No. 708,399. Patented Sept. 2, 1902.

H. PRATT.

RAILWAY SIGNALING DEVICE.

(Application filed Feb. 12, 1902.)

(No Model.)

5 Sheets—Sheet 1.

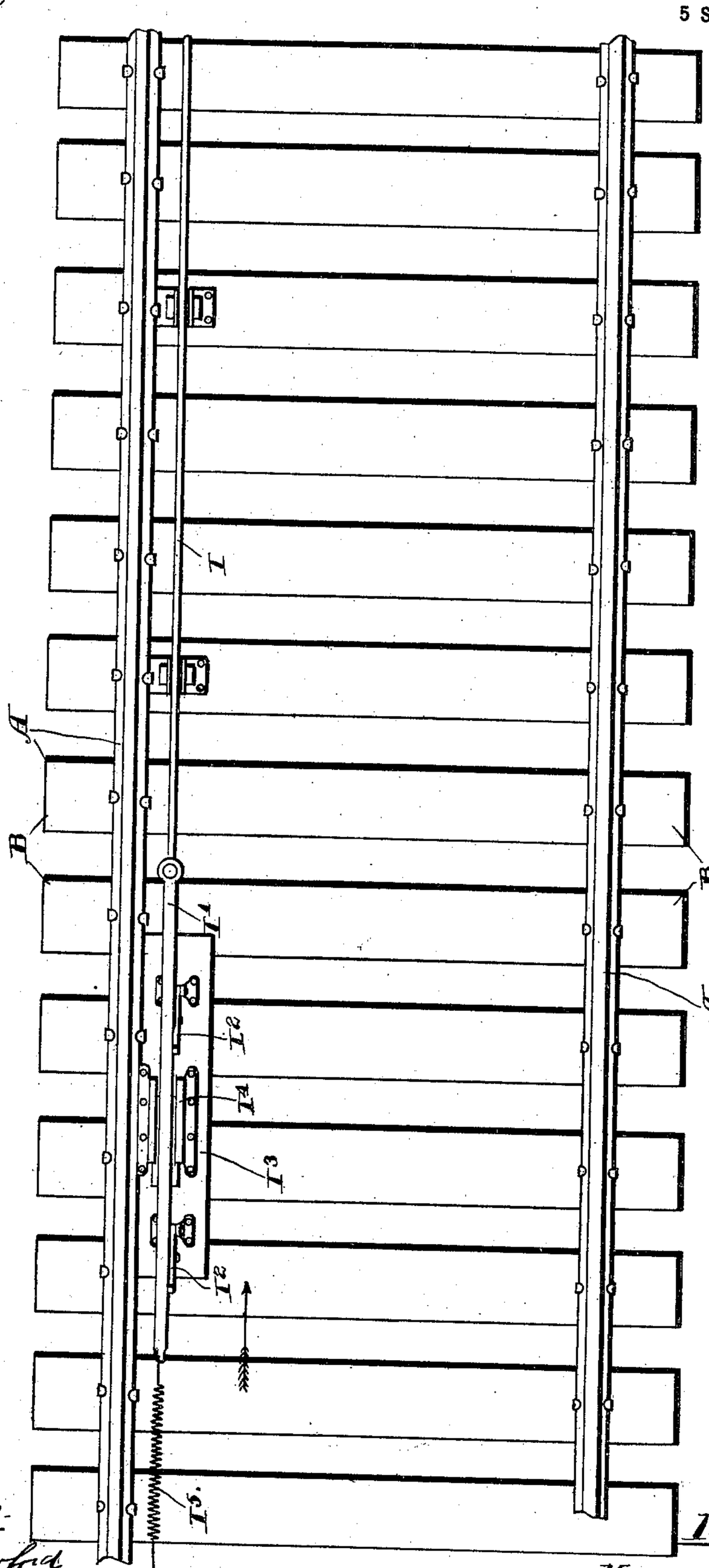


Fig 1a

Witnesses:-
Carl A. Crawford
William L. Hall

Inventor:-
Harry Pratt
by Poole & Brown
his Attorneys

No. 708,399. Patented Sept. 2, 1902.

H. PRATT.

RAILWAY SIGNALING DEVICE.

(Application filed Feb. 12, 1902.)

(No Model.) 5 Sheets—Sheet 2.

