G. W. NISTLE, B. W. BRADY & E. INSKIP.

BLOCK SYSTEM FOR RAILWAY CROSSINGS.

APPLICATION FILED JAN. 2, 1908.

928,148.

Patented July 13, 1909.

2 SHEETS—SHEET 1.

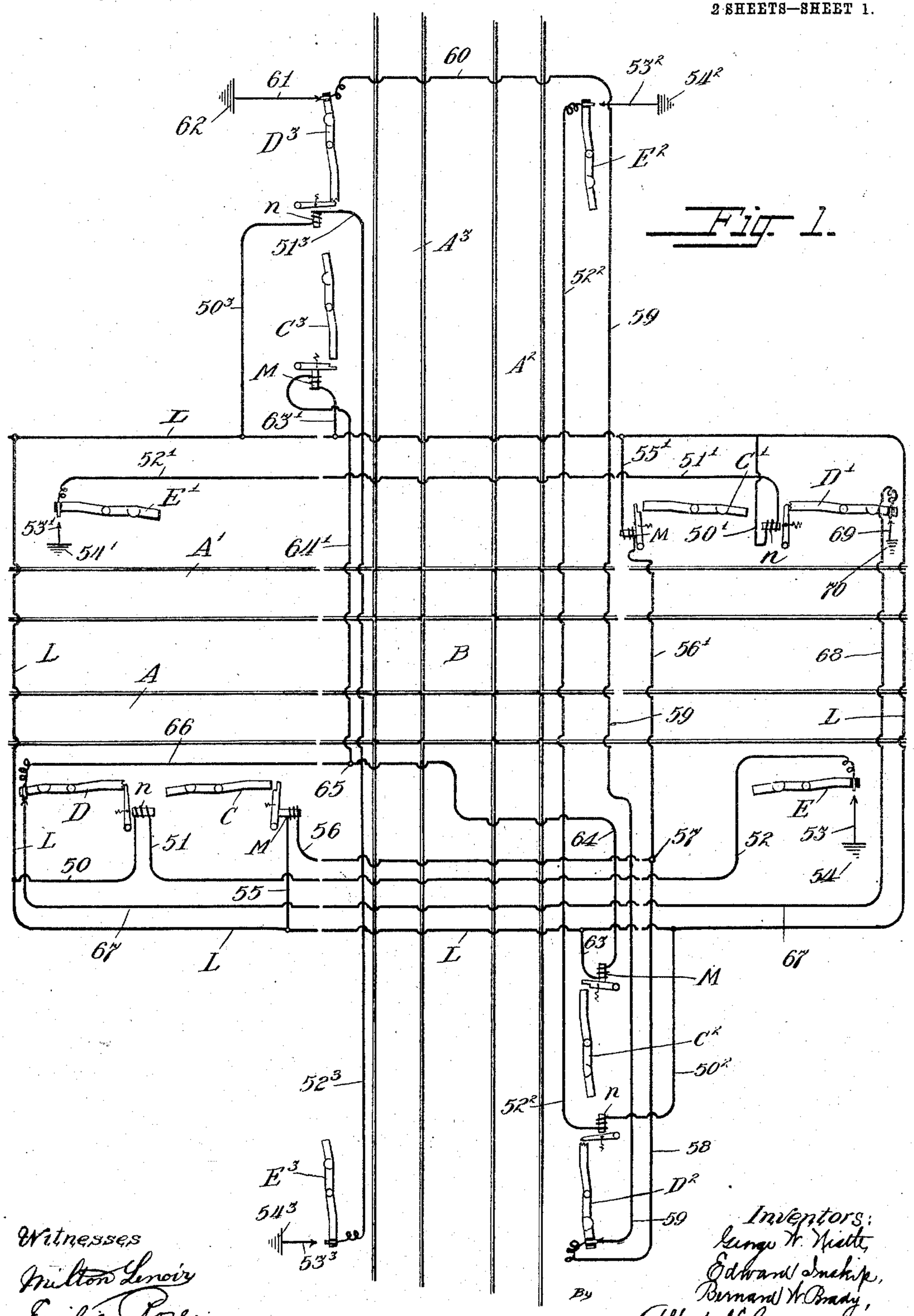

Fig. 1.

