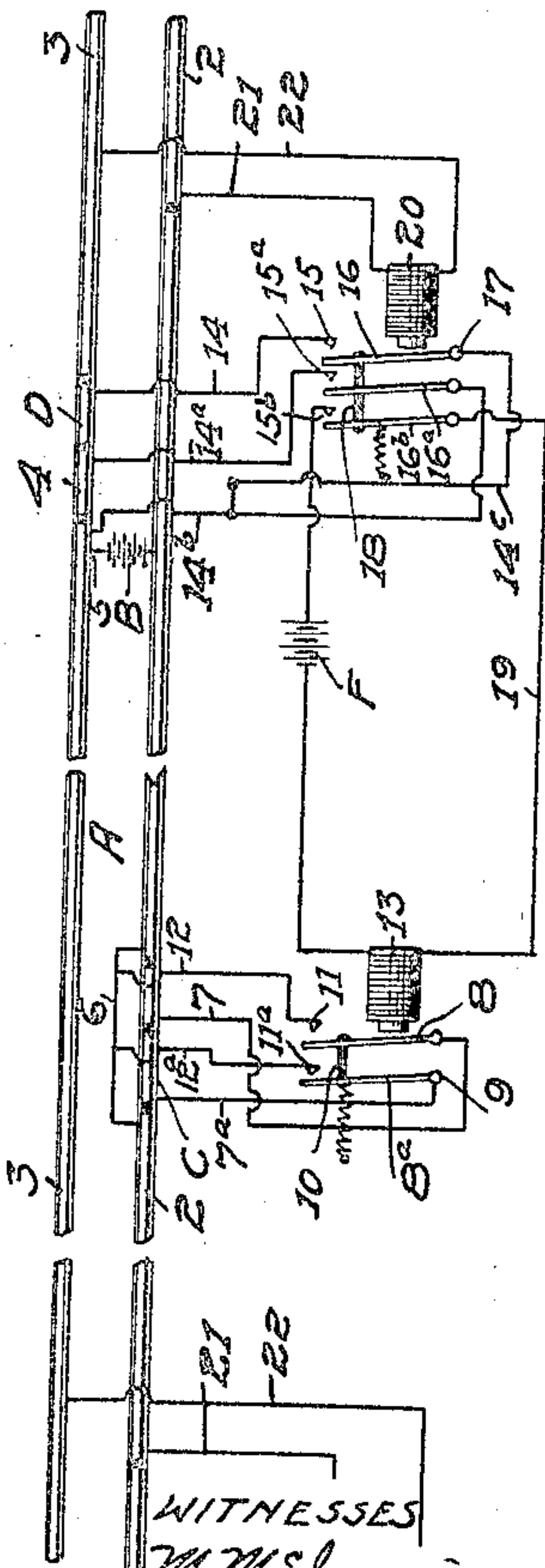
