(No Model.) 3 Sheets—Sheet 1.

W. B. GRAY & H. SHEPLEY.

RAILWAY SIGNAL AND SYSTEM.

No. 520,161. Patented May 22, 1894.

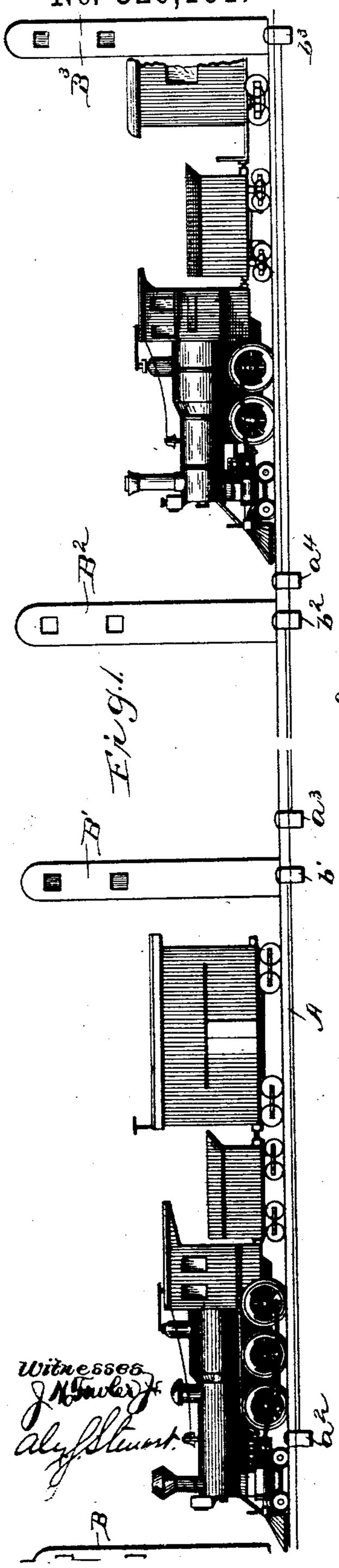

Fig. 1.

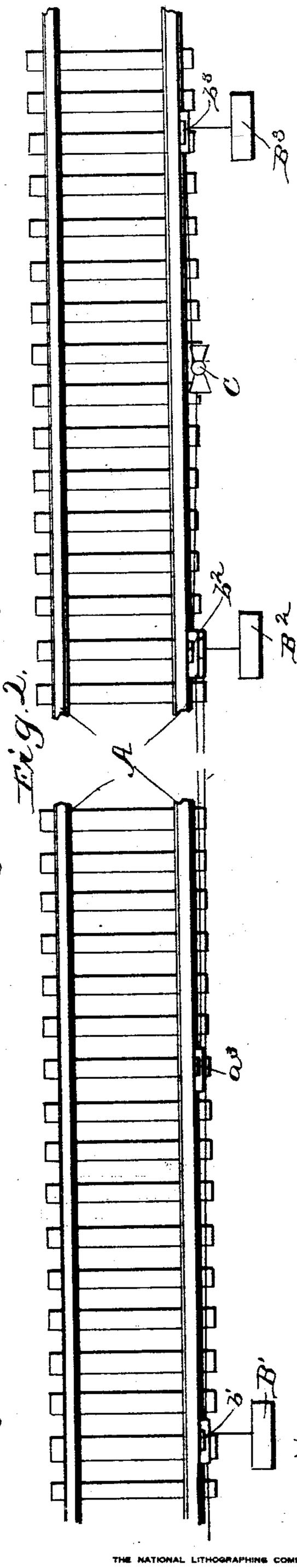

Fig. 2.

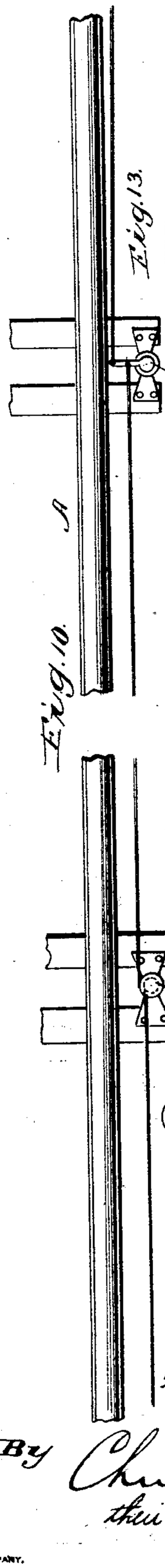

Fig. 10.