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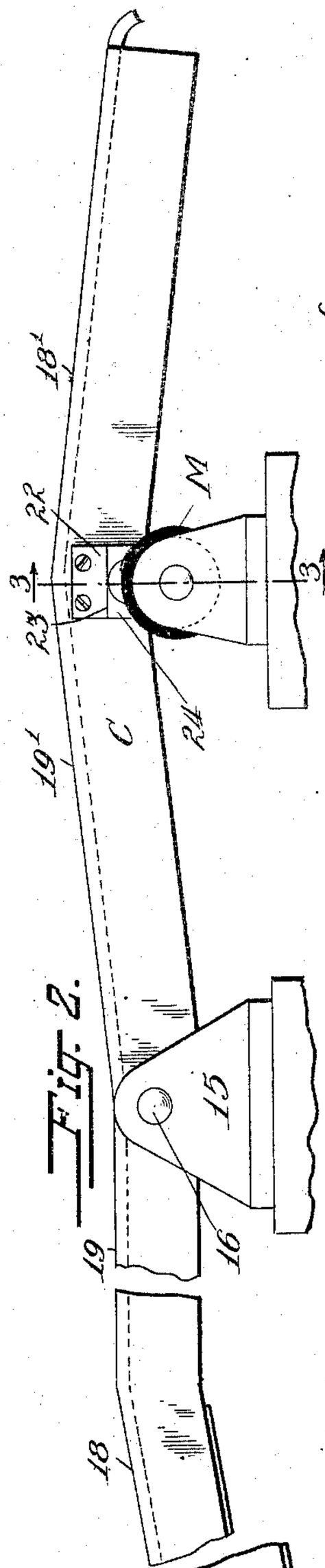

Fig. 2.

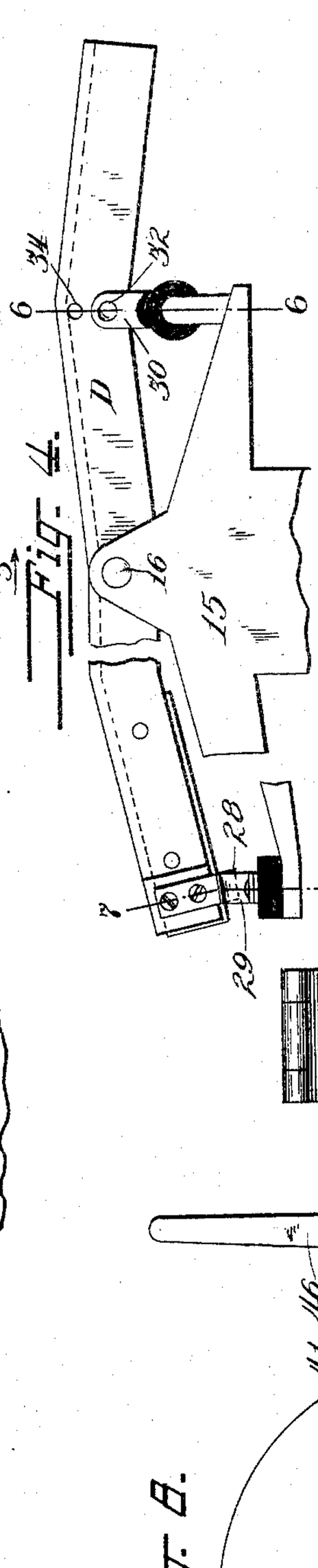

Fig. 4.

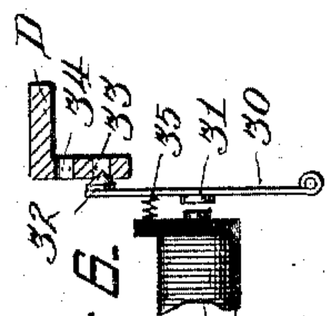

Fig. 6.