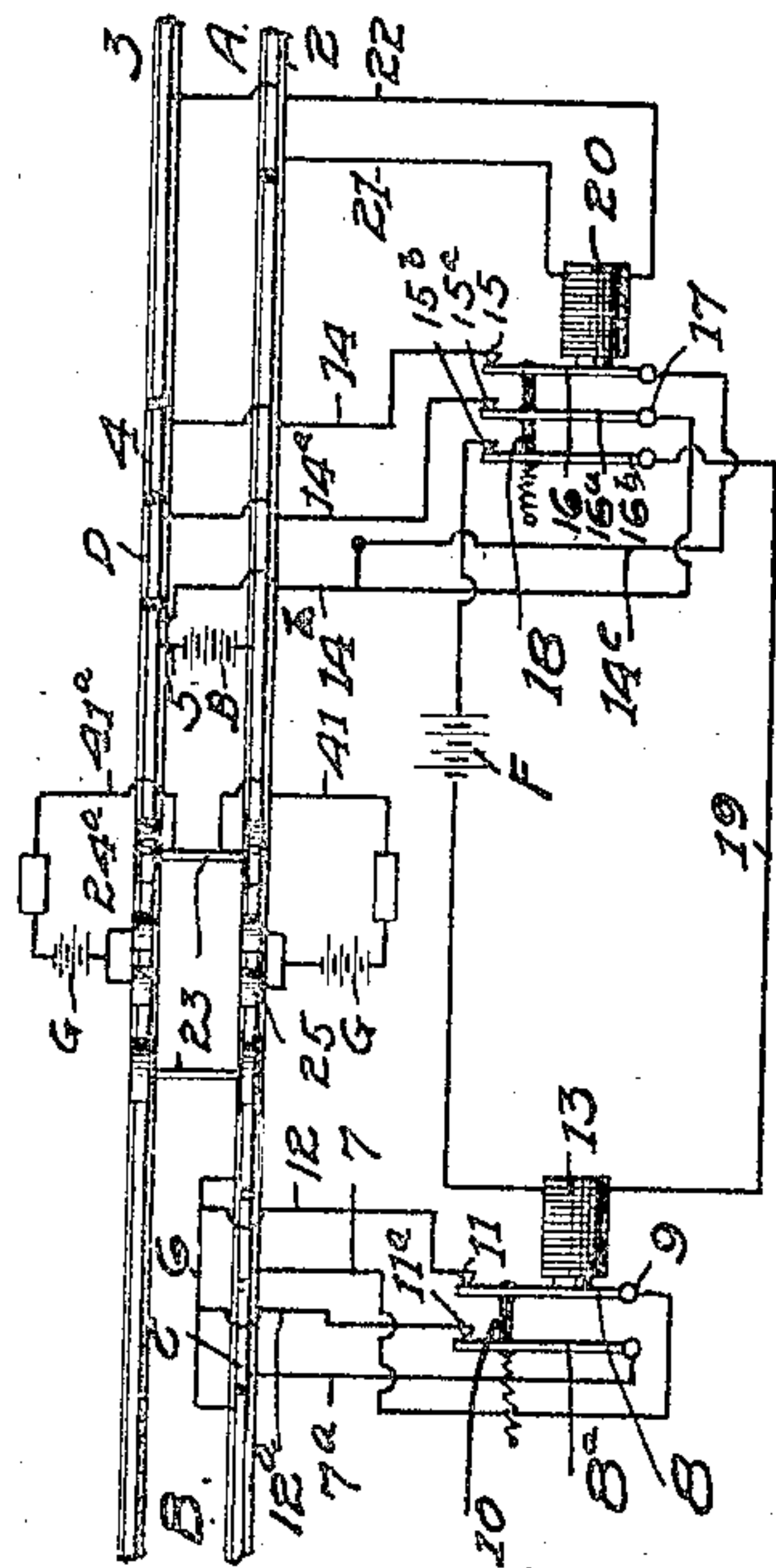