Fig. 13.

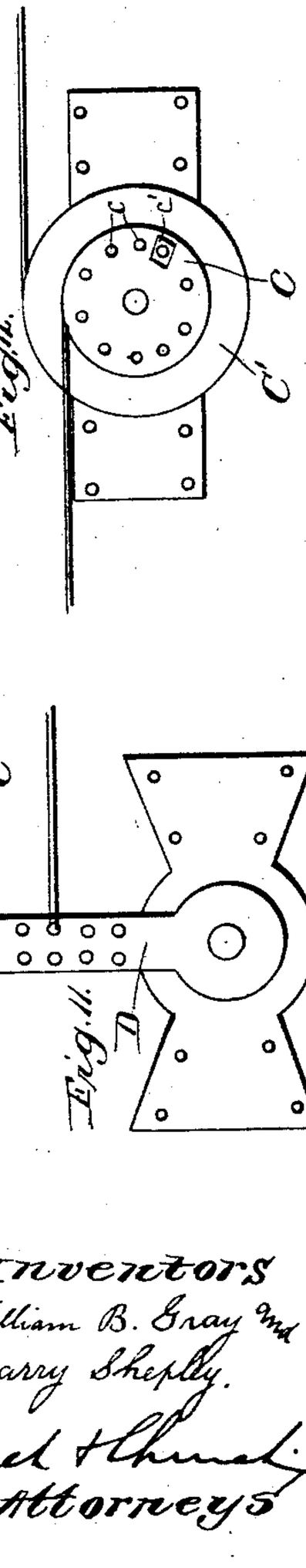

Fig. 12.

Fig. 11.

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W. B. GRAY & H. SHEPLEY.

RAILWAY SIGNAL AND SYSTEM.

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Fig. 3.

