

J. G. DIXON.
BLOCK SIGNALING ON RAILWAYS.

No. 559,688.

Patented May 5, 1896.

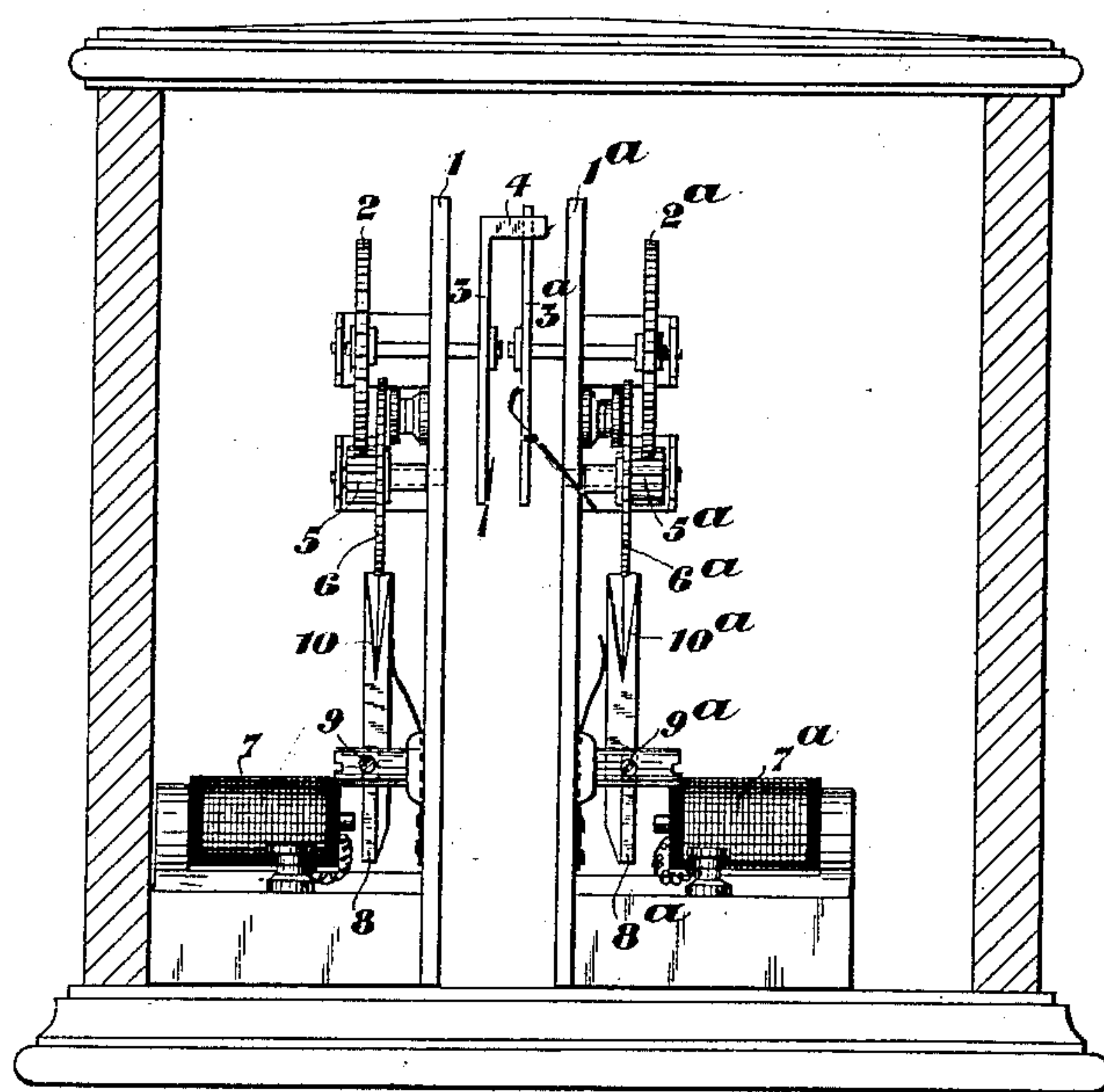


Fig. 1.

