

No. 867,197.

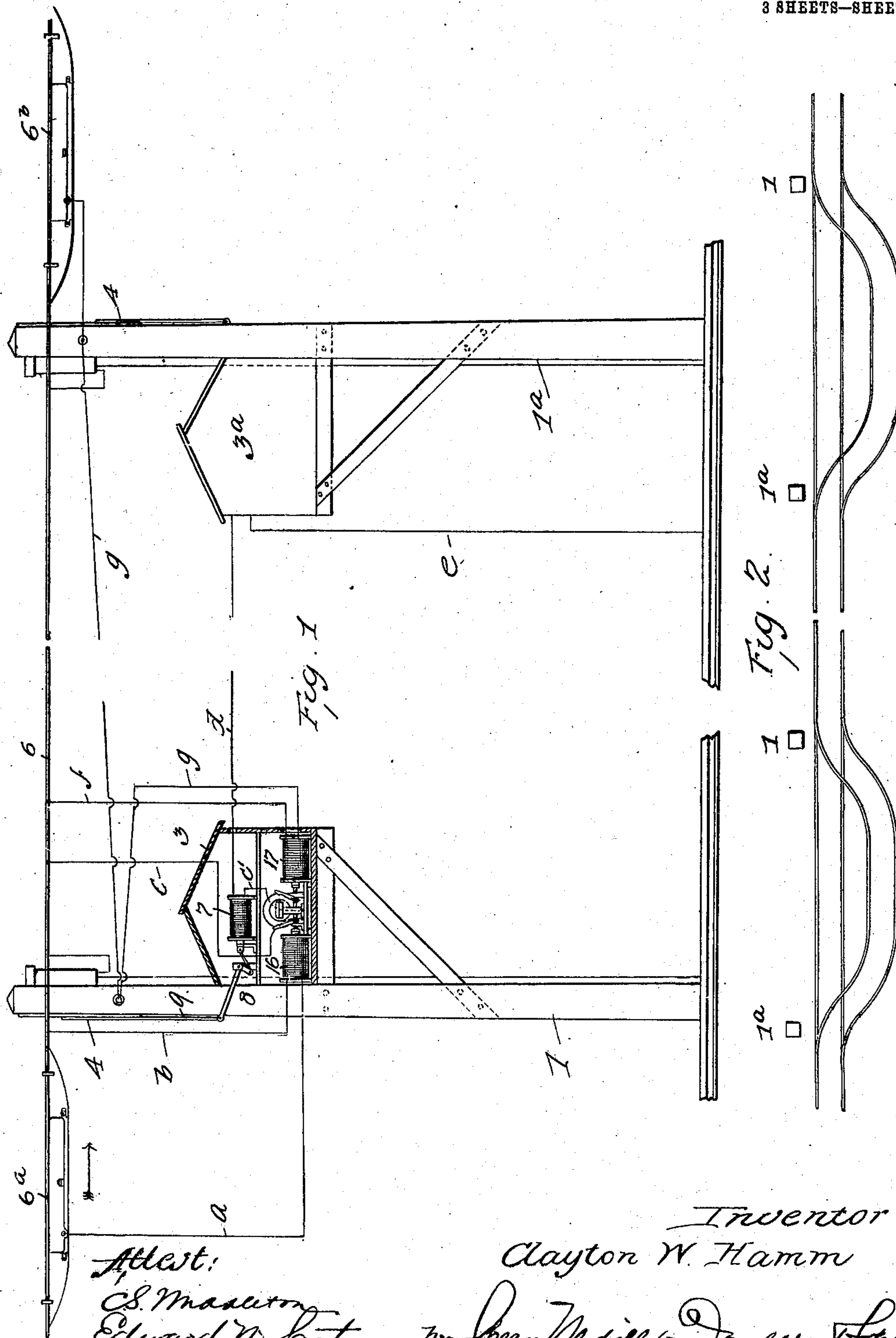
PATENTED SEPT. 24, 1907.

C. W. HAMM.

BLOCK SIGNAL SYSTEM FOR ELECTRIC RAILWAYS.

APPLICATION FILED DEC. 19, 1906.