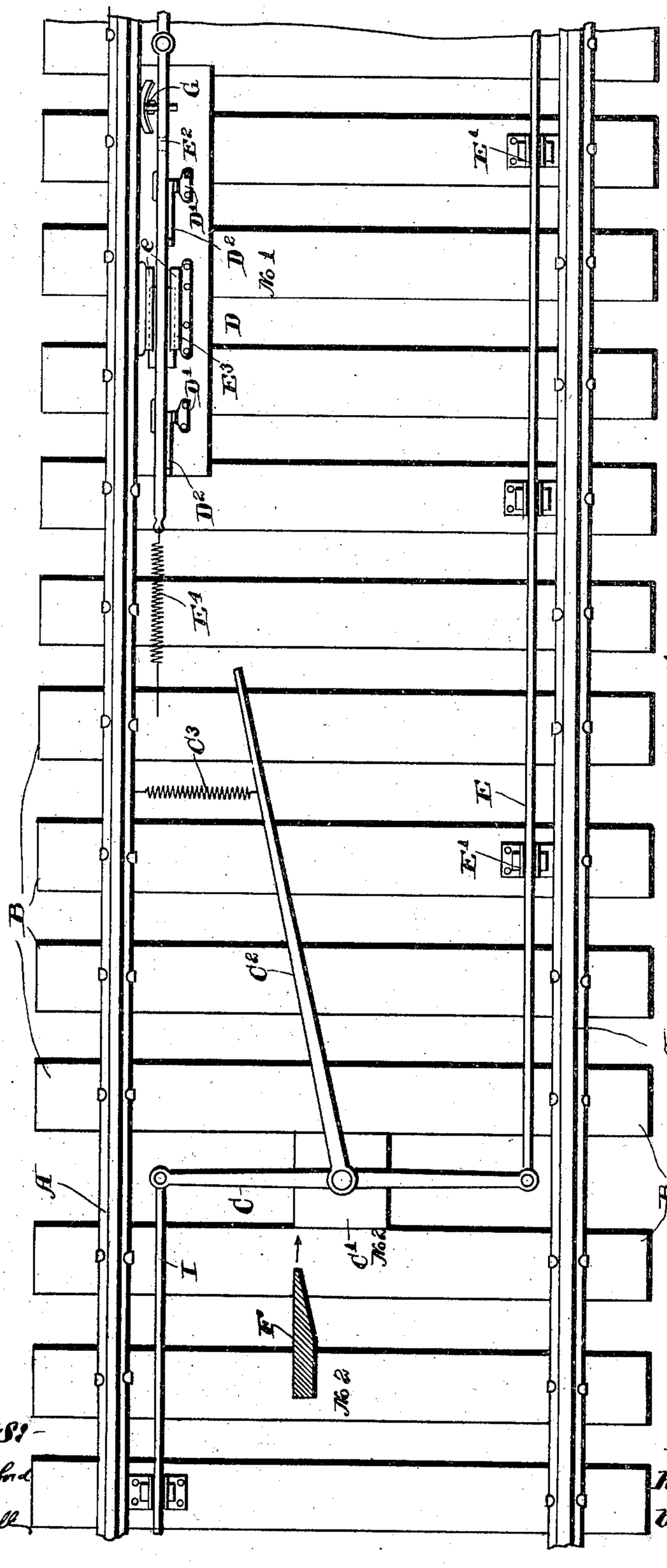


Fig 1b.

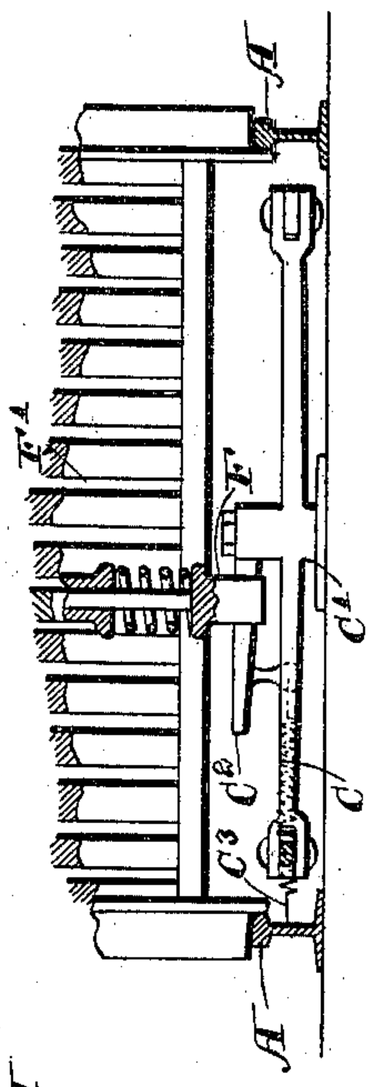


Fig 2.

Witnesses:-
Carl A. Crawford
William L. Hall

Inventor:
Harry Pratt
by Poole & Brown
his Attorneys

No. 708,399. Patented Sept. 2, 1902.

H. PRATT.

RAILWAY SIGNALING DEVICE.

(Application filed Feb. 12, 1902.)

(No Model.) 5 Sheets—Sheet 3.

