

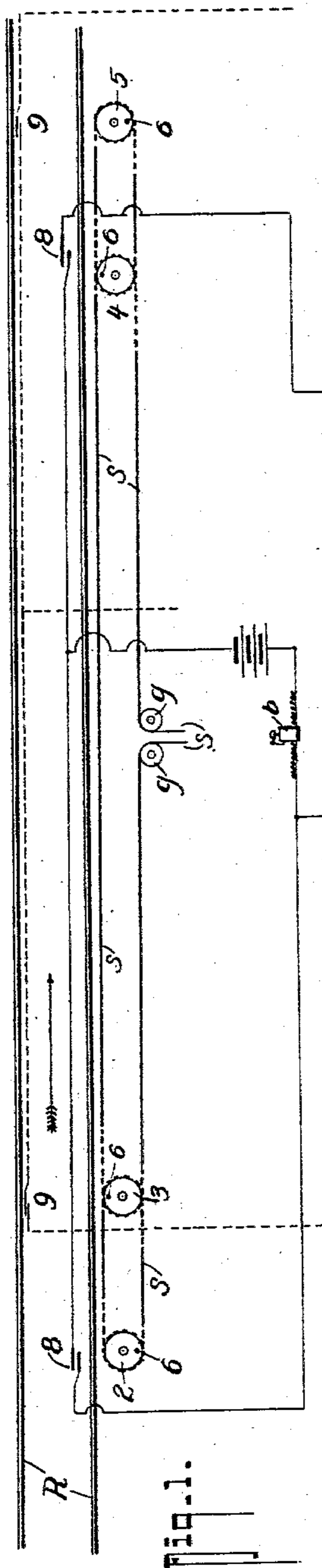
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PATENTED FEB. 23, 1904.

J. MORTON.
RAILWAY BLOCK SYSTEM.
APPLICATION FILED OCT. 19, 1903.

NO MODEL.

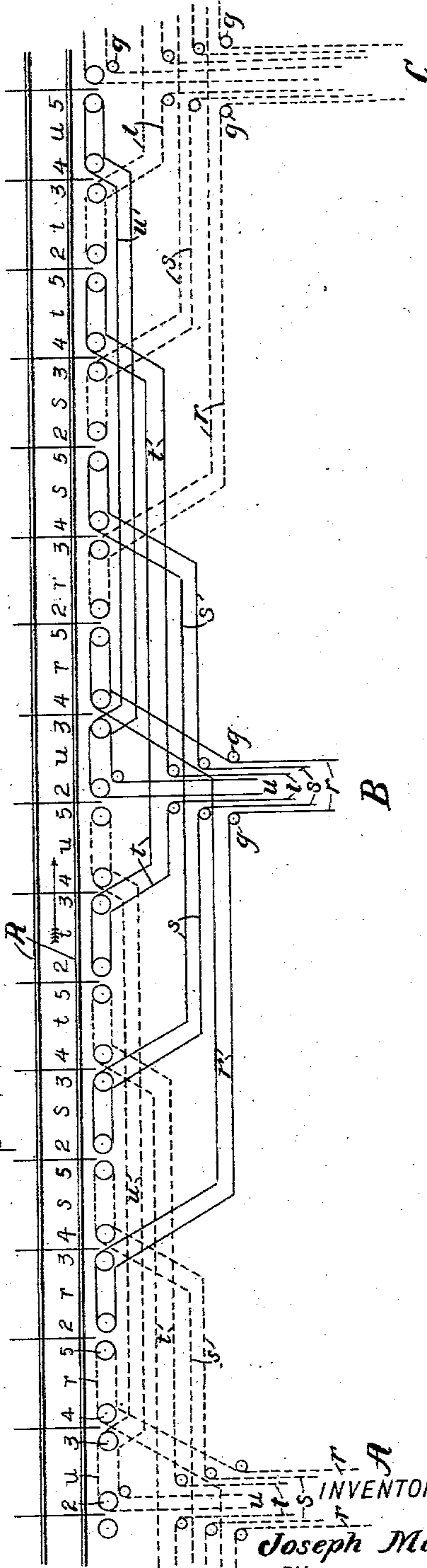
2 SHEETS—SHEET 1.



