No. 1, adjacent to block No. 2, connects through a wire 23 with a line wire 23^a that is in turn connected with the fixed contact 24 of the main relay 25 at the beginning of the next succeeding block (block No. 2). The other fixed terminal 27 of the main relay 25 of block No. 2 connects to a line wire 22^a, which is in turn connected to the battery 20 of the auxiliary relay 19, at the beginning of block No. 3, which is the next succeeding block.

The auxiliary relay 19, at the beginning of block No. 2, connects with the fixed contact 27 of the main relay 25 (not shown) of block No. 1. The auxiliary relay 19 at the end of block No. 2, connects through a lead 23, with a line wire 23^a that connects to the fixed contact 24 of the main relay 25 in block No. 3, while the fixed contact 27 of such main relay connects through a line wire 22^a to the auxiliary relay magnet 19, (see Fig. 3) at the beginning of block No. 4, and so on.

Each block is bridged at the end opposite the main relay 25, by a battery 18, whose terminals are connected with the respective track rails 17 of the block, as indicated.

When the parts are in the position shown in Fig. 1, the circuits are closed, thus the pairs of contacts 29—29^a, 30—30^a of all blocks are short-circuited through the armatures 19^a and contacts 19^b of each relay 19 which are respectively connected to the respective contacts 29—29^a—30 and 30^a, as the case may be.

Should a train enter, say, block No. 2, it will short-circuit the main relay 25 of block No. 2, and permit the armature 26 thereof to open the circuits at contacts 24, 27 and 28, thus deënergizing the magnets of auxiliary relay 19 at the end of block No. 1, and of auxiliary relay 19, at the beginning of block No. 3, and opening the armature contact connection between the track contacts 30—30^a of block No. 1, and the track contacts 29—29^a on block No. 3, thus any train passing along block No. 1, toward block No. 2 will have its train stopping mechanism actuated as soon as the brush shoes 10 engage the pair of track contacts 30—30^a at the end of block No. 1, likewise any train in block No. 3, which is moving toward block No. 2, will be stopped when its train carried shoes 10 engage the pair of track contacts 29—29^a at

the beginning of block No. 3. In a similar manner all trains will be stopped in all the blocks of the line.

In Fig. 3, I have illustrated the application of my invention where two railroads cross one another. In such figure, block No. 4, is a continuation of block No. 4, in Fig. 1, for convenience of illustration. The rails 17 of the cross over are insulated from one another, as shown at 17^x, and alining rails are bonded as at 17^y. The section or block from the insulation 16 at the end of block No. 4, to the insulation 16, at the beginning of block No. 6, constitutes the "east" and "west" portion of the cross block and that portion or section between the insulation 16 at the end of block A and the insulation 16 at the beginning of block C constitutes the "north" and "south" cross block section B.

Blocks A, B and C are provided with main relays 25 and batteries 18 the same as blocks Nos. 1, 2, 3, 4, 5, 6 and 7, etc. The blocks A, B and C also have corresponding pairs of track contacts. 29—29^a and 30—30^a. The armatures 26 of the main relays 25 of blocks 4, 5, 6, and A, B and C are each provided with an auxiliary contact 28^a to coöperate with an auxiliary fixed contact 27^a.

The fixed contact 27^a of the main relay 25 in block No. 4, joins through wire 27^b with the auxiliary contact 28^a of the main relay 25 in cross block No. 5, the fixed contact 27^a of relay 25 in cross block No. 5 joins through wire 27^c with the fixed contact 27^a of the relay 25 in block No. 6, and the auxiliary contact 28^a of relay 25 in block No. 6 joins through wire 28^c with the common line wire 31 of the "north" and "south" line; the auxiliary contact 28^a of the main relay 25 in block No. 4 connects through wire 28^b to contacts 28 of relay 25 in cross block No. B, and contacts 24 and 27 of relay 25 in cross block B are connected, through batteries 20 and auxiliary relays 19 at the end of blocks A and the beginning of C respectively, with the common line wire 31 of the "north" and "south" line, through which the circuit is completed.

The fixed contact 27^a of the main relay in block No. C connects through wire 27^d with contacts 28 of main relay 25 in block No. 5, and contacts 24 and 27 of relay in block No. 5, are connected, through batteries 20 and auxiliary relays 19 at the end of block No. 4 and the beginning of block No. 6, respectively, with the common line wire 31 of the "east" and "west" line; the auxiliary contact 28^a of the main relay 25 of block No. C connects through wire 27^x with the fixed contact 27^a of main relay 25 in block No. A, auxiliary contact 28^a of relay 25 in block No. A connects through wire 28^x with auxiliary contact 28^a of relay 25 in block No. B, and fixed contact 27^a of relay 25 in block No. B connects through wire 21 with the common line wire 31 of the "east" and "west" line, through which the circuit is completed. The wiring of the other contacts is the same as that shown in Fig. 1.