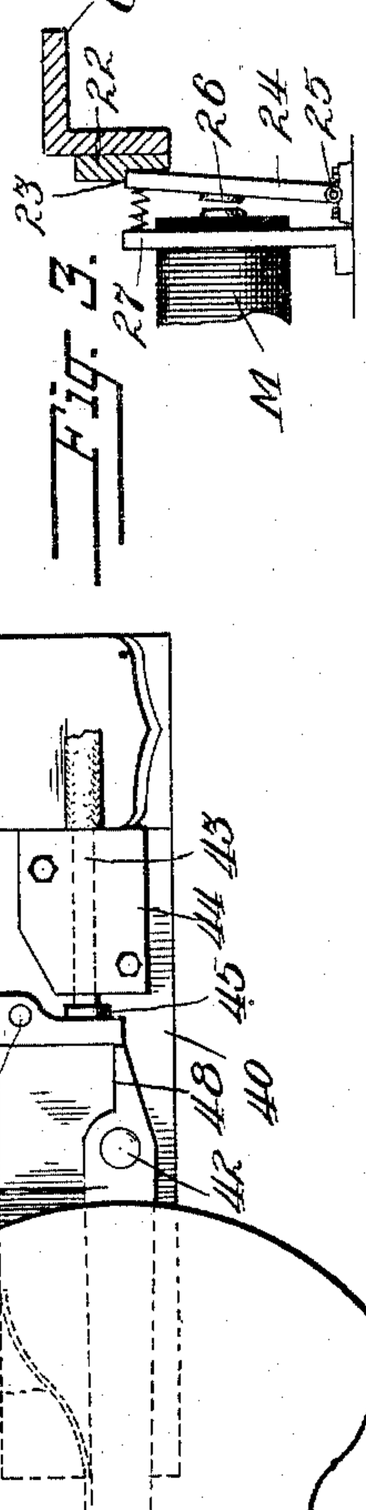

Fig. 3.

Fig. 1.

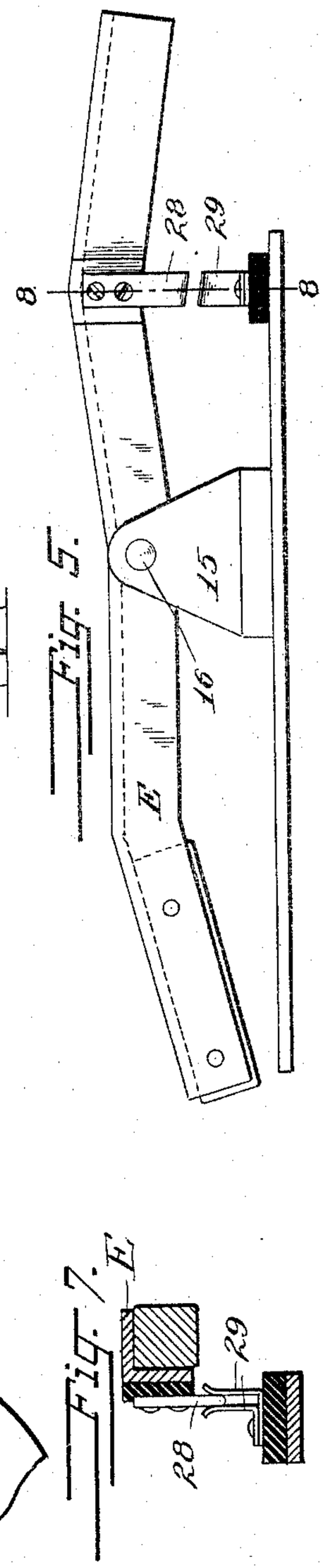

Fig. 5.

Fig. 8.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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BLOCK SYSTEM FOR RAILWAY-CROSSINGS.

No. 928,148. Specification of Letters Patent. Patented July 13, 1909.

Application filed January 2, 1908. Serial No. 408,945.

To all whom it may concern:

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

This invention relates to improvements in block systems for railway crossings, 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 attempts to pass a crossing, the block mechanism of which is set at danger.