WITNESSES:

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Fig. 2.



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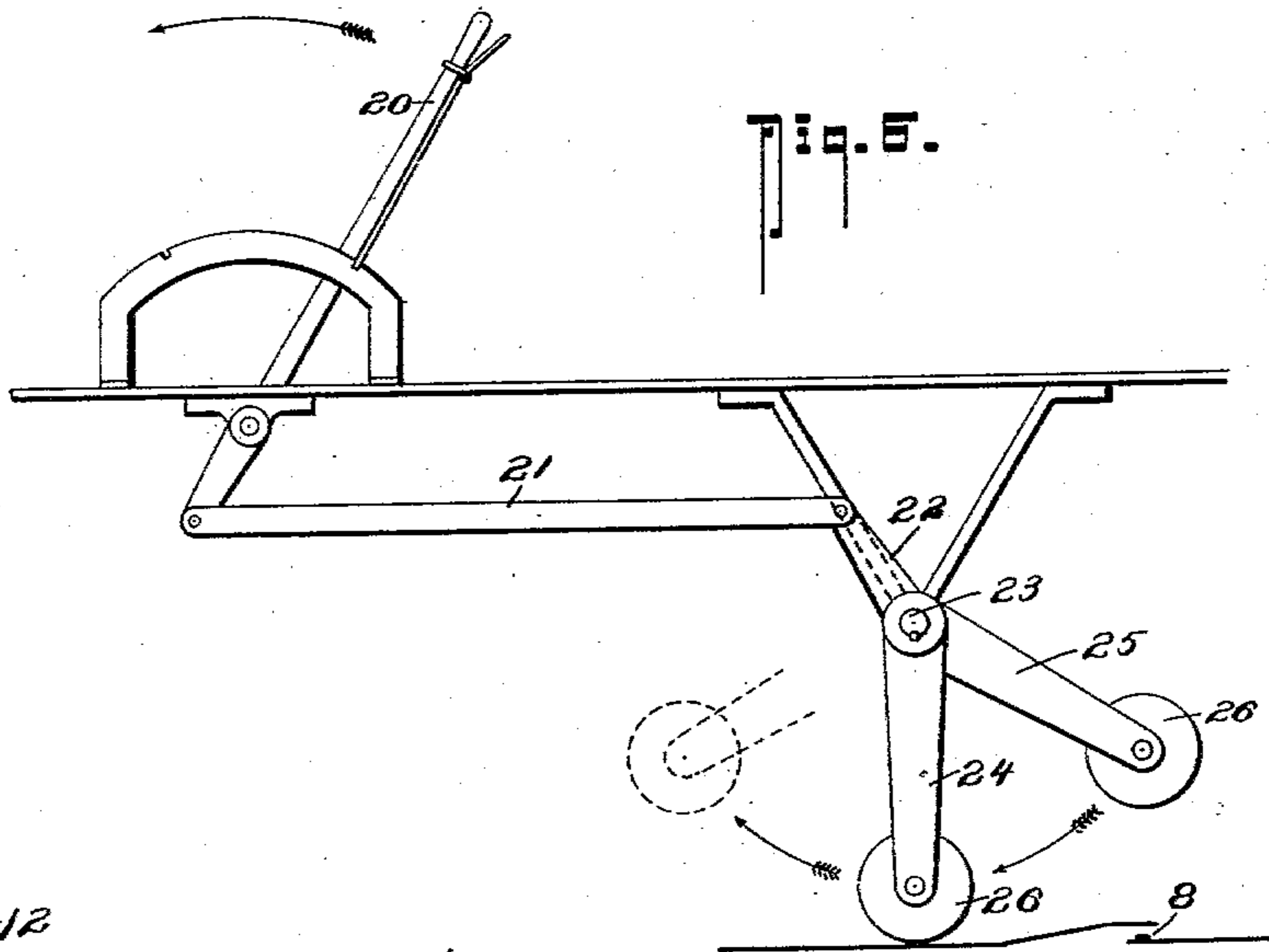
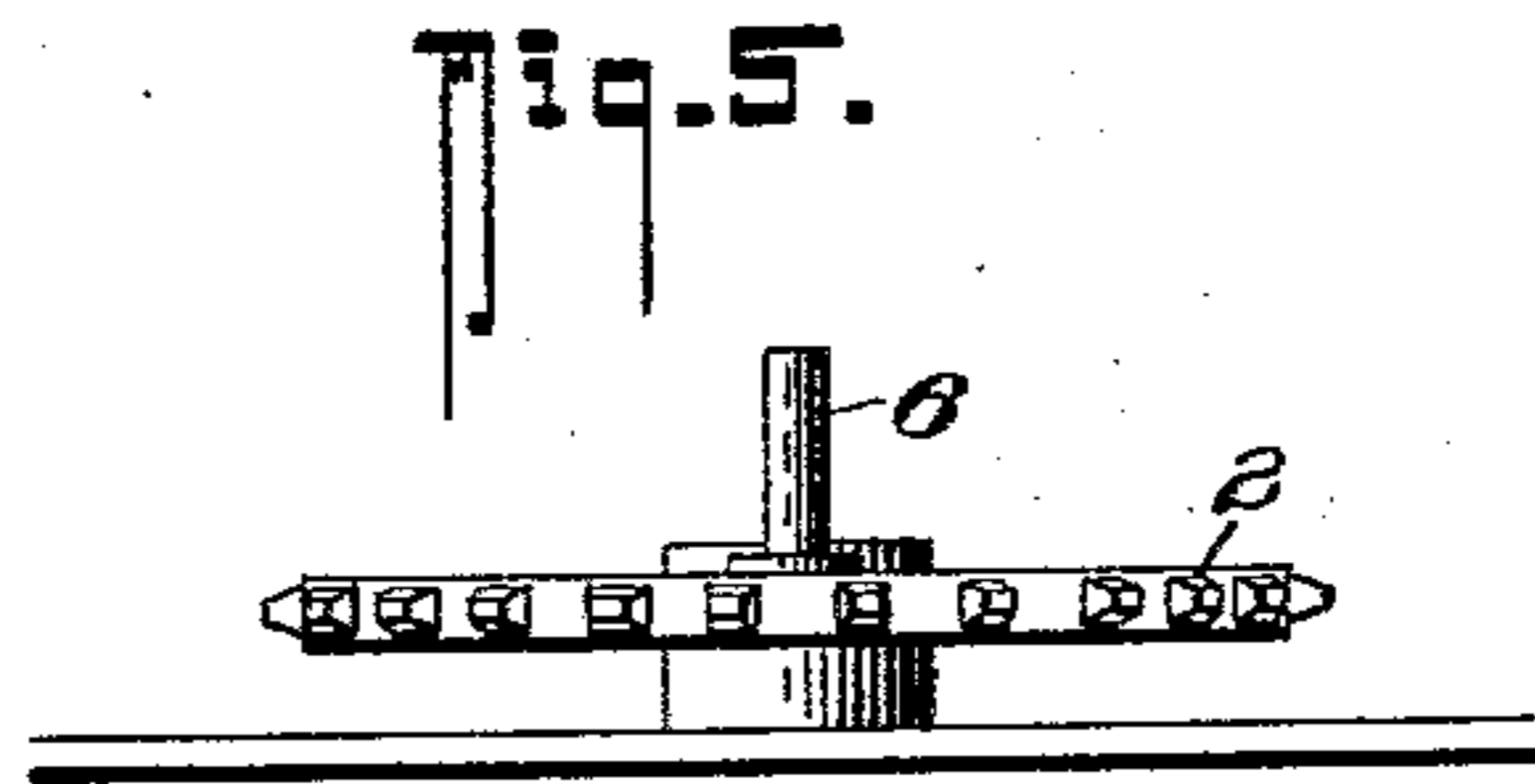
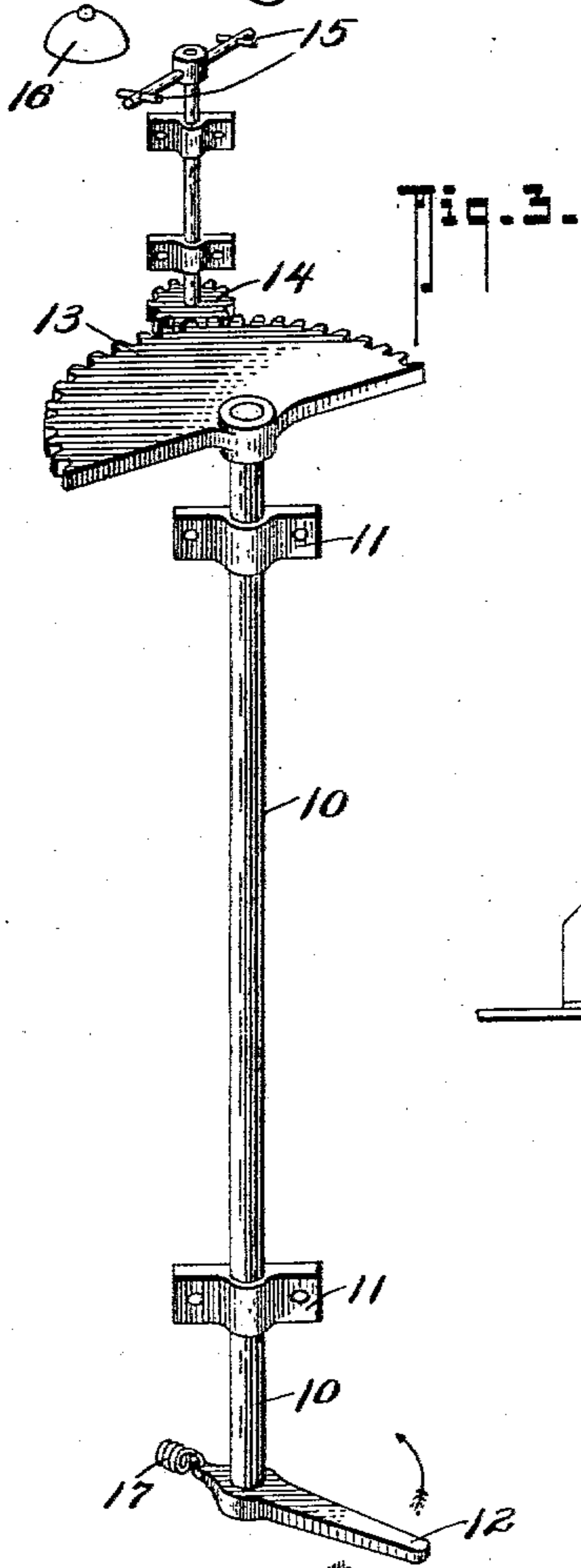