Operation of the cross track circuits: Now assume a train to be in block No. 4, in that event the relay 25 of such block will be short-circuited to release its armature and break the circuits between contacts 24 and 27 and armature contacts 28, and fixed contact 27^a and armature contact 28^a, thus deënergizing the auxiliary relay 19 at the end of block No. 3, to break the circuit between track contacts 30—30^a controlled by such relay. The circuit through relay 19 at the beginning of cross block 5 is likewise broken to open the circuit between the corresponding track contacts 29—29^a at the beginning of cross over block No. 5. At the same time the circuit through wires 28^b—27^b will be broken, thus deënergizing the auxiliary relay 19 (not shown) at the end of block A and also deënergizing the auxiliary relay 19 at the beginning of block C and permitting such relays to open the circuits between their respective track contacts, such circuits being opened as said relays 19 are controlled by the auxiliary contacts of the armatures of relays 25 of blocks Nos. 4, 5 and 6, and the main armature contacts of relay 25 of block B. Thus should any train pass the said controlled track contacts in either blocks 6, A, or C, its train stopping mechanism will be set into operation and such train brought to a stop; likewise any train that may be on the cross over will cause to be set in operation the stopping mechanism of any train passing the adjacent track contacts in blocks 4, 6, A and C.

It is not thought necessary to go into a further detailed explanation of the circuits of the crossing as they will be readily apparent by mere inspection of the drawings.

Any number of contacts 29—29^a—30—30^a may be used, either a single contact as indicated in Figs. 2 and 3 of the drawings, or a plurality of contacts, as indicated in Fig. 1 of the drawings. When a plurality of contacts is used, as shown in Fig. 1 of the drawings, they are bonded together and act as one. Applicant does not desire to be limited to the use of any particular number of contacts connected together, whether such number of contacts is a single contact as shown in Figs. 2 and 3, of the drawings, or a plurality of contacts, as shown in Fig. 1, of the drawings.

From the foregoing description taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:

1. In a track circuit for train controlling mechanisms, a main line and a second line crossing thereover, said main and said second line being divided into blocks with the rails of each block insulated from those of the other blocks, a relay bridged across the rails of each block and a source of electric energy also bridged across the rails of each block, pairs of fixed contacts mounted adjacent to the main line tracks and other pairs of fixed contacts mounted adjacent to the cross line tracks and an auxiliary relay for each pair of fixed contacts, and means electrically connecting certain of said main relays of the main line blocks with certain of the main line auxiliary relays and certain of the cross line auxiliary relays.

2. In a track circuit for train controlling mechanisms, a main line and a second line crossing thereover, said main and said second line being divided into blocks with the rails of each block insulated from those of the other blocks, a relay bridged across the rails of each block and a source of electric energy also bridged across the rails of each block, pairs of fixed contacts mounted adjacent to the main line tracks and other pairs of fixed contacts mounted adjacent to the cross line tracks and an auxiliary relay for each pair of fixed contacts, means electrically connecting certain of said main relays of the main line blocks with certain of the main line auxiliary relays and certain of the cross line auxiliary relays, and means for electrically connecting certain of said main relays of the cross line blocks with certain of the auxiliary relays of the cross line blocks, and certain of the auxiliary relays of the main line blocks.

3. In a train controlling system, a main line having its rails divided into insulated blocks, a second line crossing said main line and having its rails divided into insulated blocks, fixed contacts arranged adjacent to the track of the main line and other fixed contacts arranged adjacent to the tracks of the cross line, and auxiliary relays one for each pair of fixed contacts, and means in certain of the main line blocks for electrically connecting certain of the auxiliary relays of the cross line blocks.

4. In a train controlling system, a main line having its rails divided into insulated blocks, a second line crossing said main line and having its rails divided into insulated blocks, fixed contacts arranged adjacent to the track of the main line and other fixed contacts arranged adjacent to the tracks of the cross line, auxiliary relays one for each pair of fixed contacts, means in certain of the main line blocks for electrically connecting certain of the auxiliary relays of the cross line blocks, and vice versa.

5. In a train controlling system, a main line having its rails divided into insulated blocks, a second line crossing said main line and having its rails divided into insulated blocks, fixed contacts arranged adjacent to the track of the main line and other fixed contacts arranged adjacent to the tracks of the cross line, auxiliary relays one for each pair of fixed contacts, means in certain of the main line blocks for electrically connecting certain of the auxiliary relays of the cross line blocks, and certain of the auxiliary relays of certain of the main line blocks.

6. In a block system for railroads, a main line and a cross line, each having its rails divided into block sections, said block sections including a cross block section in the main line and a cross block section in the cross line insulated from that of the main line, pairs of track contacts for each block mounted adjacent to the tracks, auxiliary relays in each block one for each pair of track contacts, a source of electric energy in circuit with said relays, means in a block of the main line and electrically connecting with certain of the auxiliary relays of the main line and certain auxiliary relays of the cross line to control said relays, and means whereby when a train enters one of said blocks the means controlling said auxiliary relays will be released to operate said auxiliary relays to electrically disconnect the respective fixed contacts.