The general character of the invention consists in providing an electrically controlled system, whereby when one or more trains are using a crossing, trains coming at an angle thereto will be prevented from using the crossing until the first mentioned trains have safely passed the latter.

Among the salient objects of the present invention are to provide a system which is completely automatic in its arresting function and of reliable construction and operation, thereby eliminating the "personal equation" to the greatest practicable extent reducing the danger factor to a minimum; to provide a system wherein a train approaching a crossing, as a north bound train for example, automatically locks a crossing against use by a west or east bound train until the north bound train has safely passed thereover, whereupon the crossing is automatically cleared; to provide a system which is adapted for use with a relatively large number of tracks crossing each other at different angles; to provide in such a system simpler and effective mechanism for coöperating with the air brake mechanism with which nearly all trains are now equipped and whereby said air brake mechanism is brought into operation automatically in case the blocked conditions at the crossing are such that this should be done; to provide an improved type of track lever which constitutes an important factor in simplifying such systems; to provide a system in which the circuits and levers are so arranged as to be essentially duplicated with each track and in general to provide an improved construction of the character referred to.

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

In the drawings,—Figure 1 shows diagrammatically an embodiment of the system as applied to a crossing in which two double track railways are shown as crossing each other at right angles. Fig. 2 is a detail and side elevation of one of the track instruments with which each track is equipped, and hereinafter designated "blocking lever." Fig. 3 is a cross sectional detail taken on lines 3—3 of Fig. 2 and looking in direction of arrows. Figs. 4 and 5 are detail side elevations of different track instruments used for closing and clearing the block, respectively. Fig. 6 is a cross sectional detail taken through lines 6—6 of Fig. 4. Fig. 7 is a cross sectional detail of the contact devices taken through either line 7—7 or line 8—8 of Figs. 4 and 5, respectively. Fig. 8 is a side elevation of the controller and its associated mechanism with parts of wheel broken away to reduce the size of the drawing.

In carrying the present invention into effect we employ a novel type of circuit controlling track instrument which takes the form of a lever having one or more tread surfaces inclined relatively to the horizontal. One or more of these instruments is provided with contact making devices controlling circuit connections which lock or clear the block. Others of these instruments are adapted to coöperate with mechanism upon the train to set the air brakes when these instruments are latched in locked positions. Sets of these instruments varying 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.

In the diagram A, A^1, A^2, and A^3 designate two double railway tracks crossing each other at right angles at a crossing designated as a whole B; D, D^1, D^2, and D^3 designate the respective levers which control the locking circuit. E, E^1, E^2, and E^3 designate the levers which control the circuit which clears the block. C, C^1, C^2, and C^3 designate the "blocking levers." The respective instru-

ments of each of these sets are, or may be, identical in construction. Inasmuch as the several track instruments are somewhat differently constructed and these differences involve somewhat different operations, the construction of said instruments will first be described.

Referring to Fig. 2, the instrument there shown is one of the C-set, of levers. This instrument or lever is pivotally mounted at 16 to a suitable base plate 15, which in turn is mounted upon a cross tie or other suitable support upon the road bed. This lever is desirably made of angle iron so as to be both light and strong and is bent to provide oppositely downwardly inclined tread surfaces 18, 18′ and converging intermediate surfaces 19, 19′. This lever is so supported, relatively to the line of travel of the controller wheel which actuates the lever that it will be oscillated by the traverse of the wheel thereover. This lever is weighted at its rear end so that after the passage of a train thereover it will return to its normal position, *i. e.*, with its front end elevated. The depression of the forward end of this lever is positively controlled by a magnet M and a coöperating latch mechanism. Describing this latch mechanism, and referring to Fig. 3 upon the side of the lever opposite the magnet M is mounted a latch block 22 having a shoulder 23 with which is adapted to coöperate a latch 24 pivoted at its lower end as indicated at 25, and carrying an armature 26 which is acted upon by the magnet. A spring 27 is interposed between the latch and a head of the magnet spool so as to press the latch away from the magnet and into engagement with a latch block 22. This latch mechanism is so depressed as to positively hold the forward end of the lever in an uplifted position when the controlling magnet is deënergized.