3 SHEETS—SHEET 1.



Attest:

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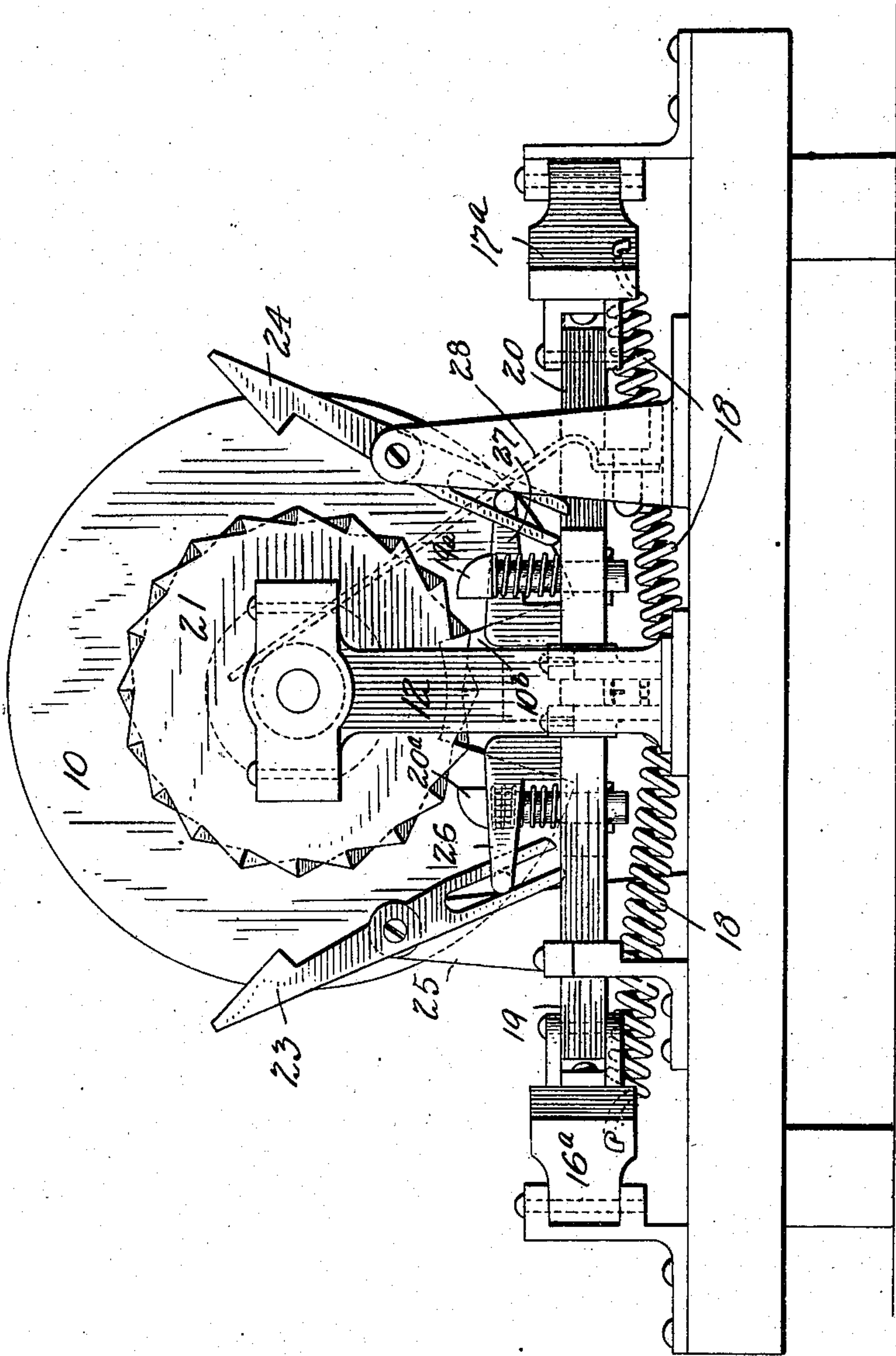
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3 SHEETS—SHEET 2.

Fig. 3.