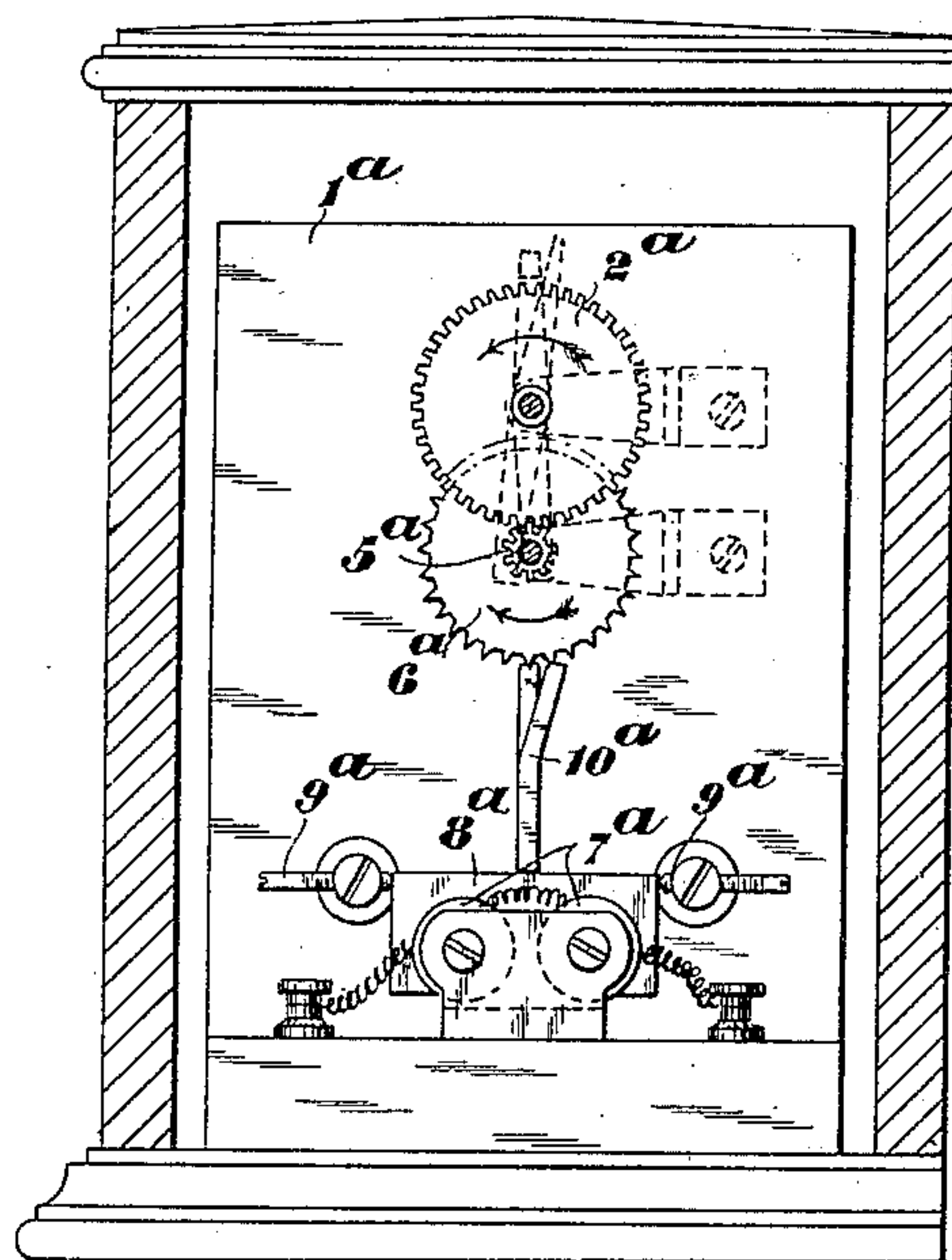


Fig. 2.

Witnesses:—

Arthur Woodman.
William A. (audy).