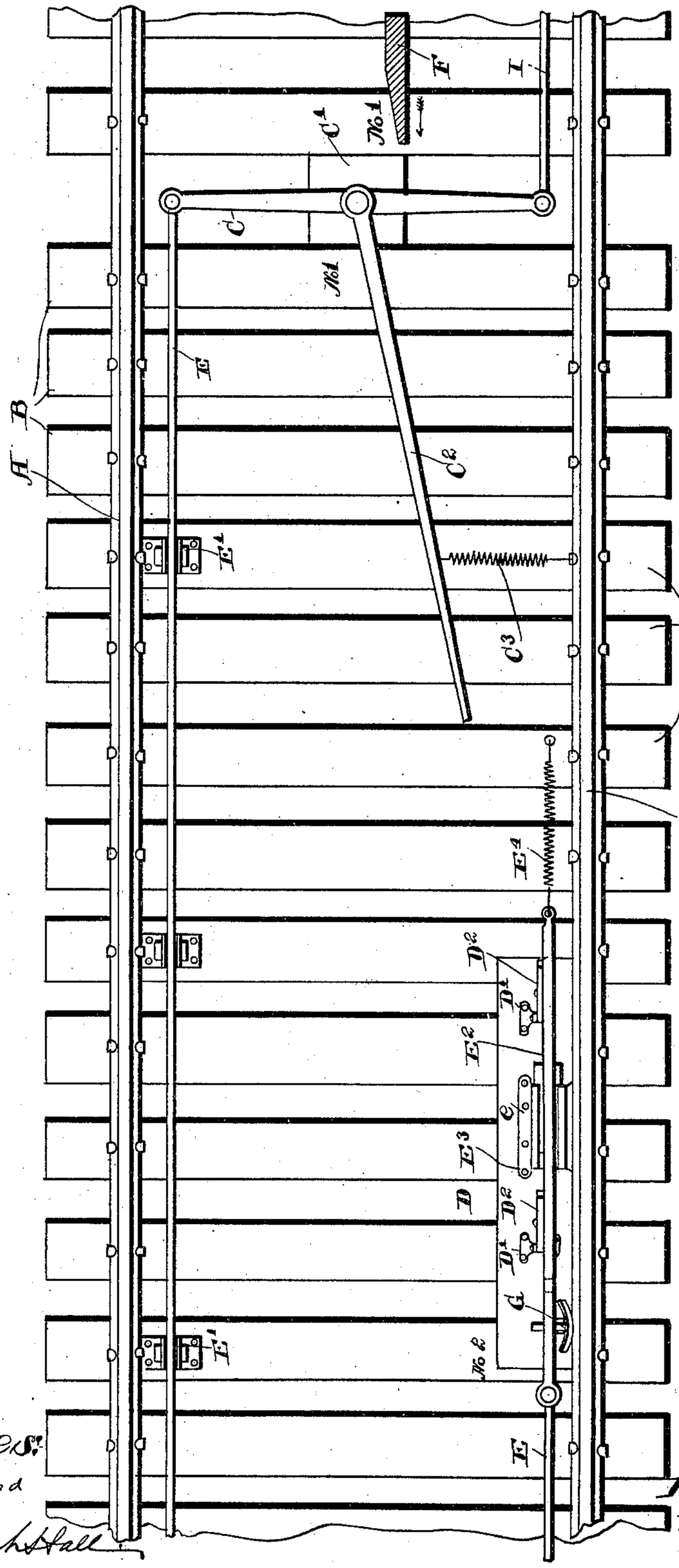


Fig 1.

Witnesses:
C. H. Crawford
William L. Hall

Inventor:-
Harry Pratt
by Poole & Brown
his Attorneys

No. 708,399. Patented Sept. 2, 1902.

H. PRATT.

RAILWAY SIGNALING DEVICE.

(Application filed Feb. 12, 1902.)

(No Model.) 5 Sheets—Sheet 4.

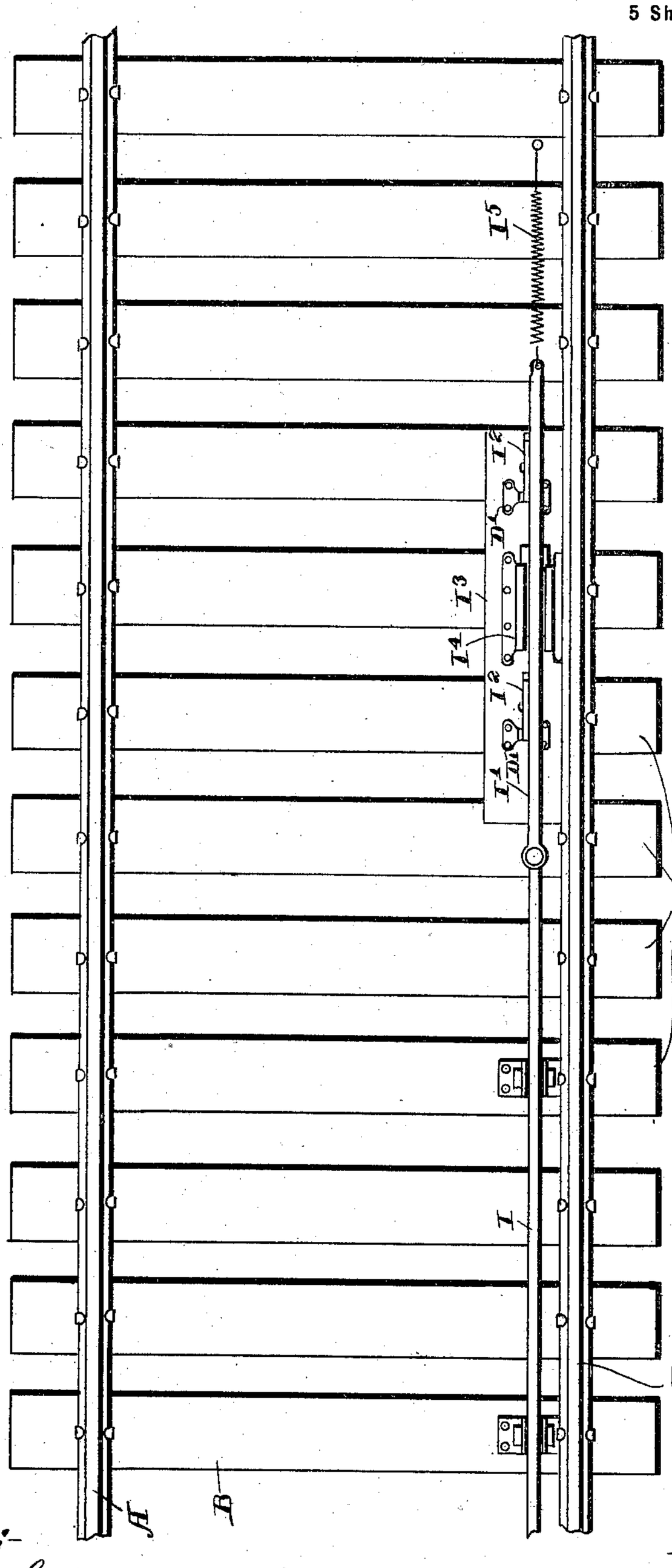


Fig. 1.