7. In a train controlling system, a main line having its rails divided into sections, and a cross line having its rails divided into insulated blocks, said main and cross lines each including a cross block insulated one from the other, a pair of contacts for each block of the main and cross lines, an auxiliary relay in each block for controlling the respective pairs of contacts, combined with means for normally energizing said relays to electrically connect the respective pairs of track contacts, and means in virtue of which when a train enters a block next adjacent the cross block of one line the circuit will be opened through certain of said auxiliary relays to open the circuit between certain pairs of track contacts in the block next adjacent to the cross block of the other line.

8. In a train controlling system, a main line having its rails divided into sections, and a cross line having its rails divided into insulated sections, said main and cross lines each including a cross block insulated one from the other, a pair of track contacts for each block of the main and cross lines, an auxiliary relay in each block for controlling the respective pairs of contacts, combined with means for normally energizing said relays to electrically connect the respective pairs of track contacts, means in virtue of which when a train enters a block next ad-

jacent the cross block in one line, the circuit will be opened through certain of said auxiliary relays to open the circuit between certain pairs of track contacts in the block next adjacent to the cross block of the other line, and the circuit will be opened through the auxiliary relay controlling a certain pair of track contacts of the cross block to open the circuit between said last named contacts.

9. In a train controlling mechanism, a main line having its rails divided into insulated blocks and a cross line having its rails divided into insulated blocks, said main and cross lines each including a cross block insulated one from the other, a pair of track contacts for each block in the main and cross lines, and an auxiliary relay and a source of electric energy in each block of the main and cross lines, one auxiliary relay for each pair of contacts to control the circuit between said contacts, combined with means for normally energizing said auxiliary relays, to normally electrically connect their respective track contacts, and means coöperating with said auxiliary relays in virtue of which when a train enters the cross block in one line the circuit will be opened through certain of the auxiliary relays to open the circuit between a pair of track contacts at each of the blocks on both lines adjacent to the cross blocks.

10. In a track circuit for train controlling systems, a main line and a second line crossing thereover, each of said lines divided into insulated blocks and each including a cross block, pairs of track contacts for each block, auxiliary relays one for each pair of track contacts and electrically connecting therewith to control the electrical connection between the respective contacts, means for normally energizing said relays and means cooperating with the relays and their energizing means whereby when a train enters a block adjacent to the cross block in one line certain of the track contact controlling relays in the cross block of one line and in the blocks adjacent to the cross block of the other line will be deënergized to open the electrical connection between certain of the track contacts of said blocks.

11. In a track circuit for train controlling mechanisms, a main line and a cross line, each divided into sectionalized blocks and including crossing blocks insulated from one another, fixed track contacts arranged adjacent to the tracks of each block of the main and cross lines, relays for electrically connecting certain of said fixed contacts, combined with means in certain of the blocks in one line electrically connecting certain of the relays of the other line.

12. In a track circuit for train controlling mechanisms, a main line and a cross line, each divided into sectionalized blocks and including crossing blocks insulated from one another, fixed track contacts arranged adjacent to the tracks of each block of the main and cross lines, relays for electrically connecting certain of said fixed contacts, combined with means in certain of the blocks in one line electrically connecting certain of the relays of the other line and train controlled means coöperating with said electrically connecting means for controlling the operation of the same.

13. In a train stopping system, a track circuit section comprising sectionalized tracks insulated from one another and divided into "blocks", a relay in each block comprising a relay magnet bridged across the track sections of a block and a plurality of movable and fixed contacts, a source of electrical energy for each block bridged across the tracks to energize the relay, pairs of track contacts for each block arranged one of each pair at one side of the track and the other of the pair at the other side of the track, an auxiliary relay having a fixed and a movable contact connected one to each of a pair of track contacts, said auxiliary relay also including a relay magnet, a source of electrical energy in circuit with said magnet and electrically connected to one of the fixed contacts of the first mentioned relay, said auxiliary relay magnet being electrically connected to one of the movable contacts of said first mentioned relay.

14. In a train stopping system, a track circuit section comprising sectionalized tracks, a main relay bridged across said tracks in each section, and means for energizing said relay when the track is clear, said relay having an armature and fixed contacts normally closed when the relay is energized, track contacts arranged adjacent to the track in each section, auxiliary relays having contacts connected with said track contacts, a coöperative connection between the auxiliary relays and certain of the contacts of certain of said main relays to normally short-circuit said track contacts when the main relay is energized and to open the track contacts when the main relay becomes deënergized.

15. In a train stopping system, sectionalized tracks arranged in blocks and forming part of an electric circuit, a main relay and a source of electric energy for each block in series with the tracks of said block, track contacts arranged in pairs for each block, an auxiliary relay controlling each pair of contacts, and means coöperatively connecting certain of said auxiliary relays with certain of said main relays whereby the auxiliary relays are controlled from the main relays.

16. In a train stopping system, sectionalized tracks arranged in blocks and forming part of an electric circuit, a main relay and

a source of electric energy for each block in series with the tracks of said block, track contacts arranged in pairs for each block, auxiliary relays, one for each pair of track contacts to control electrical connection between said contacts of each pair, the main relay of one block being electrically connected with an auxiliary relay of each block adjacent to said one block.

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Witnesses:
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