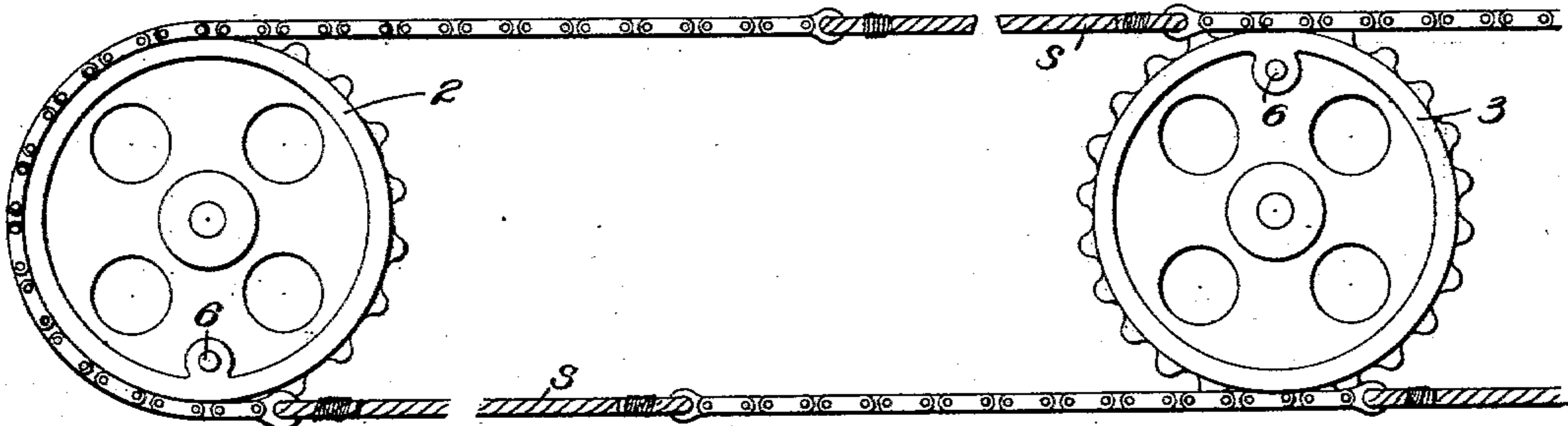
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2 SHEETS—SHEET 2.