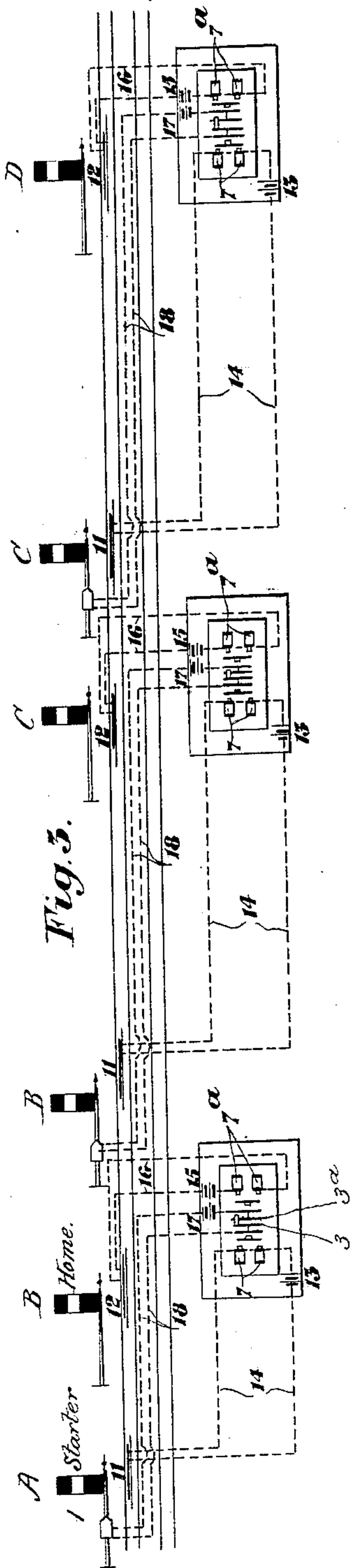
Inventor.
John G. Dixon.

per John D. Howell
Attorney.

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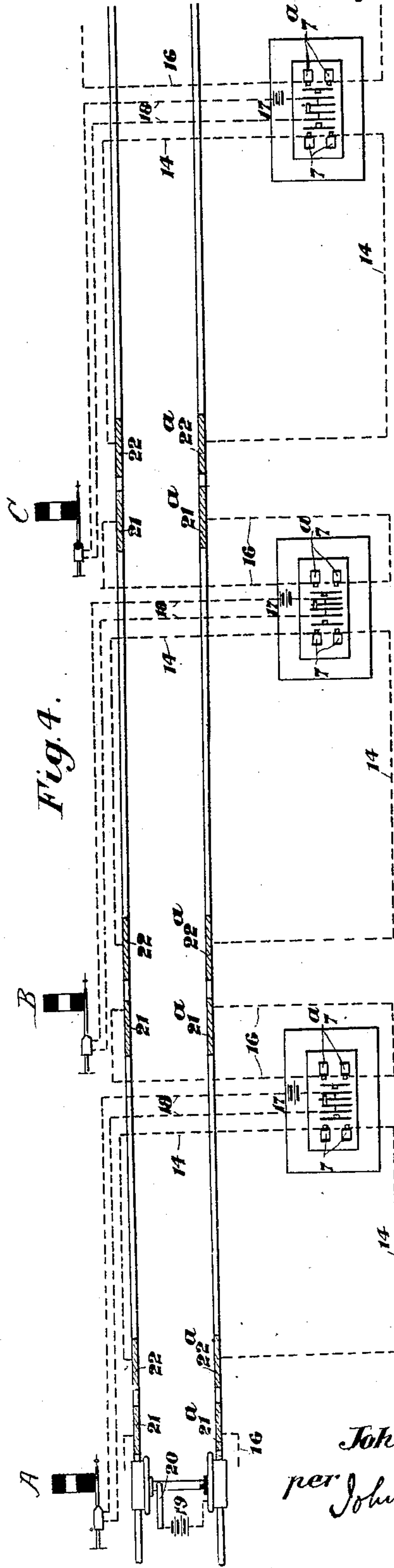
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Patented May 5, 1896.



Witnesses:-

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William K. Landy



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 5.