In Fig. 4 is shown one of the D-set of instruments. The general shape and construction of this lever is, or may be, precisely the same as that of the C-instruments. It is similarly pivoted at 16 on a base 15. At its rear end this lever is provided with an insulated contact plate 28 adapted to cooperate with a pair of stationary plates 29 mounted upon the base frame, while the forward end of the lever is provided with a friction latch mechanism. This friction latch mechanism 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 magnet and is arranged to act upon a pivoted latch member 30 carrying an armature 31 and provided with a conical or double inclined engaging end 32 which coöperates with correspondingly shaped recesses as 33 and 34 formed in the side face of the lever and at suitable points corresponding to the two positions of the lever. This latch is held normally in engagement with the lever by means of expansion spring 35 interposed between the latch and the head of the magnet spool.

In Fig. 5 is shown one of the E-set of instruments. This instrument is in general construction similar to the instrument D just described except that it carries its contact plate at its forward instead of its rear end, as shown in the drawing. It is however not provided with any latch mechanism, and is adapted to return to its normal position by gravity. It is further weighted at its rear end as shown. This instrument is adapted to close a momentary circuit when the controller wheel of a train passes over the lever whereupon the latter would momentarily return by gravity to its normal position.

Next describing the controller wheel and its associated mechanism, and referring to Fig. 8, 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 40, and which in turn carries a lever 41 pivotally mounted thereon between its ends, as indicated at 42. A pipe 43 connecting with and leading from, the air train pipe of the train extends through a suitable block or support 44 upon the frame 40 and terminates in a cap 45 which is normally held upon the pipe so as to close and seal the latter by means of an upright lever 46 pivoted upon the frame as indicated at 47. This lever is held in position to retain the cap by an extension 48 of the lever 41; the arrangement being such that when this end of the lever is depressed it releases the lever 46 and vents the train pipe. Upon the longer end of the lever 41 is mounted a controller wheel 49 which coöperates with the several levers of the track instruments hereinafter described. This controller wheel is held against rising until it encounters one of the blocking levers which is held against downward movement, by a relatively stiff spring 49′ mounted upon the frame 40 and bearing upon the upper side of the lever 41. When the controller wheel has been elevated so as to release the lever 46, 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 positions manually by the trainmen.

The circuits of the system which outline the mechanism just described will now be traced.

Referring to diagrammatic Fig. 1, the system is therein shown as applied to a crossing in which two pair of double railway tracks cross each other at right angles. The system is shown as applied to tracks in which trains pass over the respective tracks only in one direction. For the purpose of clearness, trains using the tracks A, A^1, A^2 and

A^3 will hereinafter be designated the east, west, north and south bound trains respectively. It is to be observed that the several levers shown in diagrammatic Fig. 1 are in their respective positions, such as they would be when each of the blocking levers is in its normal or cleared position. The several levers and their magnets are designated by the same numerals used in describing these mechanisms. Assuming that an east bound train is approaching the crossing B and entering the block it will first encounter the lever D, and depress the forward end of that lever as it passes over the latter, thus breaking the circuit controlled by the contact at the rear of that lever. After the passage of the train thereover the forward end of the lever D will remain depressed through the action of its friction latch for the reason that its controlling magnet is at this time deënergized. This circuit will be hereinafter described. When the east bound train interrupted the circuit controlled by the rear contact of the lever D it automatically set the blocking levers C^2 and C^3 in their danger position. This resulted from the fact that the circuits which normally energize the magnets controlling the lever C^2 and C^3 was interrupted through the back contacts of the lever D. The circuit which controls the magnet M of the lever C^2 may be traced as follows: from line L to conductor 63, thence through the magnet M controlling the lever C^2 to conductor 64 to junction point 65; thence by way of conductor 66, through the back contacts of lever D to conductor 67, to extension 68, and from thence to the back contacts of lever D′ to conductor 69 to ground at 70. This circuit is broken only at this time at the back contacts of lever D inasmuch as the back contacts of lever D′ is in its normal closed position. The circuit which controls the magnet of the lever C^3 extends from the line L to conductor 63′ and magnet M thence by way of conductor 64′ to the junction point 65; and thence to ground at 70 in the manner just described, in connection with the circuit controlling the lever C^2. It will thus be seen that after the east bound train has entered the block, a north or south bound train will be excluded therefrom inasmuch as the blocking levers C^2 and C^3 are in danger position by means of interruption of the circuit through the back contact of lever D. The levers C^2 and C^3 remain in their blocked position until the east bound train passes the crossing and its controller wheel rides over the lever E thus momentarily closing the contacts at its forward end. This closes the circuit which energizes the magnet *n* controlling the lever D, withdrawing its latch and permitting that lever to return to normal position. This circuit may be traced as follows: from line L to conductor 50 through magnet *n* to conductor 51, thence by way of extension 52 to the forward contact on the lever E and thence by way of conductor 53 to ground at 54. When the lever D has returned to its normal position it closes the circuit through its back contacts which energizes the magnets controlling the levers C^2 and C^3 thus clearing the north and south ends of the block.

