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BLOCK SYSTEM FOR RAILWAYS.

APPLICATION FILED JAN. 2, 1908.

928,271.

Patented July 20, 1909.

2 SHEETS—SHEET 1.

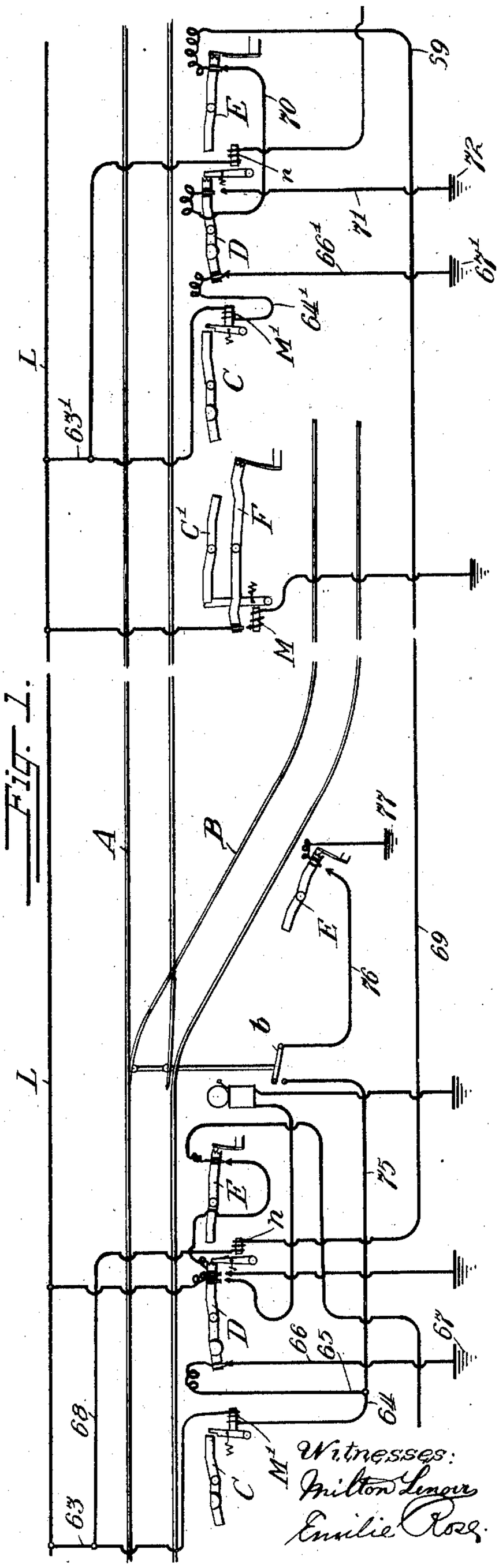


Fig. 1.

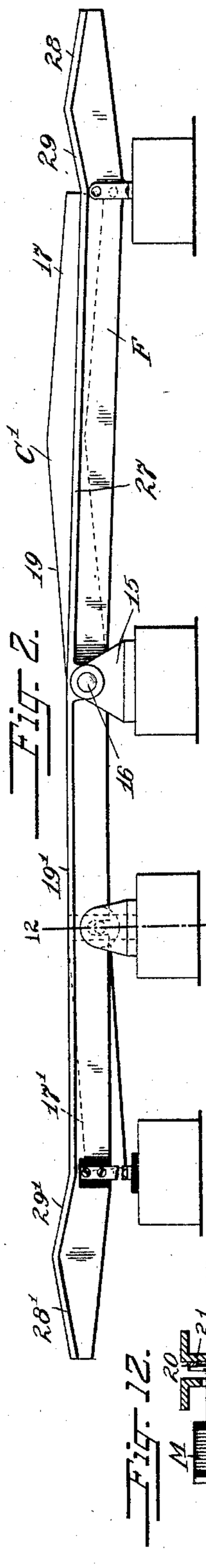


Fig. 2.