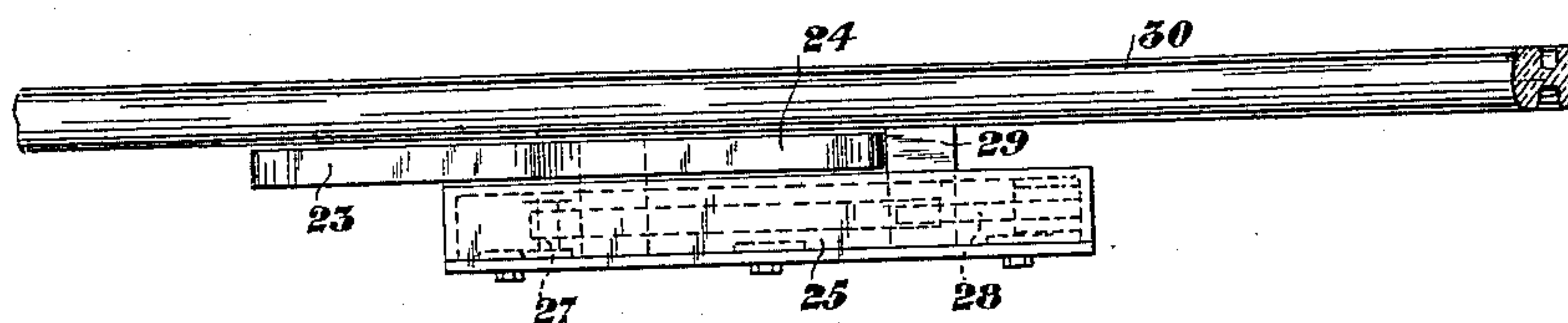
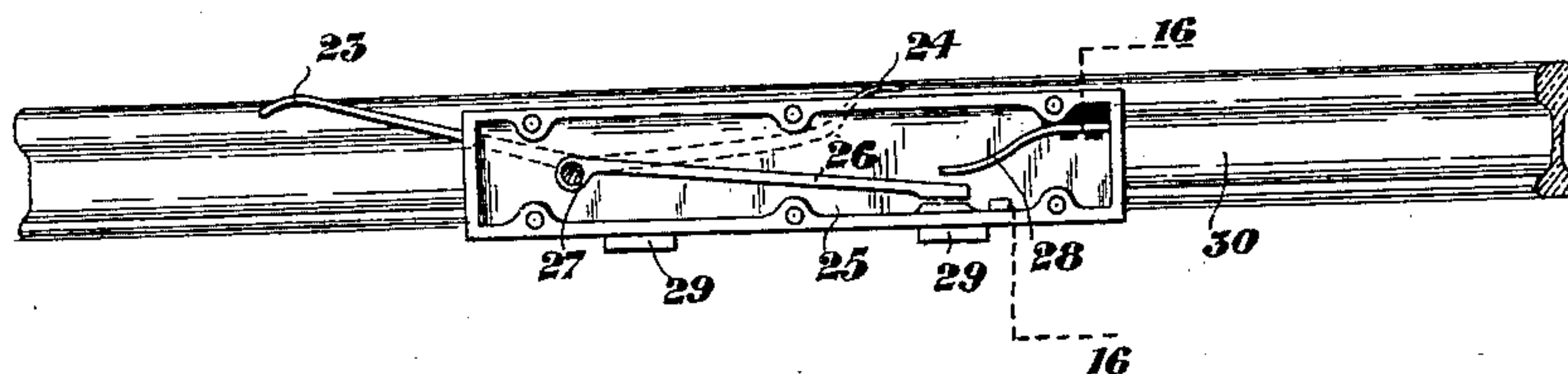


Fig. 6.

Witnesses:-

Arthur Woodman.
William H. Candy.

Inventor.
John G. Dixon
per John D. O'Connell
Attorney.

UNITED STATES PATENT OFFICE.

JOHN GEORGE DIXON, OF HUDDERSFIELD, ENGLAND.

BLOCK-SIGNALING ON RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 559,688, dated May 5, 1896.

Application filed November 25, 1895. Serial No. 569,983. (No model.)

To all whom it may concern:

Be it known that I, JOHN GEORGE DIXON, a subject of the Queen of Great Britain and Ireland, residing at Ivy House, Lindley, Huddersfield, in the county of York, England, have invented new and useful Improvements in Block-Signaling on Railways, of which the following is a specification.