It will be seen that should a west bound train be using the crossing it will set the blocking levers C^2 and C^3 controlling the north and south bound train in danger position in the manner hereinbefore described, the only difference being that the circuit controlling the magnet of levers C^2 and C^3 will be broken at the contact of the lever D′ in place of at the rear contact of the lever D. When the west bound train passes out of the block it will oscillate the lever E′ thus energizing the magnet controlling lever D′ and permit it to return to normal to clear the block. The circuit which controls the magnet of the lever D′ may be traced as follows: from line L to conductor 50′, through the magnet N of the lever D′, thence by way of conductor 51′ and 52′ to forward contact of lever E′, thence by way of conductor 53′ to ground at 54′.

It will be seen that west and east bound trains may use the crossing at the same time without in any manner disarranging the circuit connections, inasmuch as the circuit controlling the blocking lever at the north and south end of the block will be interrupted at two places in place of one.

Assuming that a south bound train is approaching the crossing B, the system being in normal condition it will first encounter the lever D^3 and as it passes over the latter interrupt the circuit at the rear end thereof in the same manner heretofore described. This interrupts the circuits controlling the blocking levers C and C′ and places the east and west ends of the block in danger position. It might be here noted that the back contacts of the lever D^3 will remain in their open position after the train has passed over the lever, inasmuch as the magnet controlling the latch mechanism of the lever D^3 is at this time deënergized. The circuit which controls the blocking lever C may be traced as follows: from line L to conductor 55, through magnet M of lever C and thence by way of conductor 56 to the junction point 57, from the junction point by way of conductor 58 to the back contacts of lever D^2, at this time closed, thence by way of conductor 59 and extension 60 to the back contacts of lever D^3 (now open) thence by way of conductor 61 to ground at 62. The circuit controlling the magnet M of the lever C′ extends from line L to conductor 55′ through the magnet of this lever, thence by way of conductor 56′

and the junction point 57. This circuit then proceeds to ground at 62 over the common circuit connections controlling the lever C just described. When the south bound train passes out of the block it will oscillate the lever E^3, thus energizing the controlling latch mechanism of the lever D^3 whereupon this latter lever will return to its normal position and the circuits which clear the east and west ends of the block will be closed. The circuit which energizes the magnet controlling the magnet of the lever D^3 may be traced as follows: from line L to conductor 50^3 through the magnet *n* to conductor 51^3 thence by way of extension 52^3 to the forward contact of the lever E^3 to conductor 53^3 to ground at 54^3.

Inasmuch as the blocking levers C and C′ are set at danger by an approaching north bound train in a manner similar to the case of the south bound train, these circuits need not be again described. The circuit, however, which energizes the magnet *n* of the lever D^2 when the south bound train passes out of the block, and thus places the system in normal condition may be traced as follows: from the line L to conductor 50^2 through the magnet *n*, thence by way of conductor 52^2 to the forward contacts of lever E^2, and thence by way of conductor 53^2 to ground at 54^2.