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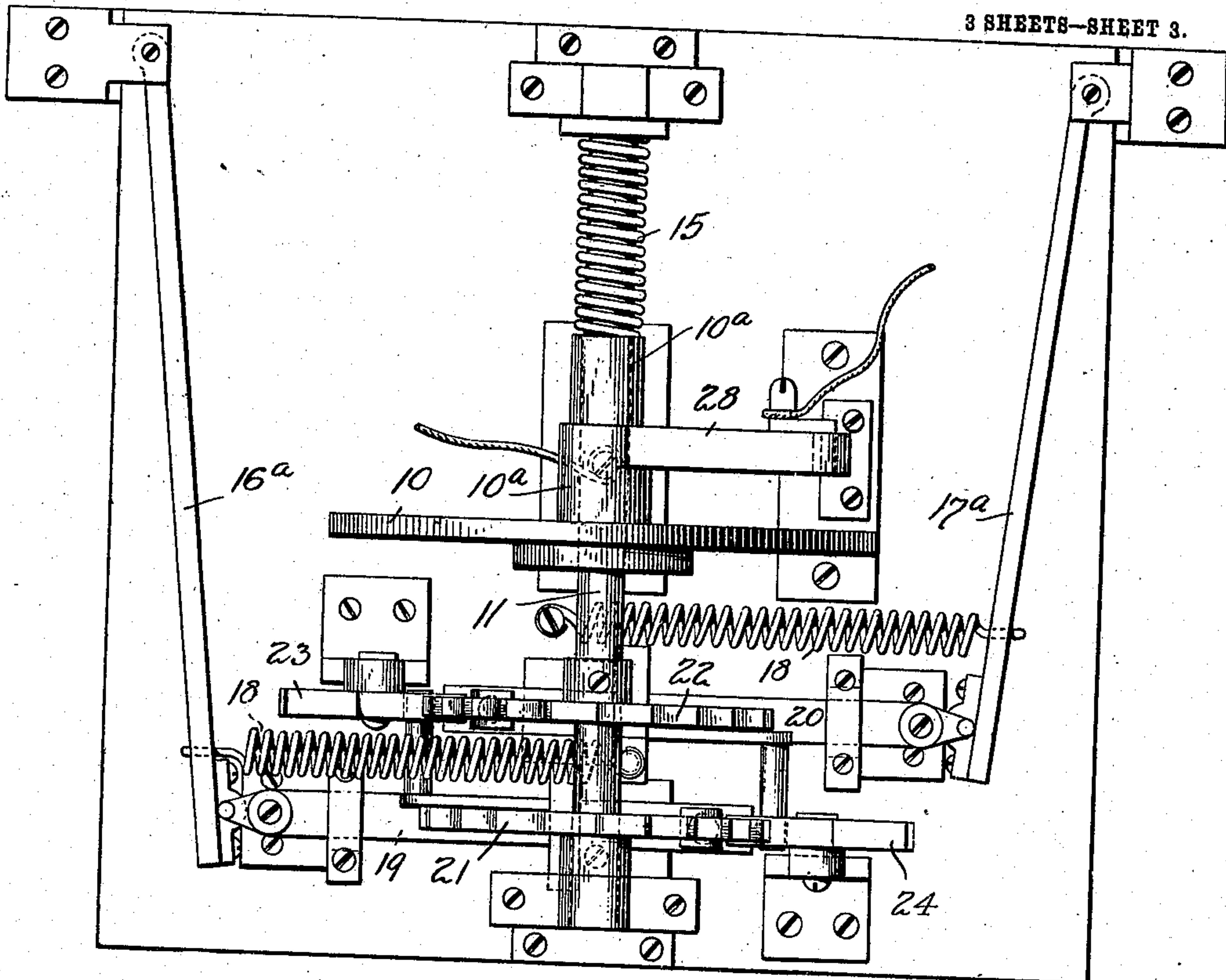


Fig. 4.

