(No Model.) 2 Sheets—Sheet 1.

B. B. MORGAN.

RAILWAY SIGNAL APPARATUS.

No. 572,268. Patented Dec. 1, 1896.

Fig. 1

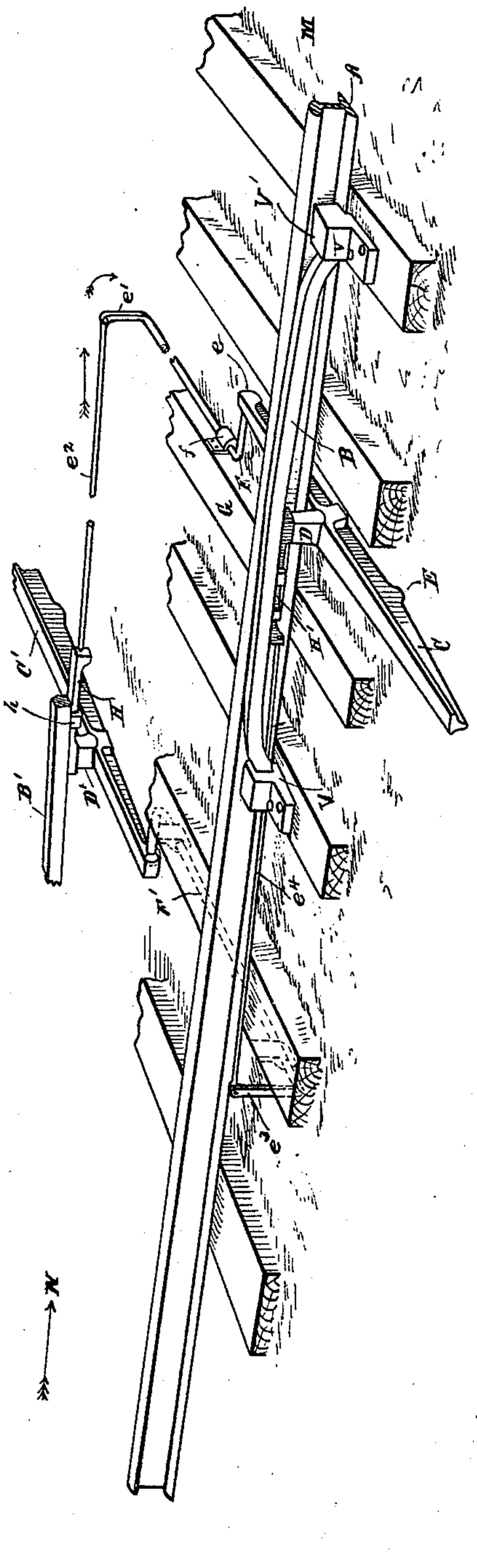

Fig. 2

WITNESSES

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Fig. 3.