We claim as our invention:

1. In a railway block system for crossings, the combination with a track, of a second track crossing the former, blocking mechanism associated with said first track, locking mechanism controlling said blocking mechanism, train actuated contact devices mounted adjacent to said second track, normally closed circuit connections for actuating said locking mechanism and including said train actuated devices whereby said locking mechanism is placed in locked position upon the opening of said contact devices, and a suitable source of electric energy.

2. In a railway block system for crossings, the combination with a track, of a second track crossing the former, a blocking lever pivotally mounted between its ends adjacent to said first track, locking mechanism controlling said blocking lever, a magnet associated with said locking mechanism and adapted to lock the latter when deënergized, a second lever pivotally mounted adjacent to said second track, electrical contact devices controlled by said second lever, circuit connections including said magnet and said contact devices whereby said blocking lever is electrically controlled by said contact controlling lever.

3. In a railway block system for crossings, the combination with a track of a second track crossing the former, a blocking lever pivotally mounted between its ends adjacent to said first track, locking mechanism controlling said blocking lever, a magnet associated with said locking mechanism and adapted to unlock the latter when energized, a second lever pivotally mounted adjacent to said second track and in advance of the crossing, a magnet controlling said second lever, electrical contact devices controlled by said second lever, circuit connections including the magnet of the blocking lever and said contact devices whereby said blocking lever is electrically controlled by said contact controlling lever a second contact controlling lever pivotally mounted adjacent to said second track, but on opposite side of crossing from first contact lever, electrical contact devices controlled by said second contact controlling lever, circuit connections including said latter contact devices and the magnet of said first contact controlling lever, whereby the latter is controlled electrically by said contact controlling lever, and a suitable source of electric energy.

4. In a railway block system for crossings, the combination with a track, of a second track crossing the former, blocking mechanism associated with one of said tracks, train actuated contact devices associated with the other track and circuit connections including said train actuated contact devices and adapted to place said blocking mechanism in blocking position upon the opening of said contact devices.

5. In a railway block system for crossings, the combination with the track, of a second track crossing said first track, a blocking mechanism associated with one of said tracks, an electrically actuated locking mechanism controlling said blocking mechanism, normally closed circuit connections for controlling said locking mechanism, a set of contact devices controlling said circuit connections and adapted to be actuated by a train upon the other track whereby said locking mechanism is set in locked position and a second set of contact devices similarly actuated whereby said locking mechanism is restored to unlocked position.

6. In a railway block system for crossings, the combination with a track, of a second track crossing the former, a blocking lever pivotally mounted between its ends adjacent to said first track and adapted to be oscillated by the traverse thereover of a traversing member carried by a train, locking mechanism controlling said blocking lever, a normally energized magnet controlling said locking mechanism, train actuated contact devices associated with said other track and circuit connections connecting said magnet and said contact devices whereby the opening of said contact devices deënergizes said magnet and places said locking mechanism in locked position.

7. In a railway block system for crossings, the combination with a track, of a second

track crossing the former, an electrically controlled blocking mechanism associated with said first track, circuit connections controlling said blocking mechanism, a set of train actuated contact devices associated with said second track and controlling said circuit connections whereby said blocking mechanism is placed in locked position upon the opening of said contact devices, and a second set of train actuated contact devices associated with the said second track but upon the opposite side of said first track to said first train actuated contact device and controlling said circuit connections whereby said locking mechanism is restored to unlocked position.

8. In a railway block system for crossings, the combination with a blocking lever pivotally mounted adjacent to a track and adapted to be oscillated by a passing train, of locking mechanism controlling said blocking lever, a normally energized magnet associated with said locking mechanism and adapted to lock the latter when deënergized, and a set of train actuated contact devices, circuit connections including said magnet and the train actuating contact devices controlling said first set, whereby through said circuit connections the locking mechanism is restored to unlocked position.