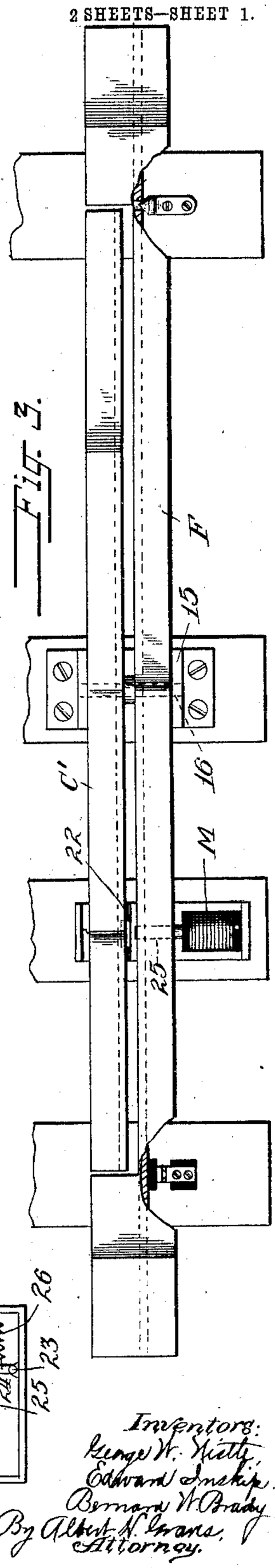


Fig. 3.




Fig. 12.

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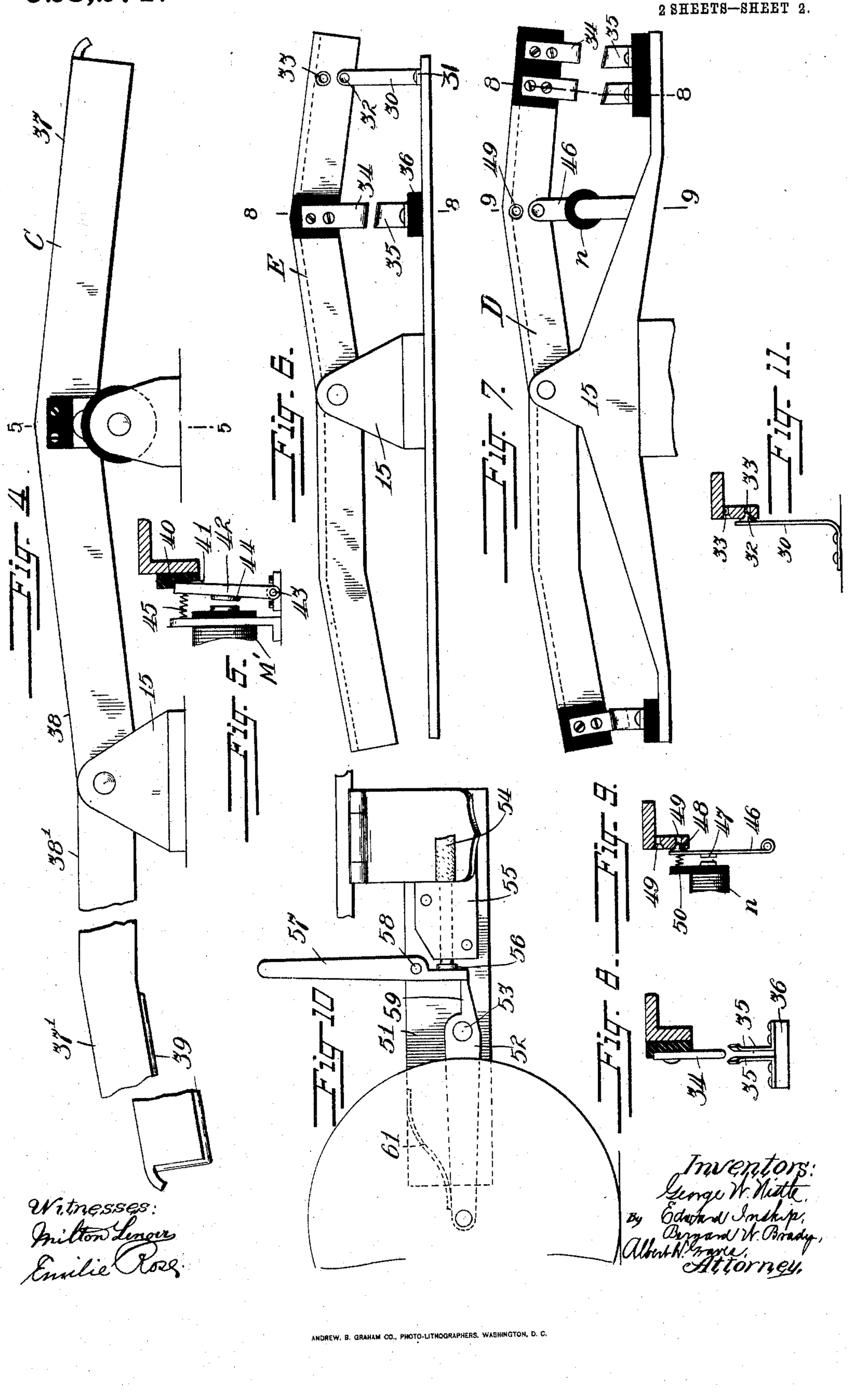