914,445.



WITNESSES
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FIG. 1

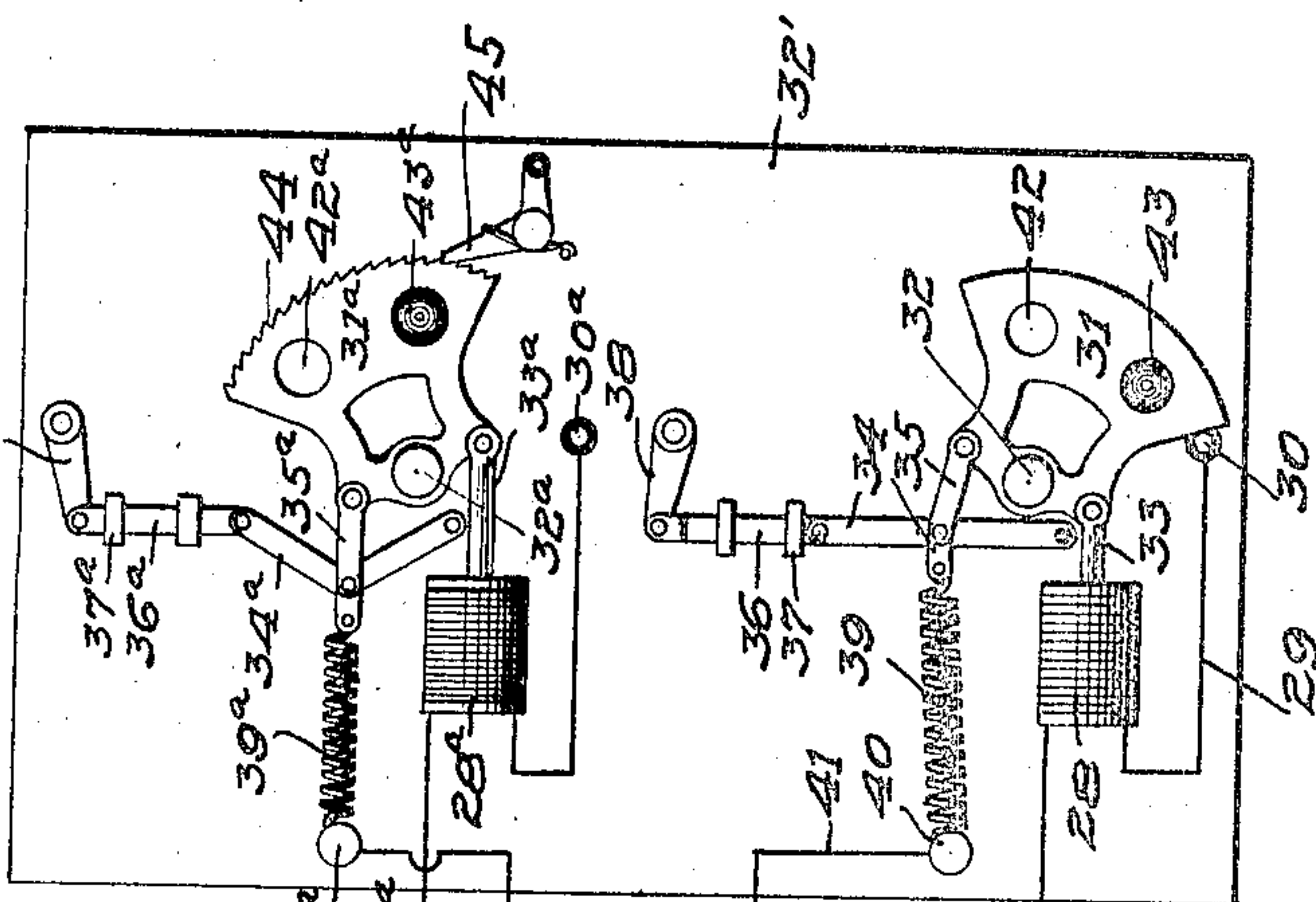


FIG. 2

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ENGINEER'S ALARM.
APPLICATION FILED DEC. 18, 1905.

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2 SHEETS—SHEET 2.