My invention relates to improvements in block-working on railways whereby if any vehicle, through the separation of couplings or otherwise, becomes detached from its train the signal authorizing a movement from the rear into that section would be held locked at "danger."

The purposes for which my invention is intended may be divided into two classes, the one where practically every wheel of a train is recorded and the other where the last coach only must be recorded, and the first in addition, if desirable.

I will describe the first portion of my invention as follows:

My invention consists in recording the number of wheels that pass out of a block-section and the number of wheels that enter beyond the home-signal of a next block-section, and also my alternative scheme provides for the rear vehicle of a train only being recorded. Where all wheels are practically to be recorded, it is obvious that it would be very difficult to record the movements of the wheels inside a section—that is, between the home-signal and the starting-signal—because vehicles are required to be detached from a train, shunted into a siding and left there frequently for the purposes of being dealt with by a local staff. For instance, a horse-box might be detached from the tail of a train, shunted into a siding and left there, the remaining portion of the train going forward to continue its journey. Under such conditions it is obvious that the same number of vehicles which came into the section are not required to go out of the section, (because the horse-box has been left in the section,) and therefore I only propose with this portion of my invention to insure that the wheels which leave the rear section, say A, must all arrive safely inside the home-signal of section, say B, before the sectional or starting

signal at A is free to be lowered a second time to send a second train from A. As practically all passenger-trains are provided with some form of automatic brake, which acts that both portions of the train are brought to a standstill through any damage to the brake-pipes or to the brake apparatus generally, my invention more particularly refers to goods-trains or trains that are not provided with automatic brakes.

It is the universal custom with all goods-trains to have a brake-van as the rear vehicle. In the second portion of my invention, therefore, I provide apparatus by which all brake-vans in a train must be recorded on leaving a section, and the number of brake-vans must enter the next section before the signal can be lowered in the rear section for another train to proceed. This portion of my invention also provides for shunting operations in the section. For instance, it is usual, if the train is divided for the purposes of detaching vehicles that (assuming half of the train remains on the passenger-line) the front half is put into a siding for the purposes of either taking on or leaving vehicles, and should that portion of the train go away without joining again the rear portion the section in the rear is still locked, because the brake-van has not left the section. When the movement is completed in the proper manner—that is to say, the portion of the train which is shunted into the siding comes out again after the work is done and shunted back onto the hind portion to which the brake-van is attached and then proceeds on its journey—the brake van or vans (according as there is one or more) on going out of the section releases the section in the rear and allows a second train to be forwarded. Therefore, although a portion of a train may be forgotten on a passenger-road, so long as it has attached to it a brake-van the signalman is powerless to accept a second train from the rear until that brake-van has been disposed of clear of the section. If the train contains two or more brake-vans, (as my invention is applied to all brake-vans,) so the two or more brake-vans which enter the section should go out of the section before the rear signal is clear.

Lest it might be objected that in practice it

would be difficult, in the first portion of my invention, in the case of an express-train to get the record of every wheel passing over the treadle or insulated portion of rail, and my invention fail to release the rear section if one tooth of my apparatus is missed—that is to say, if one wheel fails to record—I allow a little latitude, because every coach has at least two pairs of wheels, and in recording one the instrument will practically record the coach. Therefore if it fails to record not more than one wheel the apparatus may be considered as working and will release the rear section.

In the second portion of my invention I arrange that batteries be placed on the locomotive (if desirable) and in each brake-van, or any other vehicle which may be placed at the rear end of a train.

The operation of this second portion of my invention is as follows: Assuming the train leaving, say, section A to be composed of a locomotive, ten goods-wagons, and a brake-van in the rear, the locomotive (if it is desired to record its passage) in passing over the insulated rail would make contact and record "1" in the cabin in advance, the intermediate vehicles (ten goods-wagons) would not record anything at all, and the brake-van, in which are the batteries, would record "2," completing the record. Should anything happen to the train before it reaches B—assume that the brake-van and three of the vehicles have become detached, or assuming that part of the train and brake-van did not proceed out of B's section—then the signals at A would be locked so that a second train could not proceed. Practically the train must have left B with the brake-van on before A is free to send forward another train.