Witnesses:-
Carl H. Crawford
William H. Hall

Inventor:
Harry Pratt
by Poole & Brown
his Attorneys

No. 708,399

Patented Sept. 2, 1902.

H. PRATT.

RAILWAY SIGNALING DEVICE.

(Application filed Feb. 12, 1902.)

(No Model.)

5 Sheets—Sheet 5.

Fig 3.

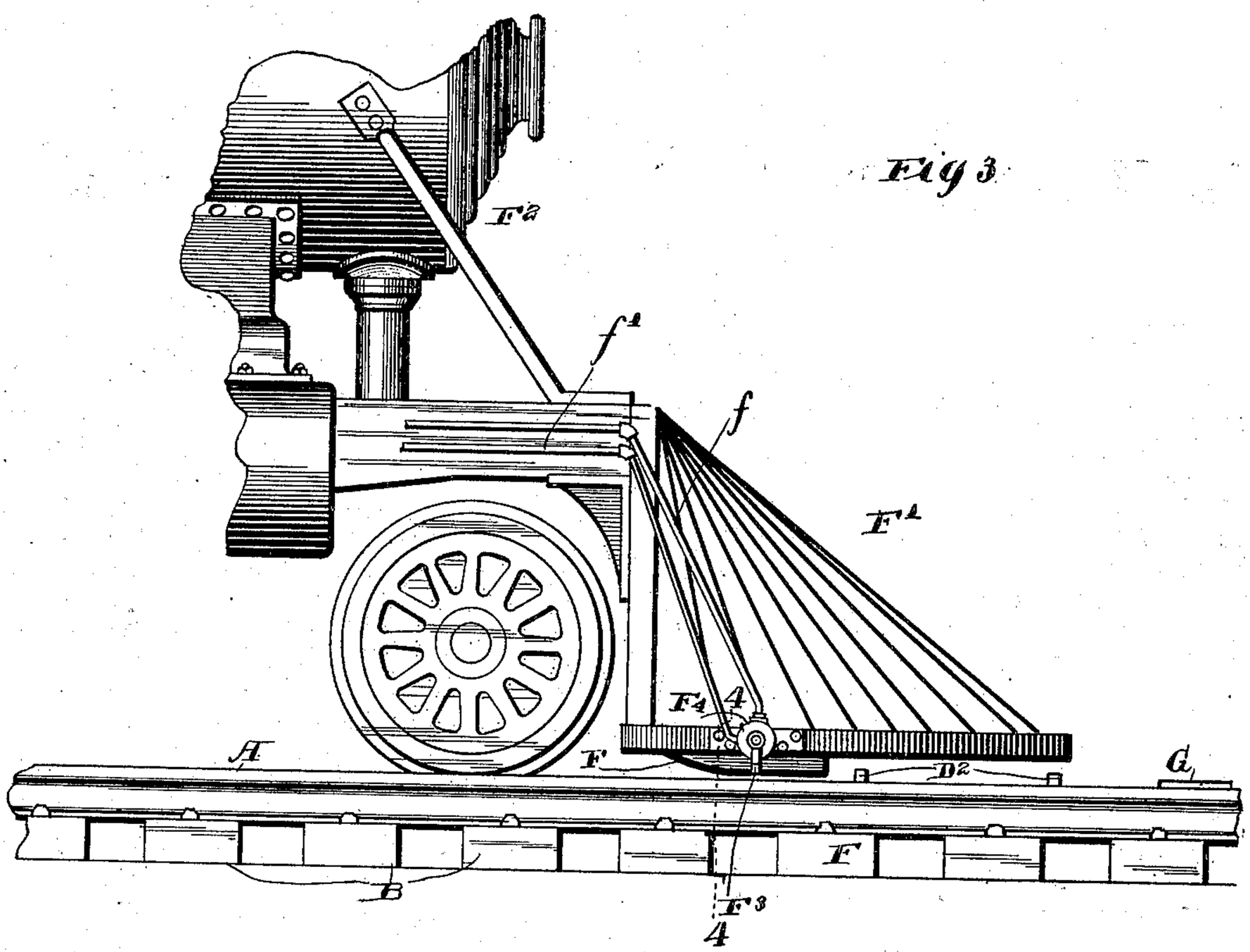


Fig 4.

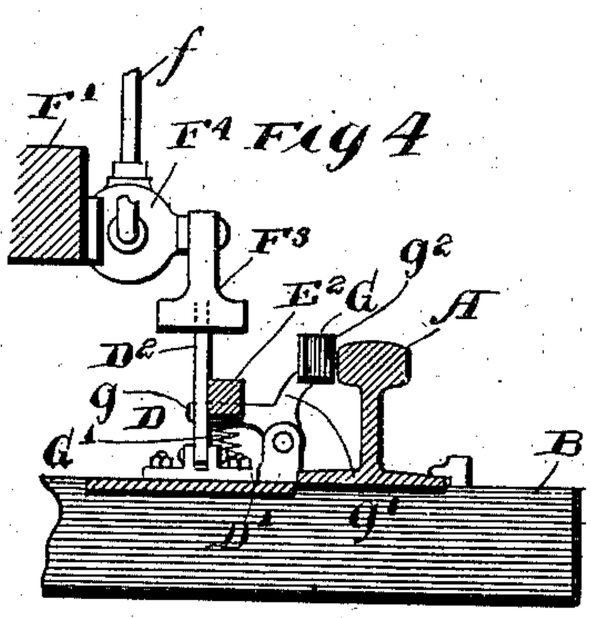


Fig 6.