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# UNITED STATES PATENT OFFICE.

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## BLOCK SYSTEM FOR RAILWAYS.

No. 928,271. Specification of Letters Patent. Patented July 20, 1909.

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*To all whom it may concern:*

Be it known that we, GEORGE W. NISTLE, residing at North Muskegon, in the county of Muskegon and State of Michigan, and BERNARD W. BRADY and EDWARD INSKIP, residing at Chicago, in the county of Cook and State of Illinois, all citizens of the United States, have invented certain new and useful Improvements in Block Systems for Railways, of which the following is a specification.

This invention relates to improvements in block systems for railways and refers more particularly to improvements in a system of that general type in which mechanism located along the track coöperates with mechanism upon the train to automatically arrest the latter in case the train be sent into a block the mechanism of which is set at danger.

Among the salient objects of the present invention are to provide a system which is completely automatic in its arresting functions and of reliable construction and operation, thereby eliminating the "personal equation" to the greatest practicable extent and reducing the danger factor to a minimum; to provide a simple mechanism for coöperating with the air brake system with which nearly all trains are now equipped and whereby said air brake mechanism is brought into operation automatically in case the blocking conditions are such that this should be done; to provide an improved type of track lever which constitutes an important factor in simplifying such systems and specifically in carrying out the system herein described; to provide a system which can be used in conjunction with a block having a siding whereby a train can pass over a block with safety when another train is on the siding and whereby the latter train is effectually protected from the other train; to provide means for preventing a train backing into a block; to provide in conjunction with the automatic arresting mechanism a coöperating signaling mechanism; and in general to provide an improved system of the character referred to.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

In the accompanying drawings—Figure 1 shows diagrammatically an embodiment of the system as applied to one track only of a double track railway, having a siding open at one end. Fig. 2 is a side elevation of the combined levers which are adapted to arrest a backing train. Fig. 3 is a plan view of the construction shown in Fig. 2 parts being broken away to more clearly show details of construction. Fig. 4 is a side elevation of one of the levers hereinafter designated the "blocking lever". Fig. 5 is a cross sectional view taken on lines 5—5 of Fig. 4. Figs. 6 and 7 are side elevations of different track instruments which coöperate with the controller wheel. Fig. 8 is a sectional detail taken on line 8—8 of Fig. 7. Fig. 9 is a cross sectional detail taken on lines 9—9 of Fig. 7. Fig. 10 is a detail side elevation of the controller wheel and associated parts and their mountings, part of the wheel being broken away to reduce size of the drawing. Fig. 11 is a sectional detail of the friction latch mechanisms shown in Figs. 2 and 6. Fig. 12 is a sectional detail taken through lines 12—12 of Fig. 2.