Fig. 4.



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JOSEPH MORTON, OF NEW WESTMINSTER, CANADA.

RAILWAY BLOCK SYSTEM.

SPECIFICATION forming part of Letters Patent No. 753,157, dated February 23, 1904.

Application filed October 19, 1903. Serial No. 177,655. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH MORTON, a citizen of the Dominion of Canada, residing at the city of New Westminster, in the Province of British Columbia, Canada, have invented a new and useful Improved Railway Block System, of which the following is a specification.

My invention relates to an improved railway block-signaling system in which each block or section is under the care and control of the signalman, who as soon as a train enters on his section has a means by which he can protect it thereon at each end. This protection consists of a series of projections adjacent to the track, which may be moved into or from the path of a mechanism on the locomotive, which is designed to be engaged and operated by these projections on the track so as to ring a bell in the cab close to the driver if the train is run onto a section which is not yet cleared of the previous one. A certain number of these projections are connected to one operative means extending the length of a section and are controlled by the signalman in charge. Several of such units of connected mechanisms, all independently operated, extend in both directions from each signal-station, and the operating means of the adjacent cabins overlap in such a manner that the required distance for efficient protection is continuously maintained both in front of and behind a train.

The particular manner in which the mechanism of my system is arranged and operated is fully set forth in the following specification and illustrated by the accompanying drawings.

Figure 1 is a diagrammatic plan of the operative mechanism of one unit of the track projections; Fig. 2, a similar view showing the multiplication and overlapping of such units over two sections; Fig. 3, a perspective view of the mechanism of the locomotive by which the driver receives intimation that the section in advance is not clear; Fig. 4, a plan of the sprocket carrying an upwardly-projecting pin which may be interposed in the path of the locomotive-bell-ringing mechanism; Fig. 5, an elevation of the same; and Fig. 6, a side elevation of the mechanism on the loco-

motive, by which bell and gong contacts on the track are made.