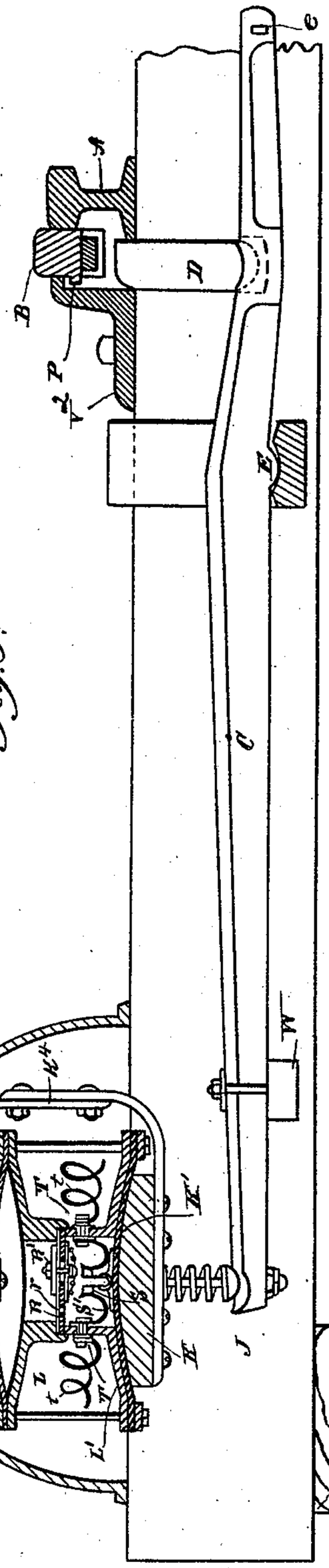
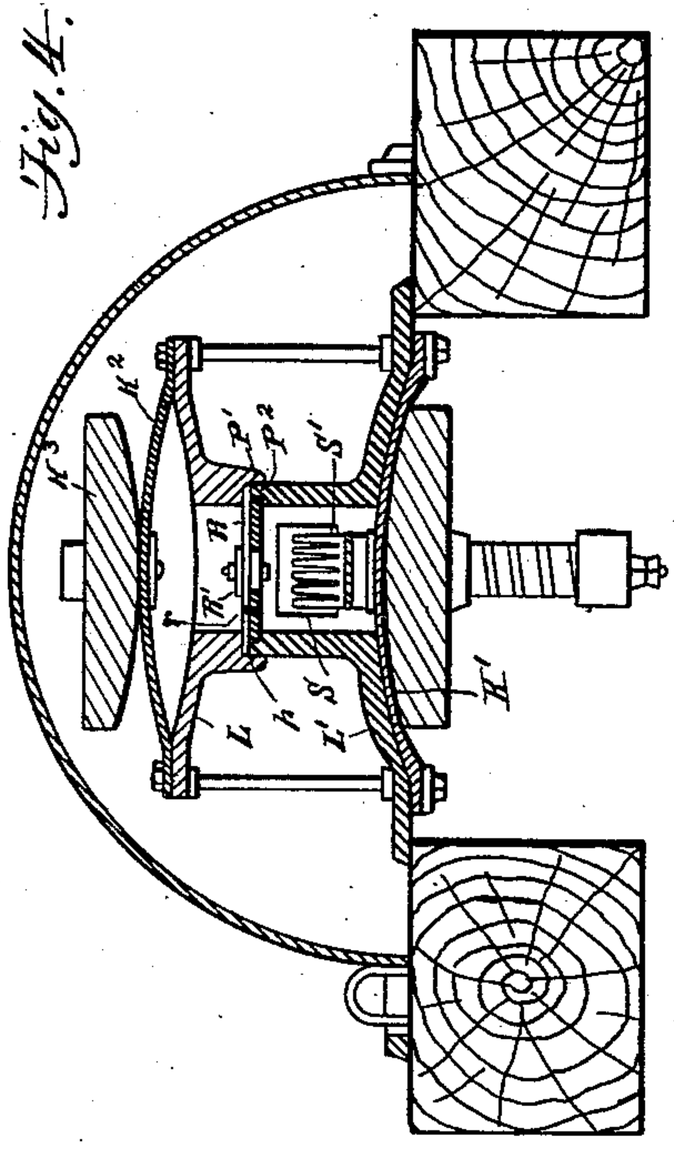


Fig. 4.



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UNITED STATES PATENT OFFICE.

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RAILWAY SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 572,268, dated December 1, 1896.

Application filed May 15, 1894. Serial No. 511,313. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN B. MORGAN, a citizen of the United States, residing at Ypsilanti, county of Washtenaw, State of Michigan, have invented a certain new and useful Improvement in Railway Signal Apparatus; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to connections for signals, and is especially designed to meet the conditions of a single-track railway where trains are running in both directions, and thus are required to operate a series, say, of block-signals for each direction entirely independent of each other.

In the drawings, Figure 1 is a perspective view of the apparatus, one rail of a railway being omitted for the purpose of showing it more clearly. Fig. 2 is a diagrammatic view of the bell-cranks and stop-blocks. Fig. 3 is a track-lever connection of the same, showing a pneumatic dash-pot in combination with an electrical connection, also illustrating one method of preventing the ends of the spring-rail B from being withdrawn from the supporting-blocks. Fig. 4 is an enlarged view of the dash-pot and electrical connection with the wires omitted, showing the mechanical manner of making the connection.

In the drawings similar letters refer to similar parts.

A is a railway-rail of the usual construction. B is a track connection or spring-rail which is supported and held on the outside of the main rail, and is raised centrally normally above the main rail, and is adapted to be depressed by the passage of a wheel, operating thereby the connecting mechanism, and to return to its normal position by its elasticity.

D is a block operated by the depression of the spring-rail B.