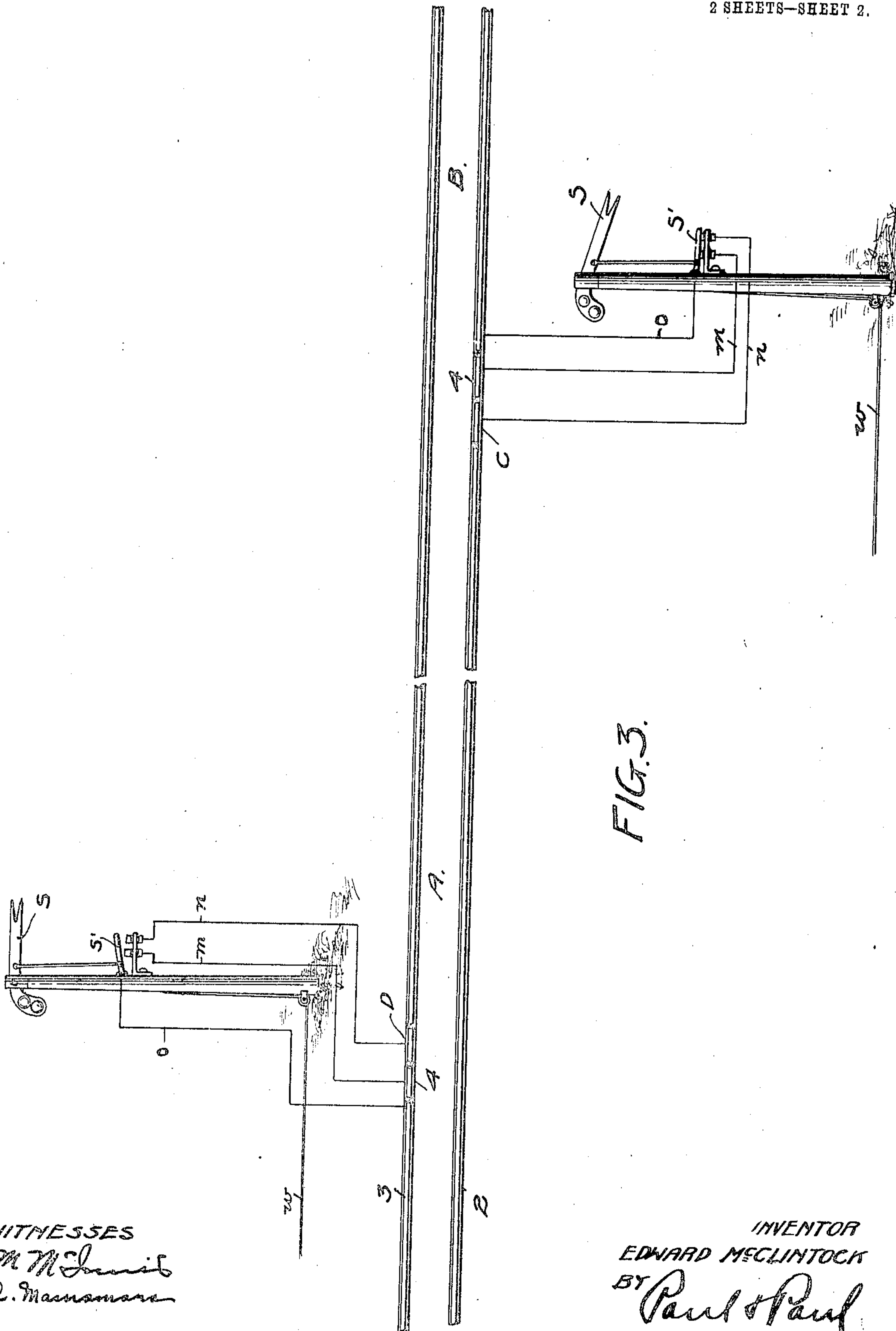


FIG. 3.

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UNITED STATES PATENT OFFICE.

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ENGINEER'S ALARM.

No. 914,445.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed December 19, 1905. Serial No. 292,139.

To all whom it may concern:

Be it known that I, EDWARD McCLINTOCK, of St. Paul, Ramsey county, Minnesota, have invented certain new and useful Improvements in Engineers' Alarms, of which the following is a specification.

My invention relates to railway automatic signal and alarm devices, and the object of my invention is to prevent rear end collisions and to provide means whereby the engineer of a following or second train will be warned of the presence of a preceding train in a contiguous, preferably the next block, the apparatus being adapted particularly for double track systems where one track is used exclusively for trains moving in the same direction.

The invention consists, generally, in various constructions and combination, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1, is a diagrammatic view illustrating the application of the apparatus to a railroad track. Fig. 2 is a similar view illustrating the apparatus used on the locomotive or motor and embodying a signaling device which is affected by the apparatus connected with the track. Fig. 3 shows a signal connected with the secondary circuit.

In the drawings, 2 and 3 represent the track rails which are divided into a series of insulated blocks or sections, two of which are shown in the drawing and indicated by reference characters A and B, for convenience of illustration and description. Each block is provided on alternate sides of the track with a series of short rail sections 4 insulated from the main portion of the rails and from each other. There are preferably two sets or groups of these insulated sections in each block, one preferably near the middle and the other near the end of the block, each group containing two or more rail sections and connecting circuits which are duplicates of one another to insure the operation of the device on the locomotive during the passage of a rapidly moving train. The rails of one set, as indicated in the drawing, are connected with the circuits which influence the caution signal, while the other set on the opposite side of the track and near the end of the block, is in circuits which influence the danger signal. For convenience of illustration

I will designate and refer to the former insulated sections by reference letter C, and to the latter by reference letter D, indicating "caution" and "danger" respectively.