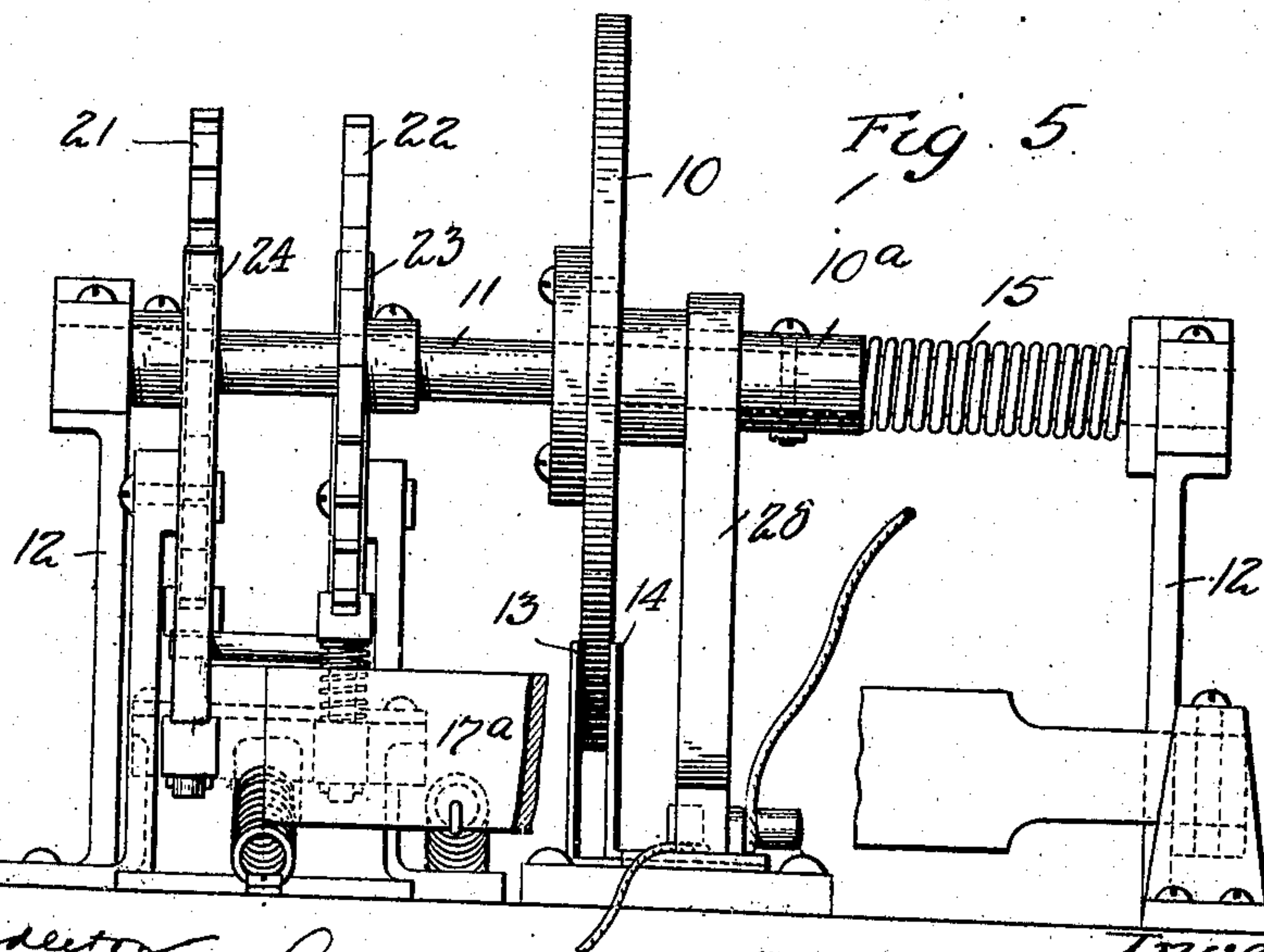


Fig. 5.

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# UNITED STATES PATENT OFFICE.

CLAYTON W. HAMM, OF YORK, PENNSYLVANIA, ASSIGNOR OF TWO-FIFTHS TO ROBERT S. BEARD, OF YORK, PENNSYLVANIA.

## BLOCK-SIGNAL SYSTEM FOR ELECTRIC RAILWAYS.

No. 867,197.

Specification of Letters Patent.

Patented Sept. 24, 1907.

Application filed December 19, 1906. Serial No. 348,561.

*To all whom it may concern:*

Be it known that I, CLAYTON W. HAMM, a citizen of the United States, residing at 350 Smyser street, York, Pennsylvania, have invented certain new and useful

5 Improvements in Block-Signal Systems for Electric Railways, of which the following is a specification.

My present invention relates to improvements in electric railway signals of the block type and more particularly to such signals as are employed in connection with single track electric railways having turnouts at frequent intervals to permit the passage of cars proceeding in opposite directions.

Among the various objects of the invention are to provide a simple, economical, durable and efficient system.

I have further aimed to produce a simple and effective form of switch mechanism which after having been operated to indicate the entrance of a car upon a block, will permit the entrance of a plurality of additional cars thereon, the signal remaining set to indicate that the block is occupied until the last car has left the block.

I have also aimed to provide a system which with the maximum simplicity, shall permit of the signals being operated by a car moving in either direction.

With these and other objects in view the invention includes the various features of construction and arrangement and combination of parts hereinafter described and particularly pointed out in the appended claims.