The way in which I carry out the first portion of my invention is as follows: Assuming two sections A and B, I arrange at any suitable spot in advance of the sectional signal, say at A, a rocking shaft operating between the four-foot way with an arm on either side adjacent to the metals. The first arm would be projecting toward the direction in which the train is coming and be depressed slightly toward the ballast. The other arm projects in the opposite direction, preferably operating near the other metal of the four-foot way. A similar bar or rocking shaft would be fixed the requisite distance inside the home-signal of the section in advance, say B, or at any suitable spot determined upon by the management of the railway. In the signal-cabin in the section through which the train is passing—that is to say, B—I fix an instrument composed of two halves substantially alike with a pair of electromagnets for each half. An armature is operated by each pair of electromagnets, and projecting from the armature is an escapement-movement, commonly known as a "pallet," operating a toothed wheel or communicating motion to a pinion and from that to another wheel. Fixed to

the latter, or to the one wheel where only one is fixed, is a projecting pin. The other half of the instrument is similar in all respects to the first half above described and with a corresponding projecting pin. The electromagnets in one half of the instrument are electrically connected to a bar or treadle fixed at the entrance of the block-section, say B—that is to say, the requisite distance beyond A's sectional signal. Electric connection is also made from the other half of the instrument to the bar just in advance of B's home-signal, and electrical connection is also made to the operating-lever at A or, preferably, to an electric slotting apparatus fixed on A's sectional signal, acting that contact must be made in the recording instrument at B through the action of the complete number of vehicles leaving A and moving inside B's home-signal, recording the same number there, completing the circuit, and thereby releasing A. With this portion of my invention it should be understood that it is intended to be purely an addition to any of the ordinary lock and block systems, which systems insure that the release of A is not complete until the train has left B's section. All this portion of my invention does is to insure that the whole of the vehicles which leave A shall arrive at B inside B's section between the home-signal and the starting-signal.

In the second portion of my invention the recording apparatus in the signal-cabin is identical with that described with reference to the first portion of my invention; but in lieu of fixing a treadle I prefer to insulate the rail at the place where a treadle would be fixed—that is to say, in advance of A's starting-signal—and the section is then continued to a corresponding position in advance of B's starting-signal. In this portion of my invention the release of A does not take place until the train has passed out of B's section. This portion is a more complete lock and block system and may be either an addition to or in substitution of the lock and block systems now in use.

I will proceed to describe my invention with reference to the drawings annexed.

Figures 1 and 2 are front and side elevations of the recording instrument, partly in section. These instruments are preferably fixed in the signal-cabins. Fig. 3 is a diagrammatic plan showing the signals, comprising three sections—that is, the sectional or starting signal at A, the home and starter at B, the home and starter at C, and the home-signal at D. This figure illustrates the first portion of my invention, where every wheel is recorded. Fig. 4 is a diagrammatic plan for the purposes of illustrating the second portion of my invention, where the rear vehicle or brake-van is only recorded. Figs. 5 and 6 illustrate a treadle such as I have referred to, so that contact be made and broken by each wheel to get a separate record in my instrument for each wheel passing over.

The same letters and numbers refer to the same parts in the several figures of the drawings.

1 1^a are two parallel uprights securely fastened to the case of the instrument. 2 2^a are toothed wheels, their fulcrums passing through the uprights 1 1^a, and attached to their ends between the uprights are pins or arms 3 3^a. A projection 4 is provided on the pin or arm 3 for the purposes of contact with the end of 3^a, which is prolonged. 5 5^a are pinions of toothed wheels 6 6^a. The pinions are geared to the wheels 2 2^a. A pair of electromagnets 7 7^a are fixed to the above and when energized attract the armatures 8 8^a, fulcrumed at 9 9^a. The armatures are projected upward toward the wheels 6 6^a, their upper ends being formed to act as pallets or pawls in connection with the toothed wheels 6 6^a. The pawls are 10 10^a. Springs are provided at the back of the upper portion of the armatures to always insure their being returned to the normal position free of the electromagnets when contact is broken.