Each block of the track has a suitable generator such as battery B connected by wires 5 with the opposite rails, and located between the rails, or at any other suitable point. A wire 6 connects the sections of the rail 2 in the same block forming a loop leading around the short insulated sections 4 of the group C. The insulated sections 4, of which I have shown two, or duplicates, in the drawing, are connected by wires 7 and 7^a with armatures 8 and 8^a pivoted at 9 and having connection 10 to operate in unison. Contact points 11 and 11^a are connected by wires 12 and 12^a with the wire 6. The armature 8 is in position to be influenced by an electro magnet 13, and when the said magnet is energized the armatures 8 and 8^a will be attracted thereby to contact with the points 11 and 11^a and close the circuits at the armatures, but the circuits at the rails will remain open normally and be closed temporarily during the passage of the first train to prevent the operation of the signal. The rail sections 4 of the group D, on the other side of the track, have wires 14 and 14^a connected therewith leading to contact points 15 and 15^a. In the path of armatures 16 and 16^a a third armature 16^b is provided, and all of them are pivoted at 17 and have a connection 18 between them, insuring movement in unison. The armature 16^b is arranged to contact with a point 15^b in circuit with the said armature 16^b and the magnet 13 through a wire 19 and battery F. A wire 14^b leads from the rail 3 to the armature 16^a, and the wire 14^c connects the wire 14^b with the armature 16. This last named armature is arranged to be influenced by a magnet 20, from which wires 21 and 22 lead respectively to the rails 2 and 3 of the block adjoining the one wherein the groups of "caution" and "danger" rail sections are located. This completes the track apparatus used in connection with each block. I have shown another apparatus for the adjoining block, but as it is a duplicate of the one already described further reference thereto will be unnecessary, it being sufficient to say that each block is similarly equipped with the "caution" and "danger" circuits affected or influenced by the passage of a train

to warn the engineer of the succeeding train of the presence of the first one in the next block.

The apparatus on the locomotive or motor and embodying the signaling devices I will now proceed to describe in detail.

23 represents the locomotive trucks, between which I arrange contact shoes or wheels 24 and 24^a, and 25 and 25^a, arranged to travel upon the track rails and insulated from the locomotive trucks. I prefer to arrange the contact shoes in pairs, two on each side of the locomotive so that they will bridge the short insulated rail sections when the train is passing over them and prevent the breaking of the circuit at this point. These shoes are illustrated clearly in Fig. 2, where one of each pair is shown resting on the track rails between the locomotive trucks. The shoes 24 and 25 have a wire 26 connecting them, and a wire 27 leads through a generator such as battery G, to a solenoid 28. A wire 29 leads from the solenoid 28 to a contact point 30. A quadrant-shaped disk 31 is pivoted at 32 on an insulating board 32' and is pivotally attached to the armature 33 of the solenoid, and when the solenoid is energized the disk 31 will be swung on its pivot to a position in contact with the point 30 to close the circuit there-through. Toggle links 34 are connected with the disk 31 by a link 35. A plunger 36 is slidable in guides 37 and connected to a crank 38 which controls the admission of steam to the engine cylinders by any suitable mechanism, not shown. A spring 39 is attached to the link 35 and to a fixed point 40, and a wire 41 leads from the point 40 to the engine truck. A complete circuit, therefore, will be established through the truck, the track rail, the shoe 24, the wires 26 and 27 and the battery G to the solenoid 28, and from thence through the wire 29 and the disk 31, link 35, spring 39 and wire 41 to the truck. The disk 31 is provided with different colored lens 42 and 43, preferably one white and one red, and a light (not shown) is mounted on the board 32' in the rear of the disk and normally visible through the white lens 42. When the circuit is broken and the spring 39 swings the disk to its other position, the red lens will be moved in front of the light, and caution the engineer of the approach of danger, or that the track apparatus is defective and in need of repairs. On the other side of the locomotive truck the shoes 24^a and 25^a are connected with a similar circuit, which I will refer to as the "danger" circuit to distinguish it from the "caution" circuit last described. The connections and manner of operation of this danger circuit are substantially the same as in the caution circuit, and I will therefore use the same reference characters for the different parts with the addition of the exponent "a."

I prefer to provide a series of ratchet teeth 44 on the curved edge of the danger circuit disk in position to be engaged by a spring-pressed dog 45 for locking the disk in its danger position and preventing any possibility of its accidentally swinging back to the clear track position until the dog has been released. This danger disk or quadrant is connected with a crank 38^a, which by a mechanism (not shown) controls the air brake, so that when the quadrant is swung to a danger position and the red light is visible, the air brake system will be operated to set the brakes and stop the train.

I may, as shown in Fig. 3, provide signals beside the track in the nature of semaphores indicated by letter S, having a knife switch S' in circuit through wires *m* and *n* with the rail sections 4 and through wire *o* with rails 2 and 3 respectively. By means of these connections the circuit through the switch will be closed when the signal is at clear to prevent interruption of the "caution" signal circuit. When, however, the circuit is broken at the switch by the elevation of the signal through a cable W operated from a distant point, the circuit, on the locomotive passing over the sections 4 will be interrupted and call the attention of the engineer to the local track signal. Instead of controlling the secondary track circuit the local signal may be arranged to be controlled by said circuit. This, however, would be a mere reversal of the construction shown and I have not thought it necessary to illustrate it herein.