An embodiment of the invention is illustrated in the accompanying drawings in which—

Figure 1 is an elevation, partly diagrammatic of two adjacent signal poles or towers, with the side of one of the boxes containing the switch mechanism removed to show the interior parts. Fig. 2 is a diagrammatic plan view of a section of track with turnouts. Fig. 3 is a side elevation, on an enlarged scale, of the switch mechanism. Fig. 4 is a plan view of the same, and Fig. 5 is a view at right angles to Fig. 3. In these last three figures the electro magnets are omitted for convenience of illustration.

Referring by reference characters to these figures, the numerals 1 and 1<sup>a</sup> designate posts or the like erected at each end of a block or section of track 2 or at the points where the turnouts occur as indicated in Fig. 2. Upon these posts are mounted the boxes 3 and 3<sup>a</sup> which contain the electro magnetic devices or switch mechanism, and also the signal lights, (not shown) and semaphore arms 4. These latter, as they form no part of the present invention are not more specifically described, or shown in detail.

The trolley wire is shown at 6 and is provided at the switch or points where the turnouts connect with the

main track with the ordinary arrangement of wires for contact with the trolley wheels of cars passing in opposite directions as indicated at 6<sup>a</sup> and 6<sup>b</sup>.

Within each box is located an electro magnetic device, such for instance, as solenoid 7, the core of which is connected to a bell crank 8 which through a link 9 operates the semaphore arm and switch for operating the lights in the ordinary or any desired manner. The passage of the current (which is derived from the trolley wire) through the coils of the solenoids in both boxes 3 and 3<sup>a</sup> is controlled by switch mechanism located in the lower part of one of the boxes, as box 3. This is shown more clearly in Figs. 3, 4 and 5. It includes a rotary switch plate or disk 10 mounted upon a shaft 11 journaled in standards 12 and designed, when operated in either direction, to pass between and make electrical contact with the two contacts 13 and 14. A spring 15 encircles the shaft and bears at one end against the prolongation or sleeve 10<sup>a</sup> of the hub and at the other end against the bearing in the standard 12. The tension of the spring produces sufficient friction to cause the disk to remain in whatever position it may be placed until the pawl and ratchet mechanism operates with sufficient force to overcome the frictional resistance. In order to cause the passage of the cars on to the block to operate this switch I provide a pair of oppositely located electro-magnetic devices such as magnets 16 and 17. The armatures of these magnets are preferably in the form of pivoted bars 16<sup>a</sup> and 17<sup>a</sup>, and are held normally away from the magnets by springs 18. Their free ends are connected respectively to sliding bars 19 and 20 which carry pawls 19<sup>a</sup> and 20<sup>a</sup> as shown more clearly in Fig. 3. The pawl 19<sup>a</sup> is designed, on movement of bar 19 towards the left, to engage with the teeth of a ratchet wheel 21, fast on shaft 11 and thus move the same and with it the switch plate or disk through the distance of one tooth. In a similar manner the pawl 20<sup>a</sup> on the movement of bar 20 towards the right, engages the teeth of ratchet wheel 22 and moves it and the switch plate or disk one step in the reverse direction.

In order to prevent undue movement of the ratchet wheels and switch plate, I provide retaining pawls 23 and 24 which are designed to engage the teeth of ratchet wheels 22 and 21 respectively. They are pivoted on posts 25 carried by the base plate and are operated by arms or brackets 26 and 27 carried respectively by the bars 19 and 20 which are provided with horizontally extending pins or projections engaging the slotted ends of the pawls 23 and 24. Thus when bar 19 is moved to the left and pawl 19<sup>a</sup> engages a tooth of ratchet wheel 21 pawl 23 will be thrown into engagement with the oppositely turned teeth of ratchet wheel 22 and vice versa with respect to bar 20 and its pawls.