The mechanism of the locomotive (see Fig. 3) consists of a light vertical shaft 10, extending from toward the level of the track outside of the rails to a position within the cab adjacent to the driver. The shaft is suitably supported in bearings 11 on the frame of the engine, so as to be susceptible of limited rotation, and is provided toward its lower end with a lever 12, projecting at right angles from the shaft and designed to be engaged and moved by the upward projections on the track under the signalman's control. The upper end of the shaft 10 is provided with a toothed sector 13, in the teeth of which meshes the teeth of a small pinion 14, rotatably mounted and provided with striking-hammers 15, by which the bell 16 will be sounded, not only when the lever 12 is struck by the track projection, but again on the return of the lever to its normal position under the pull of the spring 17. This bell-ringing mechanism is repeated on the other side of the locomotive, so that the track mechanism being situated on one side of the track the locomotive will have a means of receiving the signal in whichever direction it may be headed. The projections from the track-level which actuate the bell-ringing mechanism on the locomotive consist of (see Figs. 4 and 5) sprocket-wheels 2, 3, 4, or 5, rotatable on a vertical axis adjacent to but outside the track-rails R and having each an upwardly-projecting pin 6 on one side toward the rim. This pin is designed to engage and operate the lever 12 of the bell-ringing mechanism on the locomotive when the sprocket is turned to bring the pin into its path, say, toward the rail; but when the sprocket is turned to bring the pin to the diametrically opposite side the pin will be clear of the path of the lever 12. Each operative unit of this track-pin mechanism consists (see Fig. 1) of two sprockets, 2 and 5, a section-length apart and placed in definite positions in relation to the cabin, which will be explained later. Two other sprockets 3 and 4 are placed the same distance from the rail, each one one-eighth of the section-length from each end. Thus sprocket 3 is a one-eighth of the section-length

within from sprocket 2 and sprocket 4 is a similar distance within from sprocket 5. These four sprockets are simultaneously operated by a wire rope *s*, having short lengths of sprocket-chain where it engages the wheels and which passes round the outer sprockets 2 and 5 and engages the inner sprockets 3 and 4. The rope passes round guide-pulleys *g* to the cabin B and upward to the lever-gear for the signalman, which gear is adapted by the movement of the lever 7 to move the chain a sufficient distance to rotate the connected sprockets 2, 3, 4, and 5 through a half-revolution. The relation of the several sprockets is so adjusted to the rope or chain that when the lever 7 is in one position the sprockets 2 and 5 have their pins 6 on the same side of the wheel in relation to the track, so that they are either in or out of the path of the locomotive-bell-ringing mechanism at the same time, while the pins of the sprockets 3 and 4 are oppositely placed in relation to 2 and 5, but on the same side of their wheels. With this arrangement, therefore, when the pins 6 of sprockets 2 and 5 stand in the path of the lever 12 and will ring the bell on the locomotive sprockets 3 and 4 are clear and the signalman may by means of this lever 7 throw either pair in or out simultaneously. Proper and efficient means must be taken to enable the rope to be adjusted between the sprockets and to provide for the expansion of the rope under change of temperature. This constitutes the operative part of each unit. The disposition of the signaling means for such will now be described by which the man in charge is informed when a train is passing certain points. It is chiefly the location of such means that affects this application, the particular manner by which the contact is made being immaterial at the present stage.

Situated near each sprocket 2 and 4 is a contact-key 8, which is depressed by suitable mechanism on the locomotive, and being electrically connected causes a bell *b* in the cabin to ring as a train passes each position. Thus in Fig. 1, which represents the unit in this as in the operative mechanism, the position of the sprocket 2, with the pin 6 out of the path of the bell-ringing mechanism of the locomotive, indicates that the section ahead is clear and the train proceeds; but in passing the sprocket 2 the contact is made at 8 and intimates to cabin B that a train has entered on a section within that unit's control. The signalman pulls over the lever which operates that unit and turns the four sprockets included in it through a half-revolution, so that the pins of sprockets 2 and 5 are set in the path of the locomotive-bell-ringing mechanism protecting the train which has just passed, both from front and rear, and at the same time moving the sprockets 3 and 4 to set their pins out of the path of the locomotive mechanism. So far as this unit is concerned the train is

now free to proceed through to sprocket 5; but to intimate to the signalman that the train is approaching the end of the section and give him time to remove the pin of sprocket 5 and clear the section a contact-key 8 is placed near sprocket 4, which as a train passes that point opens circuit and rings the bell in the cabin. The signalman then throws his lever back into the normal position and sets the pins of the end sprockets 2 and 5 clear of the path of the locomotive mechanism and the pins of sprockets 3 and 4 in the path. This constitutes the mechanism of one unit. The multiplication of such to afford complete protection is illustrated diagrammatically in Fig. 2, which represents a plan of two cabin-sections included between cabins A, B, and C, the units under control of cabin B being shown in full lines while the portions of A which overlap such are indicated by dotted lines and the overlapping portions of C by dot-and-dash lines. As the lines representing the wire ropes or chains of the several units are superposed and would be indistinguishable if drawn thus, they are in this drawing diverted that the connections with their respective sprockets may be more readily followed.