From the foregoing description it will be noted that there is a main track circuit normally closed and several secondary circuits open at the rail circuits, the armatures of which are held in contact with their points as long as the magnets in the primary track circuits are energized. As soon, however, as these magnets are demagnetized, as by a short circuit, the secondary circuits will all be broken at their armatures temporarily. For instance, assuming that a train enters the block A moving toward the right. As it passes over the group C of insulated track sections, the circuit through the "caution" signal disk being broken along the rails by the insulation at that point will pass from one of the shoes 24 or 25 through the battery G and wire 27 and the connections therewith around to the truck, which will be in contact with the main rail, and from thence through wires 6 and 12 to the armature 8, and from thence through wire 7 back to the insulated section and the shoe. The circuit, therefore, through the "caution" disk of the first train or train ahead will be unbroken, and no change will take place at the signal. The same will be true when the train passes over the group of "danger" rail signals on the opposite side of the track. As soon, however, as the train passes out of the block

and enters the one indicated by "B" a short circuit will be established between the rails 2 and 3 through the locomotive trucks and axles, and the current will be shunted temporarily therethrough, instead of passing out through the wires 21 and 22 to the magnet 20; whereupon the said magnet 20 will be demagnetized and the secondary track circuits broken at the armatures 16, 16^a and 16^b, and also at the armatures 8 and 8^a, and the short circuit will continue and the magnets 20 and 13 will remain demagnetized until the train passes out of the block B. Suppose, now, another train moving in the same direction enters the block A before the first train has passed out of the block B; as soon as the second train reaches the group C of the rail sections and the shoes or wheels 24 and 25 contact therewith, the circuit will be momentarily broken through the "caution" signal disk, and it will be swung by the power of the spring 39 to a position where the colored lens will be in front of the light to warn the engineer of the approach of danger. At the same time steam will be automatically shut off from the engine cylinders. If the engineer does not then apply the brakes and stop the train, the locomotive in a few moments will pass on to the group of "danger" rail sections, and at this point the quadrant 31^a will be operated to flash its red signal and operate the air valve to set the brakes. As soon as the first train has passed out of the succeeding block the track circuit will be automatically closed, and the circuits can then be established through the "caution" and "danger" signals by swinging the quadrants 31 and 31^a back to their normal position in contact with the points 30 and 30^a. With this apparatus the engineer of a following or second train will be warned when there is a train ahead in the next block. When a train enters a block and there is no train ahead of it, the "caution" and "danger" signal circuits on the locomotive, temporarily interrupted by the short insulated track sections will, however, remain closed by the connection of the short rail sections with the secondary track circuits, which are normally closed except at the rails, and the break at this point will be temporarily connected during the passage of the contact shoes over the insulated rail sections. Therefore, if the secondary track circuits are closed at their armatures, the "caution" and "danger" signal circuits will remain closed while the locomotive is passing over the short insulated track sections. If, however, the secondary track circuits are broken at their armatures, either through the passage of a train ahead or some accident or defect in the apparatus then the "caution" and "danger" signal circuits of the train to the rear will be broken during the passage of the train over the insulated rail sections and the "cau-

tion" and "danger" signals will be displayed as heretofore described. Each train as it enters a block short circuits the track circuit of that block and opens, temporarily, the secondary circuits of the preceding block to prevent the too near approach of the following train. These circuits remain interrupted until the first train passes out of the block, when they are automatically closed and returned to their normal condition. The track of the drawing is one of a double track system and is used exclusively for trains running in the same direction, and for the track used by trains running the other direction a similar apparatus will be provided operating in substantially the same way.

I do not wish in this application to confine myself to the particular details of construction herein shown and described, as the same are capable of considerable modification, my invention consisting essentially in providing an apparatus set for a limited period by the passage of the first train to influence certain signals on a following train, or beside the track and thereby prevent the too near approach to one another of two trains moving in the same direction.