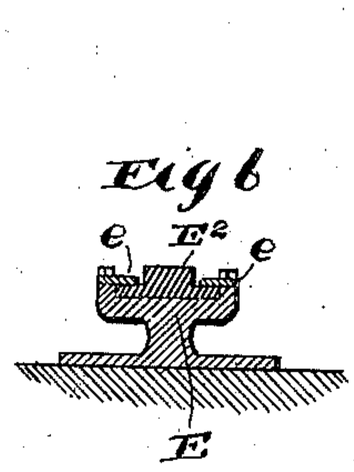


Fig 5.

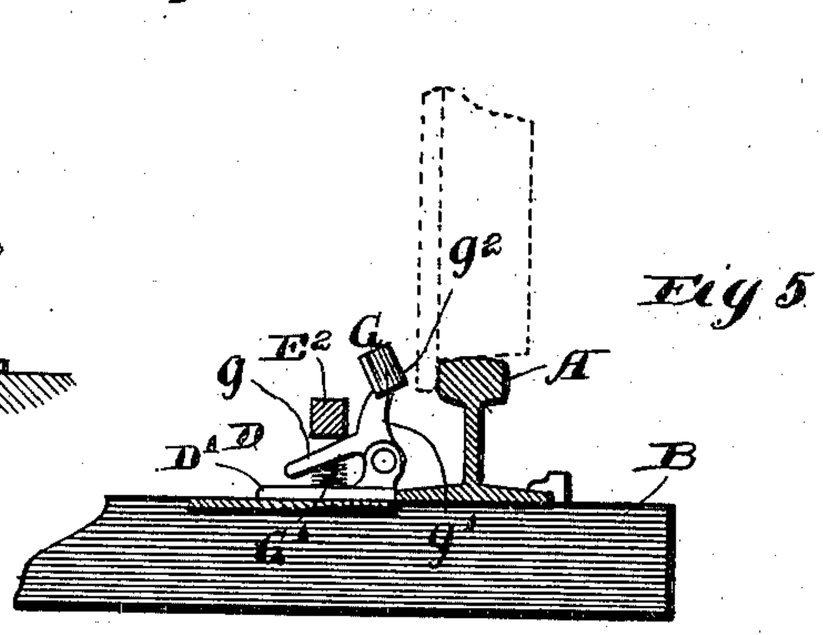
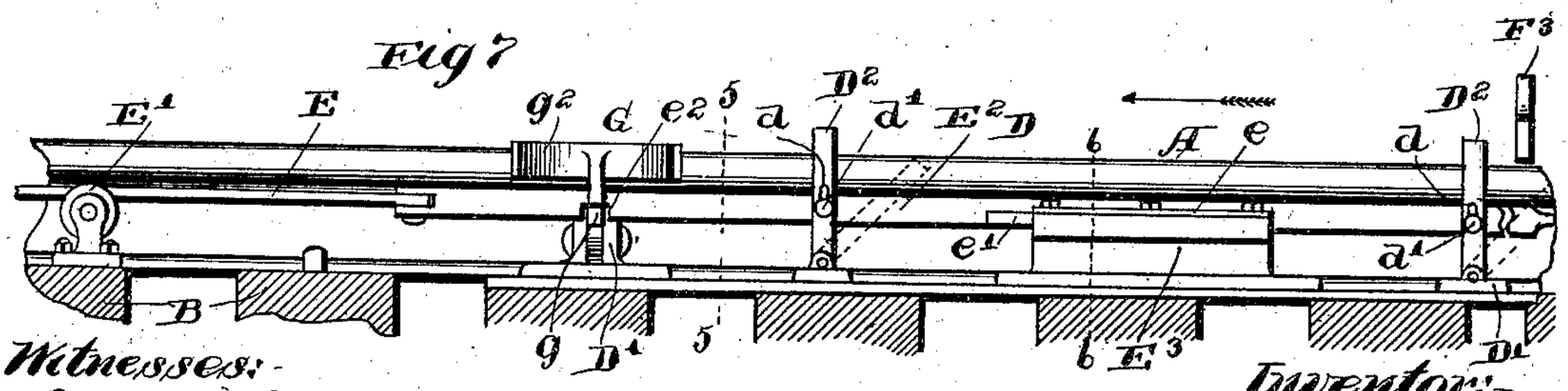


Fig 7.



Witnesses:-
Carl A. Crawford
William A. Hall

Inventor:-
Harry Pratt
by Poole & Brown
his Attorneys

UNITED STATES PATENT OFFICE.

HARRY PRATT, OF KENILWORTH, ILLINOIS.

RAILWAY SIGNALING DEVICE.

SPECIFICATION forming part of Letters Patent No. 708,399, dated September 2, 1902.

Application filed February 12, 1902. Serial No. 93,668. (No model.)