The electric circuits can best be described by tracing them out in connection with the results produced by the entrance of a car upon a block or section. In Fig. 2 I have shown diagrammatically a block section and two turnouts with the signal apparatus indicated conventionally at 1 and 1<sup>a</sup> respectively. Supposing a car to be entering from the left hand turnout, the car and its direction of movement being indicated by the arrow, the passage of the trolley over the section of trolley wire indicated at 6<sup>a</sup> will momentarily ground the conductor or wire *a* through the car in the manner well understood by those familiar with this art. At this instant a sufficient portion of the current will flow through wire *b* and magnet coils 16 by wire *a* and car to the ground. This will energize magnet 16, attracting its armature and moving bar 19 to the left which, through the pawl and ratchet mechanism already described will rotate the disk 10 one step causing it to close a circuit through itself and contacts 13 and 14. The current for this circuit passes from the main conductor through the wire *c* which is electrically connected by a suitable binding post, indicated in dotted lines in Fig. 5, with the contact plates 13 and 14. Thence the current passes through rotary disk or plate 10 and its hub 10<sup>a</sup>, (which are of course insulated from their shaft) and by contact spring 28 and wire *c'* to and through the coils of the solenoid 7 which thereupon operates the signal mechanism on post 1 in the usual manner. From the solenoid 7 the current passes by wire *d* to the corresponding solenoid of box 3<sup>a</sup> and in a similar manner operates the signal mechanism on post 1<sup>a</sup>, the current then passing to ground by wire *e*. It will be seen that the magnet 16 is only momentarily energized by the passage of the car, and hence the pawl mechanism, by the tension of the spring on the bar, is instantly returned to normal position ready for a second impulse should another car find it necessary or desirable to enter the block from the same direction. This second car would simply move the disk one step further, the signal circuit remaining closed all the time, and likewise each succeeding car would move the disk one additional step. When the foremost car leaves the block at the further end it momentarily grounds the circuit at the conductor section 6<sup>b</sup> which causes the current to pass by wire *f* through the coils of magnet 17 and by wire *g* and trolley pole and car to the ground. This through the pawl and ratchet mechanism of armature of magnet 17 moves the disk 10 one step in a reverse direction, and as each car leaves the block said disk will be moved one step backward until, as the last car leaves the block it will be restored to neutral position. It will of course be understood that the entrance of cars upon the block from the opposite direction will operate the signal mechanism in precisely the same manner though in reverse order.

From the foregoing description it will be seen that I

provide an extremely simple form of mechanism, and one in which a practically unlimited number of cars may enter the block from the same direction, the signals remaining set until the last car has left the block. This is extremely desirable as it is frequently necessary to mass a large number of cars at some one point owing to temporary obstructions, or congestion in traffic and the like. My simple mechanism, including the rotary plate enables me to thus provide for a large number of cars without necessitating a large or bulky or complicated apparatus.

Having thus described my invention what I claim is:—

1. In a system of the class described, the combination with the signal circuit and the rotary switch a helical spring encircling said shaft and bearing at one end against a stationary part and at the other end a rotary part connected with the rotary switch for controlling the same, of a shaft carrying said switch, oppositely disposed ratchet wheels on said shaft, a sliding bar in proximity to each ratchet wheel, a pawl carried by each bar engaging the teeth of the corresponding ratchet wheel, a locking pawl pivoted upon a stationary pivot on each side of the shaft, one locking pawl being in line with each ratchet wheel, an arm from each sliding bar having a laterally projecting portion engaging the locking pawl for the wheel operated by the other sliding bar, and means controlled by the passage of the cars for operating said sliding bars, substantially as described.

2. In a system of the class described, the combination with a signal circuit and a rotary switch for controlling the same, of a shaft carrying said switch, a spring encircling said shaft to frictionally resist turning movement thereof in either direction, oppositely disposed ratchet wheels on said shaft, a sliding bar beneath each ratchet wheel, a spring pressed pawl carried by each bar for engaging the corresponding ratchet wheel a locking pawl pivoted on a stationary pivot on each side of the shaft, one locking pawl being in line with each ratchet wheel, means whereby the movement of one bar to operate its ratchet wheel throws one of the locking pawls into engagement with the other ratchet wheel and vice versa, an electro magnetic device for operating each sliding bar, and electric circuits controlled by the passage of a car or cars for energizing said electro magnetic devices.

3. In a system of the class described, the combination with a signal circuit and a rotary switch for controlling the same, of a horizontally disposed ratchet shaft carrying said switch, oppositely disposed ratchet wheels on said shaft, a horizontal sliding bar beneath each ratchet wheel, a pawl projecting upward from each bar to engage the teeth of the corresponding ratchet wheel, posts projecting up on opposite sides of said shaft, locking pawls pivoted on said posts having bifurcated lower ends, arms carried by the bars having laterally projecting portions engaging the bifurcations, an electro magnetic device for operating each sliding bar, and electric circuits controlled by the passage of a car or cars for engaging said magnets, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

CLAYTON W. HAMM.

Witnesses:

ROBT. A. JUDY,  
ROBT. S. BEARD.