In carrying the present invention into effect we employ a novel type of circuit control track instruments each of which instruments has as its main feature a lever contact making device, pivoted between its ends and provided with one or more tread surfaces inclined relatively to the horizontal so that as the lever is traversed by the controller wheel, it will be oscillated and left in one position or another, depending upon the direction of the traverse of the wheel and also upon the construction of the lever itself. Sets of these track instruments differing somewhat in construction but all of the same general type, are located along the rails of the railroad in position to be encountered by a controlling wheel carried in some suitable manner by some part of the train, and this controlling wheel is under certain conditions raised or forced upwardly by the track instruments, and thereby causes the venting of the train pipe of the automatic air brake mechanism of the train, and thus brings about the arresting of the latter. The system herein described is also so arranged as to automatically lock the block when a train enters the same and also to automatically clear the block when a train has passed upon the siding and the switches are thrown back to closed position.

In the diagram, A designates as a whole a railroad track, B a siding open at one end, and these shown diagrammatically, and C, D and E track instruments which together constitute a coöperative set.

F and C′ constitute the combined levers which will permit a train to pass over them only in a forward direction.

Inasmuch as the several track instruments are differently constructed, and these differences involve different operations, the construction of the said instruments are first to be described.

Referring to Fig. 2, the instruments there shown are the combined levers F and C′. Each lever is pivotally mounted at 16 on a base plate 15 which is adapted to be secured to a cross tie or other suitable support upon the road bed. Describing first the lever C′, it is made of angle iron so as to be both light and strong and it is bent to provide oppositely downwardly inclined end tread surfaces 17, 17′, and downwardly inclined converging intermediate tread portions 19, 19′. This lever is supported relatively to the line of travel of the controller wheel which actuates the lever so that it will be oscillated by the traverse of a wheel thereover. The rear end of this lever is weighted so that its forward end will be elevated except when depressed by the passage of the train. This lever serves the purpose of a blocking lever and the downward movements of its rear end is positively controlled by a spring latch which is in turn controlled by a magnet M. Describing this latch mechanism, upon the inner side of the lever C′ is mounted a latch block 20 having a shoulder 21, with which is adapted to coöperate a spring latch 22 pivoted at its lower end, as indicated at 23 and carrying an armature 24 which is acted upon by the magnet M. The magnet has a reduced core extension 25 which extends through an under cut part of the lever F to act upon the armature of the latch. A spring 26 tends to withdraw the latch from the magnet and into engagement with the latch block 20. Describing now the instrument F, this lever comprises a relatively long central portion 27, downwardly inclined end tread portions 28, 28′, respectively, and downwardly inclined converging intermediate tread portions 29, 29′. The position of this lever is controlled by a friction latch mechanism at its forward end which is adapted to hold the lever yieldingly in either of its two positions in which it happens to be left. This friction latch mechanism comprises a spring plate latch 30 secured at 31 to a base plate and having a conically inclined engaging end 32 which coöperates with the corresponding recesses 33 formed in the side face of the lever F and at suitable points corresponding to the two positions of the lever. This latch is adapted to be normally spring pressed against the lever F. Upon the rear end of the lever F is fixed a contact plate 34, insulated from the body of the lever and adapted to coöperate with a pair of contact plates 35, 35 mounted upon a suitable fixed support 36 below the lever. The arrangement of these parts is shown clearly in Fig. 8.