To all whom it may concern:

Be it known that I, HARRY PRATT, of Kenilworth, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railway Signaling Devices; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The invention relates to improvements in railway signaling systems of that class designed to warn railway-trains while in motion of the approach of another train or trains on the same track; and the invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figures 1^a, 1^b, 1^c, and 1^d (Sheets 1, 2, 3, and 4) illustrate in plan view a section of railway-track equipped with my improved signaling system. Fig. 2 is a transverse section of the track, taken in rear of the lever C on Fig. 1^b, showing a portion of the pilot of the locomotive and the operating-shoe thereon, showing said shoe advanced in contact with the arm of said lever. Fig. 3 designates a fragmentary side elevation of the front end of a locomotive and the railway-track on which it is supported, showing the operative connections between the parts of the signaling device on the track and that on the locomotive. Fig. 4 is a cross-section taken on line 4 4 of Fig. 3. Fig. 5 is a cross-section taken on line 5 5 of Fig. 7, with the locking-lever in its releasing position. Fig. 6 is a cross-section on line 6 6 of Fig. 7. Fig. 7 is an inside view of the transmitting devices shown in Figs. 4, 5, and 6.

The switch signaling system as herein illustrated as embodying one adaptation of my invention embraces in general terms a system of sliding rods supported on the track, levers connected with said rods, which are adapted to be actuated by a part projecting from the locomotives of the trains, and transmitting devices connected with said rods at points remote from the actuating-levers and provided with projecting parts or fingers which are adapted to be moved or set in position for contact with downwardly-projecting parts of signaling devices on the locomotives, said parts being so arranged that a projecting part, such as a shoe on a locomotive, acts on the actuating-lever to throw said fingers into the path of the projections of the signaling devices on the locomotives, so that when one train enters a section of the railway-track equipped with said system the fingers or projecting parts of the transmitting device at the other end of the system are in position for engagement by the projecting part of the signaling device on a locomotive entering said section on the same track from the opposite direction, whereby said last-mentioned locomotive receives a signal which warns the engineer of the approach of the train which first entered said section.

As shown in the drawings, A designates the track-rails, and B the cross-ties or sleepers of a railway-track. Each section of the track equipped with my improved signaling system is provided with two separate systems, one located at each side of the track and one adapted to signal trains approaching from one direction and the other adapted to signal trains approaching from the other direction. Each signaling system embraces generally a lever C, pivoted between its ends to a block or plate C′, secured to the track between the rails in any suitable manner, an arm C^2, which is adapted to be actuated by downwardly-projecting parts, as the shoes F, on the locomotives, a transmitting device (indicated as a whole by D) located at a distance from the actuating-lever C, and a sliding rod E, pivotally connected at one end with the lever C and connected at its other end with said transmitting device D, said rods sliding in suitable roller-guides E′, supported on the track. It will be understood that the actuating-lever of one of the systems is adapted to be actuated by the shoe F of locomotives traveling in one direction for giving signals to trains approaching from the other direction and that the actuating-lever of the companion system is adapted to be actuated by the shoe of locomotives traveling in the opposite direction and to give signals to approaching trains. The shoes F are connected with the pilots F′ of the locomotives F^2, and said shoes are at-

tached by spring-pressed connection with the pilots, as indicated in Fig. 2, to permit said shoes to yield upwardly when the direction of said locomotives is reversed, so as to permit said shoes at such times to ride over the arms C^2 of the actuating-levers. The parts of the transmitting device are supported on base-plates D′, which are attached in any suitable manner to the track. On the upper side of said base-plate are pivoted two short bars or fingers D^2, which swing in vertical planes and have pin-and-slot connection with a sliding bar E^2, the fingers being provided with longitudinal slots *d* and connected with said sliding bar by means of pins *d*′. Said bar E^2 is attached at one end to the adjacent end of the sliding rod E and at its other end with a spring E^4, against which the rod E acts. In the operative position of the parts the fingers occupy inclined positions, as shown in dotted lines in Fig. 7, and are held in their inclined positions by the action of the springs E^4. With this construction when the bar is moved in a direction away from the spring it acts to throw the fingers D^2 in an upright position, as shown in full lines in Fig. 7, and when said bar is moved in the opposite direction said fingers are thrown into their operative or inclined positions.

The fingers D^2 are adapted for contact when in their upright positions with downwardly-projecting arms F^3 of air-valves F^4 on the locomotives. Said valves are each connected at one side with a pipe *f*, adapted for connection with a source of air under pressure and at its other side with a pipe *f*′, adapted for connection with an alarm device, such as a whistle, located in the locomotive-cab. When the valve is opened, therefore, the air-pressure is transmitted to the whistle and an alarm sounded. Obviously the signaling device may be otherwise operated—as, for instance, by electricity—and movement of the part F^3 may operate to close a signaling-circuit.

The bar E^2 has interfitting sliding connection with a slide-block E^3, fixed on the base-plate, said block being provided with undercut grooves between an upwardly-opening notch in the block and removable side plates *e*, attached to the upper face of said block and overlapping said notches. Said bar is provided with oppositely-directed lateral flanges *e*′, which fit in said undercut grooves, as shown in Fig. 6.