9. In a railway block system for crossings, the combination with a pair of tracks crossing each other, of blocking mechanism associated with one of said tracks, electrically controlled locking mechanism controlling said blocking mechanism, a normally energized magnet normally holding said locking mechanism in unlocked position, train actuated mechanism associated with said other track, and circuit connections including said train actuated contact devices and circuit connections including said magnet and said contact devices whereby said locking mechanism is placed in locked position upon the opening of said contact devices.

10. In a railway block system for crossings, the combination with a pair of tracks crossing each other, of a pivotally mounted blocking lever associated with one of said tracks, a locking mechanism controlling said lever and adapted to prevent the oscillation of the latter by the traversing member carried by a train when said locking mechanism is in locked position, a normally energized magnet normally holding said locking mechanism in unlocked position, and train actuated contact devices associated with said other track and circuit connections including said magnet and said train actuated devices whereby said train actuated contact devices electrically control said blocking lever.

11. In a railway block system for crossings, the combination with a pair of tracks crossing each other, of a blocking mechanism associated with one of said tracks, a magnet controlling said blocking mechanism, train actuated contact devices associated with the other of said tracks, circuit connections including said magnet and said contact devices, holding mechanism associated with said contact devices and controlling the same, a second magnet controlling said holding mechanism, and circuit connections for energizing said latter magnet.

12. In a railway block system for crossings, the combination with a pivotally mounted blocking lever associated with one of said tracks, of locking mechanism controlling said blocking lever, a normally energized magnet normally holding said locking mechanism in unlocked position whereby said lever is free to oscillate, train actuated contact devices associated with the other track, circuit connections including said magnet and said train actuated contact devices whereby the actuation of said contact devices by the traversing member carried by a train places said locking mechanism in locked position, holding mechanism associated with said contact devices for retaining the latter in the position in which they are left by the traverse thereover of said traversing member, a second magnet controlling said holding mechanism, a second set of train actuated contact devices, and circuit connections including said second magnet and said second set of contact devices whereby the energizing of said second magnet withdraws said holding mechanism and permits said first set of train actuated contact devices to return to normal position.

13. In a railway block system for crossings, the combination with a track, of a second track crossing the former, blocking mechanism associated with said first track, locking mechanism controlling said blocking mechanism, a magnet controlling said locking mechanism, train actuated contact devices associated with the second track, circuit connections including said magnet and said train actuated contact devices, holding mechanism associated with said contact devices, a second magnet controlling said holding mechanism, a second set of train actuated contact devices associated with said second track, and circuit connections including said latter magnet and latter set of contact devices.

14. In a railway block system for crossings, the combination with a track, of a second track crossing the former, blocking mechanism associated with said first track, a magnet controlling said blocking mechanism, train actuated contact devices associated with said second track and controlling said magnet, circuit connections including said magnet and said train actuated contact devices, retaining mechanism associated with said contact devices, a second magnet con-

trolling said retaining mechanism, and circuit connections for said second mechanism.

15. In a railway block system for crossings, a pair of tracks crossing each other, a blocking mechanism associated with one of said tracks, a normally energized magnet controlling said blocking mechanism, train actuated devices associated with the other track and circuit connections including said magnet and said contact devices.

16. In a block system for railway crossings, the combination with a track, of a second track crossing the first, one or more blocking levers associated with one of said tracks, a locking mechanism controlling each of said blocking levers, one or more train actuated controlling levers associated with the other of said tracks and controlling said locking mechanisms, all of said levers operated by the traverse over them of a traversing member carried by a train, the said traversing member as it passes over each lever depressing one end of said lever and raising the other end.

17. In a block system for railway crossings, the combination with a track, of a second track crossing the first and one or more blocking levers associated with said first track, one or more train actuated controlling levers associated with said second track, each of said blocking levers pivoted between its ends, having a locking mechanism controlled by one or more of said controlling levers to rigidly hold one end of said blocking lever in an elevated, blocking position after said end of said blocking lever has been raised by the depression of the other end by the traverse thereover of a traversing member carried by a train.

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