C is a lever to which the block D is connected, which is pivoted at E. Its outer end operates the pneumatic retarding device. (Shown in Fig. 3.) The inner end at *e* has pivotally attached to it a bell-crank F, which is journaled at *f* to a fitting upon the side of the tie G, and from thence runs across the track and underneath the opposite rail to its outside, where it has a crank *e'* at substantially right angles to the crank *e*. To this crank *e'* is connected a connecting-rod e^2, running longitudinally of the rail and underneath one end of a spring-rail B'. The end of the spring-rail is cut away for the purpose of showing the mechanism. This spring-rail B' is attached and operates precisely the same as that marked B, but is contiguous to the opposite rail. (Not shown.) It also operates a lever C' by means of the block D'. Underneath the spring-rail B' and connected to the connecting-rod e^2 is a sliding block H. With the spring-rail B' in its normal attitude this block H is adapted to fill the space between the block D' and the spring-rail when the parts are in their normal position. It thus enables the depression of the spring-rail B' to operate upon the block D' and thereby depress the lever C' in the same manner exactly as though the block D' was as much higher than the thickness of the sliding block H. Obviously the withdrawal of the sliding block H in the line of the arrow by the rotation of the bell-crank *e'* would enable the spring-rail B' to descend throughout the thickness of the block H without operating through the block D' the lever C'. The sliding block H is controlled by a bearing *h*, attached to the under side of the spring-rail B'. An apparatus of exactly similar construction is connected with the lever C' and operates, in combination with the spring-rail B, block D, and lever C, as shown in Fig. 1 at H' and dotted lines at F', the crank e^3 and connecting-rod e^4.

As shown in Fig. 1, the respective spring-rails B and B' are not directly opposite each other, but are so placed that their centers would be on a diagonal line across the track. There results from this the following-described mode of operation: Assuming that a train is approaching from the direction shown by the arrow at M it is obvious that the first wheel would depress the spring-rail B, and if the block H' is in position between it and the block D it would also depress the lever C,

turning upon the pivot E. The end between the tracks, therefore, at *e* would rotate downward the crank of the rod F and rotate in the direction of the arrow the crank *e'*. It would at once, therefore, withdraw the block H from between the spring-rail B' and the block D'. As the lever C is held downward during the passage of the train by means hereinafter described the block H is kept withdrawn, so that the spring-rail B', as the advancing train reaches it, does not operate to depress the lever C', and therefore does not operate the signal connected, as hereinafter described, with that lever. After the train has passed, the lever C returns to the position shown by virtue of its outer end, as shown in Fig. 3, having thereon an overbalancing-weight W, which may be adjusted at any point along the length of the lever C, and thus cause a slow or a quick return, as may be desired. The block H is therefore returned to the position shown in the drawings; and if a train approaches from the opposite direction, as shown by the arrow at N, the spring-rail B' would depress, by means of the interposition of the block H, the lever C', and this would operate through exactly the same form of mechanism to withdraw the block H' from between the spring-rail B and the block D, and hence the lever C would not be operated, and the signal to which it was attached would also remain unaffected by the passage of the train.

In order to prevent the spring-rail B from being thrown out, either intentionally or by accident, by any excessive lifting in the center, thus withdrawing the ends from the supporting-blocks V V', I provide a third block V^2, (shown in Fig. 3,) which is located at a point midway between the two ends of the spring-rail. This block is bolted to a tie and is provided at its upper edge with a flange which extends over the bead P, formed along the lower and outer edge of the spring-rail B. Any excessive lifting of the central portion of the spring-rail, as above stated, would bring the bead P in contact with the under edge of the flange on the block V^2, thus limiting the movement and preventing the accidental or intentional removal of the spring-rail.

It is obvious that the bead might be placed upon the other side of the spring-rail, provided the same was of sufficient width to engage on its rising with the under side of the head of the rail instead of the under side of the block, and that such construction would be a mere equivalent for that shown.

As shown in Figs. 3 and 4, these signals are shown to be electric and may be of any form of electric signal, the only material feature of my invention being the manner of making connections.