It will be understood that the fingers are thrown upwardly when the shoes F engage the inclined arms of the operating-levers C, said shoes swinging the arms straight and vibrating the levers in a manner to give endwise movement to the rod E and bar E^2, and thereby swing said fingers upwardly. Said actuating-arm of the lever C is held normally in its inclined position by means of a spiral contractile spring C^3, attached at one end to the arm and at its other end to the adjacent rail, and said spring acts, together with the spring E^4, attached to the bar E^2 of the transmitting device, to return the parts to their inoperative positions.

The operation just described constitutes the setting operation of the transmitting device D. When said parts have been set—that is to say, when the fingers D^2 have been raised to their upright positions for contact with the projecting parts of the signaling device on the locomotives—means are provided for holding said parts in this position until a train approaching in the opposite direction passes upon the section of track equipped with said system or until the train which has set said devices passes off said equipped section.

The devices for locking the parts in their set positions are made as follows:

G designates a bell-crank lever, Figs. 4, 5, and 7, having horizontal and upright arms *g* *g*′, respectively, and which lever is pivoted at its angle upon a lug d^2 on the upper surface of the base-plate D′. Said horizontal arm *g* of the bell-crank lever is adapted to enter a downwardly-opening notch e^2 in the horizontally-movable bar E^2 when said bar is shifted endwise to raise the fingers D^2 into their upright positions, as shown in Fig. 7. The other arm *g*′ of said bell-crank lever is provided with a widened upper end g^2, having a horizontally-curved bearing-face which bears against the adjacent rail. The end g^2 is held against the rail by means of a spiral expansively-acting spring G′, interposed between the arm *g* and the base-plate D′, said spring exerting an upward pressure on said arm. When said bar E^2 is in a position to throw the fingers D^2 downwardly, as shown in dotted lines in Fig. 7, the notch e^2 is out of line with the horizontal arm of said bell-crank lever, so that said horizontal arm bears upwardly at this time against the lower face of said bar, the part g^2 of the vertical part of the bell-crank lever being at such time retracted from the rail, as shown in Fig. 5. When the bar E^2 is shifted to bring the notch e^2 thereof in line with the horizontal arm of the lever, the spring G′ throws said arm upwardly into the notch e^2 and the end g^2 of said lever against the rail in the manner clearly shown in Fig. 4. The arm *g* of the bell-crank lever in this manner holds the lever E^2 in its forwardmost position and the fingers in their upright positions for contact with the projecting parts of the signaling devices on the locomotives, so that should a locomotive enter said section of track equipped with the system and approaching the locomotive which set the transmitting device the signaling device carried by the locomotive is actuated to give an alarm to the engineer of said locomotive. Said fingers of the transmitting device are restored to their inoperative positions by means of the flange of the locomotive-wheels, which passes between the rail and the upper end of the bell-crank lever G, as indicated in dotted lines in Fig.

5, said flange throwing the lever outwardly and the horizontal part of the lever downwardly out of the notch e^2 of the bar E^2, and thereby permitting restoration of said parts under the action of said springs C^3 and E^4. If, however, no train enters said equipped section before the train which set the apparatus has passed off said section, said last-mentioned train will release the devices through the action of the lever G, acted upon by the wheel-flange, so that they will be returned to their inoperative positions.

In the practical installation of my system one set of apparatus for transmitting the signals in one direction is located on one side of the track, and the other or duplicate set of apparatus for transmitting signals in the opposite direction is located on the opposite side of the track. The actuating-lever of one set of apparatus is located closely adjacent to the transmitting device of the other or duplicate set, and vice versa. The duplicate sets of apparatus are shown in Figs. 1^a, 1^b, 1^c, and 1^d, the transmitting devices and the operating-lever of one set of apparatus being designated as "No. 1" and the similar parts of the other set of apparatus being designated as "No. 2." The positions of the shoes F, which depend from the pilots of the locomotives, are indicated on said sheets just prior to their entrance upon the equipped section of the track, said shoes being adjacent to the levers. The shoe F, which actuates the lever No. 1, is correspondingly numbered, while the other shoe is designated as "No. 2." When shoe No. 1 is brought into contact with lever No. 1, it acts through the connecting-rod E to throw upwardly the fingers associated with the transmitting device D, and the bell-crank lever G, associated with said transmitting device, is thrown upwardly into the notch e^2 of the sliding rod E^2 when said notch is brought into line therewith and locks said fingers in their upright positions. Said transmitting device is now set to actuate the signaling device on a locomotive entering the section from left to right, and the valve F^4 is located on the left-hand side of the pilot of said locomotive, so that the actuating-arm F^3 of said valve is brought into contact with the upright finger D^2 of the transmitting device and a signal given to the engineer of said locomotive. At the time the locomotive is passing over the transmitting device and just after the signal has been transmitted to the signaling device on said locomotive the flange of the wheel on said locomotive engages the upper enlarged part of the bell-crank lever G and throws the horizontal arm of said lever downwardly out of the notch e^2 of the sliding bar E^2 and allows all parts of the apparatus associated therewith to be restored to their inactive positions under the influence of the springs C^3 and E^4. If, however, after locomotive No. 1 has set transmitting device No. 1 in position to transmit a signal and said locomotive reaches the transmitting device No. 1 before another locomotive enters said section, the flange of the front wheel of locomotive No. 1 will, through the lever G, restore said parts to their inactive positions, so that a locomotive subsequently entering said section will not receive a signal. As the valve of the signaling device on locomotive No. 1 is on the side thereof remote from the transmitting device No. 1, no signal will be transmitted to the engineer of locomotive No. 1.