Referring to Fig. 4, the instrument there shown in the one designated C and which is adapted to serve as one of the main blocking levers. This lever is similar in construction to the lever C′ before described and is bent to provide oppositely downwardly inclined tread surfaces 37, 37′ at its ends, and intermediate converging tread portions 38 38′. This lever is similarly mounted on a base 15 and weighted at its end, as indicated at 39. This instrument is provided at its forward end with a latch mechanism similar in construction to the latch mechanism of the lever C′. Describing this latch mechanism, upon one side of the lever is mounted a latch block 40 having a shoulder 41 with which is adapted to coöperate a latch 42 pivoted at its lower end, as indicated at 43, and carrying an armature 44. This armature is acted upon by a magnet M′ which when energized draws the latch away from the block 40. A spring 45 is interposed between the latch and the head of the magnet spool intended to press the latch away from the magnet into engagement with the latch block 40. This latch mechanism is adapted when in a locked position to prevent the depression of the forward end of the lever by the controller wheel on a train, and thus set the air brake should the train try to pass over this lever when in blocked position.

In Fig. 7 is shown the instrument designated D in the diagram. The shape of this lever is, or may be, similar to the shape of the lever C just described and is similarly mounted upon a base plate 15. The forward end of this lever is provided with a friction latch mechanism adapted to hold the lever yieldingly in either of its two positions in which it happens to be left. This friction latch mechanism comprises a magnet N arranged to act upon the pivoted latch member 46 carrying an armature 47 and provided with a conical or double inclined engaging end 48 which coöperates with corresponding shaped recesses as 49, 49, formed in the side face of the lever and at suitable points corresponding to the two positions of this lever. This latch is held normally in engagement with the lever by means of an expansion spring 50 interposed between the latch and the head of the magnet spool. Upon the forward end of this lever D is fixed a pair of contact plates 34 each of which coöperates with a pair of stationary plates 35 as shown in Fig. 8. The rear end of this lever carries a single contact plate 34 which coöperates with a pair of stationary plates 35, it being understood that

these contacts may be identical in construction with each pair of those upon the forward end of this lever.

In Fig. 6 is shown the instrument or lever E. This instrument is in construction generally similar to the instrument D just described. It is provided, however, with only one contact 34 which is fixed at its forward end and coöperates with the stationary contacts 35 on the base member 36. The frictional latch mechanism may be exactly similar in construction to the construction of the frictional latch which coöperates with the forward end of the lever F, and is shown in detail in Fig. 11. It will be seen that this instrument is adapted to remain in the different positions in which it may be left, by reason of its frictional latch mechanism. Inasmuch as it is to be shifted positively from one position to another it is unnecessary to provide means for withdrawing this frictional latch so as to permit it to return by gravity.

Next describing the controller wheel and its associated mechanism, and referring to Fig. 10, upon a suitable part of the train as for example upon the journal box of one of the axles of the tender, is mounted a frame designated as a whole 51, and which in turn carries a lever 52 pivotally mounted between its ends, as indicated at 53. A pipe 54 connected with, and leading from, the air train pipe of the train extends through a suitable block or support 55 upon the frame 51 and terminates in a cap 56 which is normally held upon the pipe and tends to close and seal the latter by means of an upright lever 57 pivoted upon the frame, as indicated at 58. This lever is held in position to retain the cap 56 by an extension 59 of the lever 52; the arrangement being such that when this end of the lever is depressed it releases the lever 57 and vents the train pipe. Upon the longer end of the lever 52 is mounted the controller wheel 60, which coöperates through the several levers hereinbefore described. This controller wheel is provided with a relatively wide tread of sufficient width to simultaneously engage two of the levers of the track instruments which may be arranged in overlapping position to each other as the levers C′ and F. The wheel is held against rising until it encounters a lever which is held positively in fixed position, by a relatively stiff spring 61 mounted upon the frame 51 and bearing upon the upper side of the lever 52. When the controller wheel has been lifted so as to release the lever 57, vent the train pipe and so apply the brakes and arrest the train, the parts associated with the controller wheel will be restored to their normal position manually by the train men.

The circuits of the systems which utilize the mechanism will now be traced.

Referring to diagrammatic Fig. 1, the system is therein shown as organized for controlling a single way track, *i. e.* a track over which the trains normally pass in one direction only, as usual where double tracks are employed. The single way track is as shown provided with a siding open at one end only. It is to be observed that the several contact levers are shown in their normal positions.