I claim as my invention:

1. The combination with a track divided into insulated blocks, of a normally closed main track circuit for each block adapted to be temporarily short-circuited by a train entering the block, a normally closed caution signal circuit carried by a locomotive, and a secondary normally closed track circuit to each block, the secondary normally closed caution circuit of one block being electrically connected with the normally closed main track circuit of a block ahead and adapted to be temporarily opened upon the short-circuiting of the main track-circuit of a block ahead by a train passing through that block, and to cause the caution signal circuit of a following train to be temporarily opened to operate its signal, substantially as described.

2. The combination with a track divided into insulated blocks, of normally closed track circuits for each block arranged to be temporarily short-circuited during the passage of a train through that block, normally closed caution and danger signal circuits carried by the locomotive, and means whereby the caution and danger signal circuits on a second train will be successively broken to operate their signals when the track circuit of a block is interrupted by the passage of a train ahead through that block, substantially as described.

3. The combination with a track divided into insulated blocks, each block containing an insulated section of track-rail, of a normally closed main track-circuit for each block arranged to be temporarily short-circuited by the passage of a train through the

block, a normally closed caution signal circuit carried by a locomotive, and a secondary track circuit connected with said insulated section of track-rail and electrically connected with the normally closed main track circuit of a block ahead and influenced by short-circuiting the main track circuit of a block ahead upon the passing of a train over said block so as to open the caution signal circuit on a following train, to operate its signal, through the influence of said secondary caution track-circuit, substantially as described.

4. The combination with a track divided into insulated blocks and each block containing short insulated rail sections arranged in groups at intervals, of a normally closed track circuit for each block, secondary track circuits connected with said short rail sections and normally broken at that point and having circuit closers normally closed by said track circuits, normally closed caution and danger signal circuits carried by the locomotive, shoes provided in said caution and danger signal circuits and arranged to contact with said short rail sections and be kept closed by said secondary circuits at that point, whereby said caution and danger signal circuits will remain unbroken and unaffected during the passage of the first train, and whereby when the first train enters a block and short circuits the track circuit of that block, the caution and danger signal circuits of the following train in a rear block will be broken to set its signals while passing over the insulated rail sections of said rear block, substantially as described.

5. The combination with a track divided into insulated blocks, each block containing a short insulated rail section, of a normally closed track circuit for each block arranged to be temporarily short circuited during the passage of a train through the block, a magnet in said track circuit, a secondary track circuit connected with said insulated rail section and normally broken at that point and having a circuit closer normally held in its closed position by the influence of said magnet, a normally closed caution signal circuit carried by the locomotive and having a shoe to contact with said short rail section and temporarily be completed by said secondary circuit when the circuit closer of said secondary circuit is attracted by the magnet of said track circuit, and said caution signal circuit being temporarily broken to operate its signal during the pas-

sage of its shoe over said short rail section when said secondary circuit is broken at its circuit closer by the short-circuiting of said track circuit, substantially as described. 60

6. An engineer's signal comprising an oscillating disk quadrant having different colored lens, and a spring arranged to urge said disk to its alarm or danger position, a contact point in the path of said disk, a valve lever, toggle levers, pivotally connected with said disk and with said valve lever, contact shoes and an electric circuit connecting said contact point and said disk with said shoes, and a solenoid having its armature connected with said disk and normally holding it in contact with said point against the power of said spring. 65

7. The combination with a track divided into insulated blocks, the blocks containing insulated sections of track-rail, of a normally closed track-circuit, a locally disposed signal having a switch connected with the normally closed track circuit and in a secondary track-circuit which includes said sections of track-rail, and a normally closed caution signal circuit carried by a locomotive, said normally closed signal circuit being adapted to be temporarily broken by the passage of a train over said sections of track-rail and the opening of said locally disposed signal switch, substantially as described. 75

8. The combination with a track divided into insulated blocks, each block having a normally closed main track-circuit arranged to be temporarily short-circuited by a train entering the block, a secondary normally closed circuit to each block, and a normally closed caution signal circuit carried by a locomotive, said secondary normally closed track-circuit being adapted to be temporarily opened upon the short circuiting of the track-circuit of a block ahead by a train passing through said block, and said caution signal circuit on a following train adapted to be temporarily broken to operate its signal by said temporary opening of the secondary track-circuit and to be restored to its normal condition after the train ahead has passed out of the block ahead, substantially as described. 85 90 95 100 105

In witness whereof, I have hereunto set my hand this 8th day of December 1905.

EDWARD McCLINTOCK.

Witnesses:

RICHARD PAUL,
C. MACNAMARA.