As an addition to the system described I have provided a branch or supplemental apparatus connected with each of the apparatus described, which is designed to be set in position when the principal set of apparatus with which it is connected is set, said auxiliary or branch apparatus being designed for giving warning to a train in rear of a train which has set the principal apparatus associated therewith and approaching the train which first enters the equipped section and in the same direction, so as to prevent a rear-end collision between said first and second train. Said devices are made as follows:

I designates a rod which is pivotally connected with the end of the operating-lever C remote from the pivotal connection of said lever with the sliding rods E. Said rod I is attached at its end remote from said lever to a sliding bar I'. I^2 I^2 designate fingers which are pivoted at their lower ends to a base-plate I^3 and are loosely connected to the bar I' in the same manner as the fingers D^2 are connected with the bar E^2, before described. Said bar I' engages a guide-block I^4, made like the guide-block E^3, before described, and to the outer end of said sliding bar I' is connected one end of a spiral restoring-spring I^5, the other end of which is connected with a part stationary with the track in any suitable manner. With this construction when one of the operating-levers C is swung on its pivot to set its transmitting device D said lever acts through the rod I to give movement to the bar I', and thereby swinging the fingers I^2 into upright positions in the same manner as the fingers D^2, before described. Should a train approach said equipped section in the same direction as the train which has entered the section and set the apparatus at one side of the track, the signal device of said approaching train will be actuated by the fingers I^2 and the train warned of the presence of a train upon the equipped section. When the fingers of the transmitting device D are restored to their inoperative position by the means hereinbefore mentioned, the fingers I^2 are also simultaneously restored, the spring I^5 aiding the springs E^4 and C^3 to restore the parts.

The system hereinbefore described may be applied to a railway-track at short intervals, thereby dividing said track into a series of sections of any desired length, each section being equipped with a complete signaling device which acts in itself to warn trains approaching said section or sections of the pres-

ence of other trains on said section or sections, whether traveling in the same or opposite directions. Moreover, my system is also adapted to be applied to a railway-track at extra hazardous locations, such as at sharp curves or at places having a tunnel or tunnels and other places where excessive caution demands such a signaling system.

So far as the construction of the transmitting devices is concerned the operative connection between the same and the actuating-lever may be varied—as, for instance, such operative connection may be electrical.

Other changes may be made without departing from the spirit of my invention, and I do not wish to be limited to such details, except as hereinafter made the subject of specific claims.

I claim as my invention—

1. A railway signaling device comprising an operating-lever which is adapted for actuation by a part depending from the locomotive, a transmitting device located at a distance from the operating-lever comprising a part which is adapted to be thrown upwardly into the path of the actuating part of a signaling device carried by a locomotive, operative connections between said transmitting device and the lever, and means for locking said projecting part of the transmitting device in its uppermost position embracing a lever which is thrown toward the track-rail when the transmitting device is locked, said lever being adapted for engagement by the locomotive-wheel to swing the same therefrom and to release the locking means of the transmitting device to permit the parts to be restored to their inoperative positions.

2. A railway signaling device comprising an operating-lever which is adapted to be actuated by a part projecting from a locomotive, a transmitting device located at a point distant from the operating-lever, said transmitting device embracing an endwise-movable bar, a finger pivoted on a plate which is supported on the railway-track, and is loosely connected with the bar, whereby, upon endwise movement of the bar, the finger is thrown into an upright position, operative connections between said bar and said operating-lever, means for locking said bar to hold the finger in an upright position, and means for releasing said bar to permit the finger to be restored to its inoperative position.

3. A railway signaling device comprising an operative lever which is adapted to be actuated by a part projecting from the locomotive, a transmitting device comprising an endwise-movable bar, operative connections between said bar and the operating-lever, a finger pivoted to a plate supported on the bracket and loosely connected with the bar, whereby, when said bar is moved endwise, the finger is thrown upwardly into the path of the projecting part of a signaling device carried by a locomotive, a locking-lever engaging said bar for holding said finger in its upright position, said lever being adapted for contact with the wheel of the locomotive for releasing said bar and permitting the finger to return to its inoperative position.

4. A railway signaling device comprising an operating-lever which is adapted to be actuated by parts depending from the locomotive, a transmitting device comprising an endwise-movable bar, operative connections between said bar and lever, a finger pivoted to a plate supported on the track and having loose pivotal connection with the bar, whereby, when said bar is moved endwise, the finger is swung upwardly into the path of an actuating part of a signaling device carried by a locomotive, a bell-crank lever pivoted to said plate, one arm of which is adapted to engage a downwardly-opening notch in said bar to lock the finger in its operative position, and a cam-surface on the other arm of the lever adapted to be engaged by the wheel of the locomotive for releasing said lever from the bar.

5. A railway signaling device comprising a horizontally-swinging operating-lever, which is located between and normally inclined to the track-rails, rigid arms on said operating-lever, two transmitting devices, one located in front and the other in rear of the operating-lever and at a distance therefrom, each comprising a part which is adapted to be thrown upwardly into the path of the actuating member of a signaling device carried by a locomotive, rigid rods connecting said arms of the lever with the movable parts of the transmitting devices, means for locking the projecting members of the transmitting devices in their uppermost positions, and means operated by a part on the locomotive for releasing said members to permit the same to be restored to their inoperative positions.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 1st day of February, A. D. 1902.

HARRY PRATT.

Witnesses:

WILLIAM L. HALL,

GERTRUDE BRYCE.