The several levers and their magnets are designated by the same characters used in describing these mechanisms.

At the entrance to the block, the lever C is in unlocked position so that it may be oscillated in either direction, inasmuch as the magnet which withdraws the controlling latch 42 is at this time energized. The circuit which energizes this magnet extends from the feed line L by way of conductor 63 through magnets M′ thence by way of conductors 64 and 65, rear contacts of the lever D and conductor 66 to ground at 67. This circuit is normally closed inasmuch as the rear end of the lever D is normally down. A train entering the block will thus freely pass over the lever C and next encounter the lever D and as it passes over the latter depresses its forward end. The forward end of this lever will remain depressed after the passage of the train thereover by reason of its friction latch mechanism, inasmuch as the controlling magnet *n* is at this time deën-ergized.

The circuit which energizes the magnet N may be traced as follows: From feed line L to conductor 63 thence by way of conductor 68 through magnet N to conductor 69 to the forward end of the block, thence through the contacts of the lever E to conductor 70, from conductor 70 to the forward contacts of the lever D, to conductor 71 and to ground at 72. This circuit is at this time broken between the contacts of the forward lever D inasmuch as this lever is in its normal position, *i. e.*, having its front end elevated.

After the train has passed over the lever D it next encounters the lever E, thus clearing the block at the rear as will hereinafter more clearly appear, but without performing any electrical function as far as this block is concerned. Assuming that the switch at the siding is closed, the train will ride by the switch and pass on to the forward end of the block. At the forward end of the block the controller wheel will first encounter the combined lever C′ and F. When it meets these levers it will first depress the rear end of the lever F thus closing the circuit which energizes the magnet M, withdrawing the latch controlled thereby, and place the lever C′ in unlocked position. While the rear end of the lever F is still depressed, the controller wheel encounters and depresses the rear end of the lever C′, and thus safely passes over the latter. The controller wheel next encounters the forward end of the lever F, elevating the rear end and thus breaking the

circuit between the contacts of the lever F, whereupon the latch mechanism returns to its normal locked position. The controller wheel next encounters and rides freely over the lever C, inasmuch as the magnet controlling the latch mechanism associated with this lever is at this time energized.

The circuit which energizes the magnet M′ at the forward end of the lever C may be traced as follows: From line L to conductor 63′, through forward magnet M′ to conductor 64′, thence through the back contacts of the forward lever D to conductor 66′ to ground at 67′.

When the wheel reaches the forward lever D it will ride over the rear end of the latter without performing any electrical function, inasmuch as it is already in its normal position *i. e.*, with its rear end depressed. When the wheel depresses the forward end of this lever it will break the circuit which energizes the forward magnet M′, thus setting the block at the rear at danger, and at the same time will close the contacts at the front end on the forward lever D. This closes the circuit which energizes the rear magnet *n*, which thereupon withdraws the latch controlling the rear lever D permitting the latter to return to normal position and thus clearing the block. It will be noted that as the train leaves a block it first elevates and then depresses the forward end of the lever E without, however, performing any electrical function, inasmuch as it merely returns this lever to its normal position.