11 is the treadle in advance of A's sectional signal. 12 is the treadle in advance of B's home-signal. 13 is the battery in the signal-box at B for energizing the coils 7.

14 is the wire starting from the battery 13 and leading through the electromagnets, through the treadle 11, and back to the battery.

15 is the battery for energizing the coils of the electromagnet 7^a.

16 is the wire from the battery 15, through the treadle 12, and back again through the electromagnet 7^a to the battery 15.

17 is a battery which is controlled by 3 3^a, forming contact, and completes the circuit at the sectional signal in the rear, A.

18 is the wire from the battery 17 to the slotting apparatus in the section in the rear, (say Fig. 3, arm 1^a), through the slotting apparatus, back to the arm 3, thence to the arm 3^a, through the toothed wheel 2, and thence to the battery 17.

19 is a battery which is required for the second portion of my invention (illustrated in Fig. 4) in lieu of battery 13 in the signal-cabin in Fig. 3. It is fixed in the brake-van or hind vehicle of a train. 20 is a contact from the battery to the axle. One wheel of the pair is insulated from the axle.

21 21^a are pieces of the rails insulated from the rails on either side of them, acting so that when the coach or goods-van in which the battery is placed passes over them a current is set up, passes through the axle and the wheels, through the insulated rails 21 21^a by wire 16 to the instrument, completing the release in the rear section.

22 22^a are the pieces of insulated rails placed, preferably, adjacent to and slightly in advance of 21 21^a and through which the current passes upon the coach and battery 19, passing over and setting up a current, by which a record is given in the instrument at

B (or the section in advance) on the train having left the section A, (or rear section.) Practically 22 is the insulated portion of the rail equivalent to the treadle 11, Fig. 3, which records the train leaving the section, and 21 is the insulated portion of rail equivalent to the treadle 12, Fig. 3, which insures that the train must have arrived at the section in advance and passed clear before the release can take place on the sectional signal in the rear.

23, Figs. 5 and 6, is the arm of the treadle nearest the direction in which the train is coming.

24 is the other arm tilted by the train to break contact after 23 has been depressed. The depression of 24 raises 23.

25 is the box or case containing the fulcrum of the treadle and the electrical contacts.

26 is the lower third arm or counterbalance which keeps the arm 23 normally raised, and also makes contact with spring 28 when the arm 23 is depressed.

27 is the fulcrum of the treadle.

28 is the contact-spring.

29 and 30 are brackets or supports for maintaining the box or case in position.

Briefly, the way in which my invention works is as follows: In the first portion of my invention, (reference can be made to Figs. 1, 2, 3, 5, and 6,) on the train leaving A and the first wheel passing the starting-signal 1 and over treadle 11, the arm 23 would be depressed and contact made, which would set up battery 13, the current passing along wires 14, through the coils 7 of the instrument, which attracts the armature 8 and operates the pawl 10, into the toothed wheel 6, revolving the pinion 5 and moving the top wheel 2, through the latter, the spindle to which it is keyed, and the arm 3, the wheel 2 being moved one tooth. The first wheel after passing the arm 23 depresses the arm 24 and breaks the contact, if the counterbalance 26 did not already do it. The second wheel of the locomotive would perform a like operation, moving the top wheel 2 one tooth again, through the operation previously described, and moving the arm 3 the equivalent distance. This operation is performed by every wheel throughout the train. For the purposes of description let it be assumed that there are forty axles and pairs of wheels in the train. The arm 3 of the instrument is moved a distance equal to the toothed wheel 2, revolving forty teeth. Forty axles and pairs of wheels therefore left A. On the train arriving at the treadle 12, inside B's home-signal, precisely the same operation takes place with regard to the right-hand half of the instrument through the electromagnet 7^a—that is, battery 15 is set up, the current going from the battery, through the treadle, back to the instrument, through the coils, and to the battery. The pawl 10^a performs a like operation, previously described with reference to 10, and the wheel 2^a (if all the coaches safely arrive, and therefore the requisite number of axles—that is, forty) with the arm or pin