In Fig. 3 the lever C is shown prolonged beyond the bearing E, the prolongation carrying the weight W until it engages at its outer end at J with the plunger K. This plunger carries upon its upper surface an elastic diaphragm K', which forms one side of an air-chamber, which, by means of said diaphragm and the side walls thereof, is made air-tight and which of course contains the normal quantity of air. The side walls of this air-chamber are formed by two concave castings L L' with central openings. Around the central openings arise from each flanges P' P^2, which are adapted to meet and form an air-tight joint at *p*. At this point a diaphragm R is interposed, carrying an ordinary flap-valve R'. The upper wall is formed by an elastic diaphragm K^2, to which is attached centrally a plunger K^3, the plungers K and K^3 being attached by means of a yoke K^4, so that they operate in unison. A very small aperture *r* exists in the diaphragm R. The crowding of the plunger K upwardly therefore transfers the air between the diaphragm K' and the lower casting L and inclosed in the chamber practically through the valve R' to the chamber above the valve and raises the diaphragm K^2, carrying with it the plunger K^3. The moment the pressure is withdrawn from the plunger K the weight of the parts tends to transfer the air backward in the reverse direction to the under side of the diaphragm R; but as the valve R' closes air-tight it can only be thus transferred by passing therethrough the small orifice *r*, and this is so proportioned that it takes several seconds, depending upon the pressure and tendency to pass, to permit of such transfer of air and the consequent descent of the plungers K and K^3, together with the outer end of the lever C.

It is obvious that the shifting of the weight W would increase or decrease the time within which the plunger K would be restored to its normal position.

This apparatus has been heretofore described by me in its essential features in another application, Serial No. 492,472, filed December 1, 1893.

In order to enable this device to make an electrical connection, I have shown, especially in Fig. 4, apparatus for that purpose. From the central portion of the diaphragm K' arises a series of plates S, which interlock with another series of plates fixed in the chamber, as shown at S'. When the diaphragm K' is withdrawn in a depressed condition, this interlocking is not effected; but on the raising of the diaphragm the interlocking takes place, and the plates are brought thereby in contact. If, therefore, the plates are insulated by any appropriate means, as by plates of ebonite, from the surrounding walls, and wires, as shown in Fig. 3 at T T, are brought into the interior by means of insulated connections *t t*, it is obvious that the bringing of the plates together may be made the means of effecting an electrical connection, and that this connection will exist so long as the plates are in contact, which again is dependent upon the length of time that the diaphragms will remain in position shown in the figures; and this again is governed, as hereinbefore stated,

by the length of time that the air is escaping through the small orifice.

What I claim is—

1. In a track signal device, the combination of a track consisting of two rails, a spring-rail in connection with each rail thereof, not adjacent but successive one to the other, block connections adapted to be operated by the spring-rails respectively, connections between the blocks arranged in such manner that the depression of one block on one side operates to withdraw the other block from operative contact with the opposite spring-rail, and means to hold it in an inoperative position, substantially as described.

2. In a combined track and signal device for railways, the combination of a single track and a rail connection with each rail thereof, the two rail connections not being adjacent but successive in their relative positions, means whereby the operation by a passing train of one rail connection disconnects the other rail connection, whereby the same is prevented from operating, a pneumatic retarding device adapted to hold said latter connections in an inoperative position, and means whereby the length of time it is so held is controlled, substantially as described.

3. In a signal device for railways, the combination of a track, a rail connection with each rail thereof, the two connections not being adjacent but successive in their relative positions longitudinal with the track, means whereby the operation by a passing train of the rail connection first reached disconnects the other rail connection and prevents the same from operating, an electric connection consisting of a pneumatic retarding device operated by said track connection and carrying therein electrical contacts adapted to engage fixed electrical contacts in such manner that the electric connections are successively operated by the separate track connections, and also successively disconnected from operating and held in an inoperative position by the retarding device, substantially as described.

4. A combined track and signal connection consisting of the combination of a pneumatic retarding device composed of a lower movable diaghragm carrying thereon an electrical connection, an upper movable diaphragm K^2, means whereby the lower diaphragm is operated by a track connection actuated by a passing train, an interposed fixed diaphragm containing a valved aperture for the quick passage of inclosed air, and a small aperture for the return thereof, substantially as described.

5. In a combined track and signal connection, the combination of a pneumatic retarding device composed of a lower movable diaphragm, an upper movable diaphragm, means whereby the lower diaphragm is operated by a track connection, a fixed diaphragm interposed between the two movable diaphragms containing a valved aperture for a quick passage of inclosed air from below to the upper side of said interposed diaphragm, a small aperture for the slow return of air, and an unyielding connection between the upper and the lower diaphragm compelling a simultaneous movement of the two diaphragms with reference to each other.

In testimony whereof I sign this specification in the presence of two witnesses.

BENJAMIN B. MORGAN.

Witnesses:

FRANCES CLOUGH,

MARION A. REEVE.