Each cabin has under its control four of the units, as just described, (indicated by the letters *r s t u*,) each connected over the guide-pulleys *g* to a separate lever for operating and each unit provided with the contacts 8 for bell-signals at 2 and 4. The first unit *r* extends three-quarters of a section distance back from the cabin (considering the arrow to indicate the direction of approach on the rails R) and one-quarter of a section distance forward, unit *s* extends a half-section back from the cabin and the same distance forward, *t* extends one-quarter back and three-quarters forward, and *u* extends the length of the section forward, so that its sprocket 5 is opposite to the next cabin in advance. Each unit is a section distance in length, and its inner sprockets 3 and 4 are each one-eighth of that distance from each end, and when the manner of overlapping is considered it will be seen that this arrangement divides each section into eight substations, each having two sprockets, one operated from one cabin and the other from the next cabin to that side on which the substation is, and each substation has a bell-contact to one cabin or the other, the one in advance alternately with the one behind.

Consider now the approach of a train within the first limit of cabin B—that is, at r^2 —having just been cleared by cabin A off his section *r* in response to the bell rung as the train passed A's r^4 . As soon as the train passes the contact at r^2 and the signal is rung at B, B sets r^2 and r^5 to protect the train, which removes the pins at r^3 and r^4 . A's s^4 is standing clear, and in passing it the bell is rung at A for the signalman to clear s^5 , and the train passes it and

B's s^2 , (normally standing clear,) and B being signaled of such passage the pins s^2 and s^5 are immediately turned to protect the train on the section, and s^3 and s^4 are simultaneously turned clear, and A being signaled of the passage of t^1 , t^5 is cleared and the train enters on B's section t , t^2 , and t^5 , being at once placed to protect it from both ends, and so on. With this protection it will be seen that a train or engine cannot approach within striking distance unless its driver utterly disregards a constant succession of warnings, and as it is intended to make the section distance two miles and the substations will therefore be one-quarter of a mile apart ample protection will thus be afforded.

It is further intended to cover the ropes from the weather with a thin sheet-iron guard that will collapse under a rock, mud, or snow slide, and the signalman being unable to move the ropes to clear a section the train will be stopped and prevented running into such danger. The sprocket-wheels will be similarly shielded from the weather by a casing that while affording free movement under ordinary conditions will be crushed down on the mechanism under abnormal conditions and render it inoperative.

As before mentioned, the track mechanism is on one side only, the bell-ringing device on the locomotive being on each side, so that the signaling device is operative whichever way the train may be moving; but in order that the cabin-signalman may know from which direction a train is approaching contacts 9 are provided toward the opposite rail, which ring a gong in the cabin instead of a bell, and they are placed opposite substations 5 and 3 instead of 2 and 4 of each unit, the conditions of approach over the track mechanism being reversed.

The mechanism on the locomotive by which the contacts are made will require to be made in such a manner that while the roller or wheel is down to operate the bell-contacts the one at the opposite side to operate the gong-contacts is clear, and vice versa, such change being operated from the cab of the engine. One manner of doing this is illustrated in Fig. 6, a hand-lever 20 being placed within the cab of the locomotive and the lower end of it connected by a rod 21 to a short lever 22, keyed on a cross-shaft 23, and on this shaft are keyed two levers 24 and 25, each carrying a wheel or roller 26 and placed one over the bell-ringing contacts 8 and the other over the gong-ringing contacts 9, the levers being so set in relation to one another and the operating mechanism that as one lever is down and in position for closing the contacts 8 the other is clear of the contacts 9, and vice versa.