3^a will be moved exactly the same distance in the same direction that 3 was moved by the action of the train leaving A through the treadle 11. By the train performing this movement in the recording instrument the projection 4 makes contact with the prolongation of the arm 3^a. Another current is set up by that contact through battery 17 by which, through the wires 18, the release is completed in the slotting apparatus on the sectional signal in the rear, A. If, therefore, any accidental break-away takes place and only thirty axles arrive at B and depress the treadle 12, then the arm 3^a will not have moved a sufficient distance to make contact with the projection 4 on the arm 3. Consequently battery 17 will not have been put in action, and the release will not have taken place on the slotting apparatus at the section in the rear, and consequently the sectional signal is held locked at "danger." The same description refers to a train traveling from B to C, C to D, and so on.

With the second portion of my invention a similar action takes place, and the description is similar; but instead of being a series of records, one for each wheel, and movements of the toothed wheels 2 2^a, and through them the arms 3 and 3^a, records are only given by the wheels which have batteries connected to them. For instance, if it is desirable to make the beginning and the end of the train make a record, then batteries would be on the locomotive as well as in the brake-van; but in this illustration I have only shown the last axle of the brake-van to be in contact with the battery. As the train proceeds past A, Fig. 4, the last vehicle containing the battery 19 sets up action, the current is passed through the insulated rails 22 22^a, and the coils 7 are energized, the armature attracted, and a record or movement of one tooth takes place, moving the projection 4 on the arm 3 a distance which may be prearranged, a fairly long distance, preferably, to insure a definite movement. If any break-away takes place and the brake-van does not arrive at B and pass B's starting-signal, then the release on A's starter does not take place, and it is still locked at "danger." With this portion of my invention the brake-van containing the battery must itself go right out of the section in advance—that is to say, beyond B's starting-signal into section C—before A's starting-signal is free. Figs. 3 and 4 are similar, with the exception that battery 19 in the brake-van is in substitution of battery 13 in the signal-cabin, and that the treadle shown in Fig. 3 as a complete treadle—that is, 11 in Fig. 4—is, as it were, divided into two portions, (insulated rails,) one, 22 22^a, to indicate the records of wheels or vehicles in the instrument in the cabin in ad-

vance, and the other, 21 21^a, to insure that the same number of wheels or vehicles have arrived at B and the circuit completed to release the rear section. It is obvious that the treadle 12 or insulated rails 21 21^a may be fixed anywhere to insure that the entire train reaches that spot.

My apparatus may be used to protect shunting movements in a section only, say between the home and starting or sectional signals.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a block system, the combination, with a signal at A, and a contact-maker connected to the rails adjacent thereto; of a signal at B, and a second contact-maker connected to the rails adjacent thereto; electromagnets 7, a battery, and wires 14 operatively connected together and to the circuit-maker at A; electromagnets 7^a, a battery, and wires 16 operatively connected together and to the circuit-maker at B; a revoluble contact-maker formed of two parts such as 3 3^a, similar driving mechanisms connecting the said parts with the electromagnets 7 and 7^a respectively; and a battery 17, and wires 18 connected to the said revoluble contact-maker and with the said signal at A, said devices operating to cause a current of electricity to pass through the wire 18 when the electromagnets 7 and 7^a have been energized successively for the same number of times by the passage of the wheels of a train over the said circuit-makers pertaining to the said electromagnets, substantially as set forth.

2. In a block system, the combination, with a signal at A, and a treadle connected to the rails adjacent thereto; of a signal at B, and a second treadle 12 connected to the rails adjacent thereto; electromagnets 7, battery 13, and wires 14 operatively connected together and to the treadle 11; electromagnets 7^a, battery 15, and wires 16 operatively connected together and to the treadle 12; a revoluble contact-maker formed of two parts such as 3 3^a, similar driving mechanisms connecting the said parts with the electromagnets 7 and 7^a respectively; and a battery 17, and wires 18 connected to the said revoluble contact-maker and with the signal at A, said devices operating to cause a current of electricity to pass through the wire 18 when the electromagnets 7 and 7^a have been energized for the same number of times by the passage of the wheels of a train over the said treadles 11 and 12, substantially as set forth.

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Witnesses:

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