The manner of clearing the block when a train has entered the siding and it is desirous of permitting a following train to pass through the block, will now be described. It will be remembered that when a train has passed over the rear lever D it breaks the circuit at the ground 67 and thus deënergizes the rear magnet M′. This magnet M′ will remain deënergized until the train has passed out of the forward end of the block and the lever D is released, unless a circuit is provided for energizing the magnet M′ other than the one through the back contacts of the lever D. To the above end we provide a lever E similar in construction to the other levers E heretofore referred to, which lever is adapted to be oscillated by the controller wheel of a train after the latter has entered the siding B. This lever is so arranged as to close the circuit which will energize the rear magnet M′ when the forward end of this lever is depressed. In order that a block may not be cleared after a train has entered the siding B until the switch is closed, the secondary circuit which controls the rear magnet M′ is also adapted to be broken and closed by a switch spring *b*. Assuming that a train has entered the siding B, depressed the forward end of the leve E and the switchman has closed the switch, the secondary circuit which energizes the magnet M′ will now be closed. This circuit may be described as follows: From line L by way of conductor 63 to and through magnet M′, thence by way of conductor 64 to conductor 75 to the switch spring *b*, which is now closed, thence by way of conductor 76 to the contacts of the siding lever E, to ground at 77. The closing of this circuit clears the block by energizing the magnet M′, even though the contacts at the rear end of the lever D still remain broken. The second train may now enter the block, inasmuch as it may freely oscillate the lever C. After the following train has passed the siding B, the switchman may open the switch and permit the first train to back out of the siding and follow the second train out of the block. When the first train backed out of the siding it elevated the forward end of the lever E, thus taking off ground at 77 and thus deënergizing the magnet M′. This sets rear end of block in danger position inasmuch as the contacts at the rear end of the rear lever D still remained broken. When the trains pass out of the forward end of block they will of course clear the latter as heretofore described.

We claim as our invention:

1. In a railway block system, the combination with a pair of levers pivotally mounted between their ends, adjacent to each other and having parts overlapping, each of said levers having one or more inclined track surfaces whereby said levers are oscillated by the traverse thereover of a traversing member carried by a train, a locking mechanism associated with one of said levers, and means carried by said other lever for controlling said locking mechanism.

2. In a railway block system, the combination with a pair of levers pivotally mounted adjacent to each other and having parts overlapping, said levers being adapted to be oscillated by the traverse thereover of a traversing member carried by a train, a locking mechanism associated with one of said levers, and means controlled by said other lever for actuating said locking mechanism.

3. In a railway block system, the combination with a pair of levers pivotally mounted between their ends, adjacent to each other, each of said levers having one or more track surfaces whereby said levers are oscillated by the traverse thereover of a traversing member carried by a train, a locking mechanism associated with one of said levers, a circuit controlling said locking mechanism, and contact devices carried by said other lever and controlling said circuit.

4. In a railway block system, the combination with a pair of levers pivotally mounted between their ends adjacent to each other, each of said levers having one or more track surfaces whereby the said levers are oscil-

lated by the traverse thereover of a traversing member carried by a train, of a locking mechanism associated with one of said levers, and mechanism controlling said locking mechanism and in turn controlled by said other lever.

5. In a railway block system, the combination with a pair of track levers pivotally mounted between their ends, each of said levers having one or more track surfaces whereby said levers are oscillated by the traverse thereover of a traversing member carried by a train, and a friction latch mechanism associated with one of said levers for holding the latter yieldingly in one or more positions.

6. In a railway block system, the combination with a track lever pivotally mounted between its ends and provided with a track surface whereby said lever is oscillated by the passage thereover of a traversing member carried by the train, a second lever pivotally mounted adjacent to said first lever and provided with an inclined track surface beyond either end of the track surface of said other lever, and electrically controlled mechanism operatively associated with said levers.

7. In a railway block system, the combination with a pair of track levers mounted adjacent to each other and provided with one or more inclined track surfaces, a locking mechanism associated with one of said levers, a magnet associated with said locking mechanism and adapted to unlock the latter when energized, and means controlled by said other lever for energizing said magnet.

8. In a railway block system, the combination with a pair of track levers pivotally mounted between their ends adjacent to each other with parts overlapping and each provided with one or more track surfaces, of self locking mechanism associated with one of said levers for automatically locking the latter against oscillation, a magnet for unlocking said locking mechanism and an electric current for energizing said magnet, said circuit being controlled by said other levers.

9. In a railway block system, the combination with a blocking lever of locking mechanism associated with said lever, a circuit controlling said locking mechanism, a second lever carrying a contact device for controlling said circuit, said locking mechanism and controlling circuit being so arranged as to permit the passage of a train over said blocking member only in one direction.

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