Having now particularly described my invention and the manner of its operation, what I claim as new, and desire to be protected in by Letters Patent, is—

1. As a means for signaling from the track to a passing train; a bell-ringing mechanism on the locomotive comprising a vertical shaft extending from within the cab downward toward the track-level and having a limited rotative movement which is operative of the bell-striker, a lever projecting from the lower end of said shaft, a series of sprocket-wheels along the track each having an upwardly-projecting member toward the periphery designed to engage the lever of the bell-ringing mechanism of the locomotive when in one position, but clear of such lever when partially rotated, and means operative from a signal-cabin for imparting partial rotation to the sprockets whereby the bell on the locomotive may be rung or not, as required.

2. As a means for signaling from the track to a passing train; a series of wheels rotatable on vertical axes at suitable intervals along the track, such wheels having upwardly-projecting members toward the periphery designed to engage and operate a bell-ringing mechanism on a passing locomotive, and means operative from the signal-cabins for partially rotating the wheels by which the upwardly-projecting members may be moved out of or into the path of the locomotive-signaling mechanism.

3. As a block-signaling means for railway-trains; a series of sprocket-wheels at suitable intervals along the track rotatable on vertical axes and having members upwardly projecting toward their peripheries, an endless wire rope having chain-sections adjacent to the sprockets, such chain passing round a group of such sprockets and in engagement with the intermediate ones, and means for moving such rope back and forth whereby the sprockets may be rotated a half-revolution, and a bell-ringing mechanism on the locomotive designed to be engaged and operated by the upward projections of the sprockets when they are in one position, but which will not be operated by such when the sprockets are rotated a half-revolution.

4. As a block-signaling means; two sprockets rotatable on vertical axes a suitable distance apart on the track and having members upwardly projecting from toward the same side of their peripheries, a wire rope and chain passing round the sprockets and designed to be operated to impart a half-revolution to the sprockets, two similar sprockets situated between the foregoing and having their upward projections both on the same side of the periphery but on the opposite side to those of the aforementioned sprockets, a bell-ringing mechanism on the locomotive comprising a light vertical shaft extending from within the cab to toward the track-level and having a lever secured to the lower end designed to engage the upwardly-projecting members of the track-sprockets by which the shaft may be partially rotated, a spring to return the lever

to its normal mid-position, and a toothed sector toward the upper end of the shaft meshing with a pinion whereby strikers will ring a bell adjacent when the shaft is rotated.

5 5. In a train-signaling means having a bell-ringing mechanism on the locomotive and means for operating such by a series of controlled upward projections on the track; a means for intimating to the cabin-signalman
10 the passage of the train from the position of the track projections comprising contacts on the track which when depressed will ring a bell or gong in the cabin, and a controlled lever depending from the locomotive whereby
15 the contacts may be depressed.

6. In a railway block-signaling system wherein a bell-ringing mechanism on the locomotive is operated by upwardly-projecting members on the track which may be moved
20 in or out of the path of the locomotive-bell-ringing mechanism; the arrangement of the projection carrying and operating mechanism of each cabin into four groups of four projections each, the two end projection-carrying
25 mechanisms of each group being fixed a section distance apart and arranged that their

projections will be in and out of the path of the locomotive-bell-ringing mechanism at one time, the other two projection-carrying mechanisms being similarly operative together but
30 arranged to be in the path when the end ones are out, and vice versa, each group of four to be separately operative from the cabin and each group to extend the first from three-fourths of a section distance on one side of the
35 cabin to one-fourth on the other, the second from one-half such section on one side to one-half on the other, the third from one-fourth of a section distance on one side to three-fourths on the other, and the fourth a section
40 distance to one side, and the necessary means automatically operative by the locomotive for signaling to the cabins by bell or gong when a train passes the several subdivisions of each
45 section, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH MORTON.

In presence of—

ROWLAND BRITAIN,
ELLICE WEBBER.