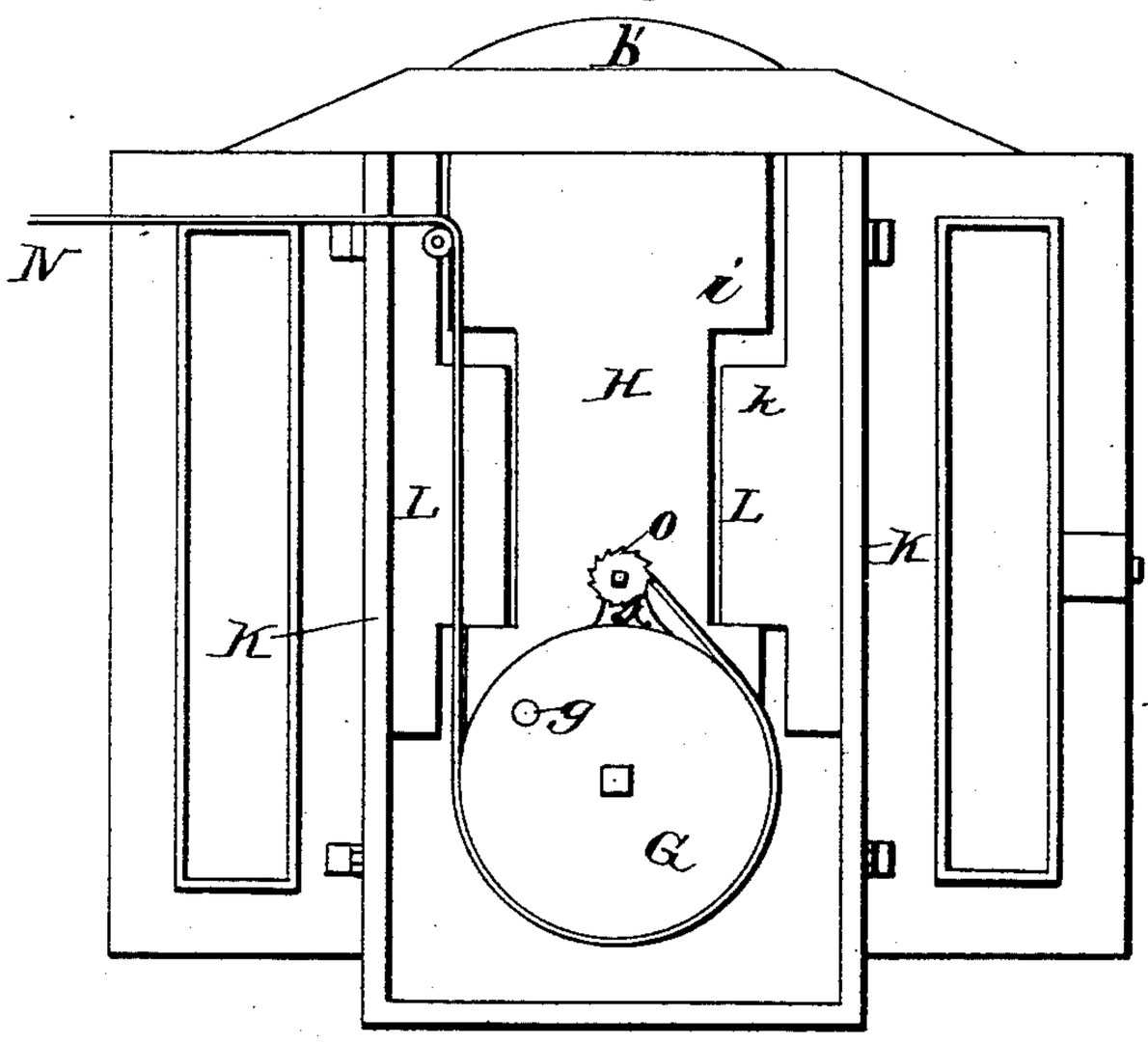


Fig. 4.

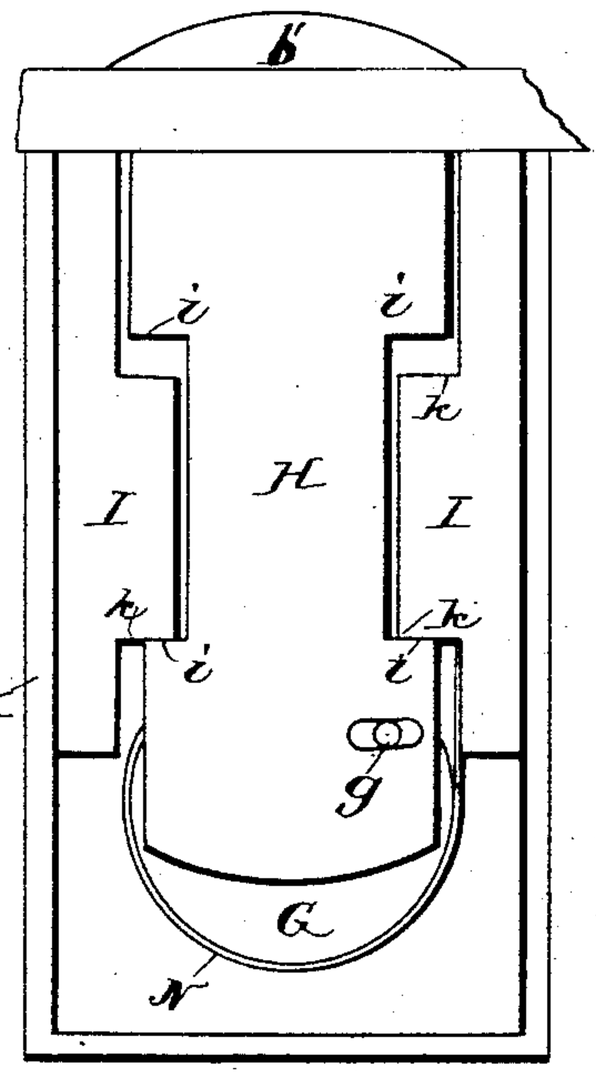


Fig. 6.

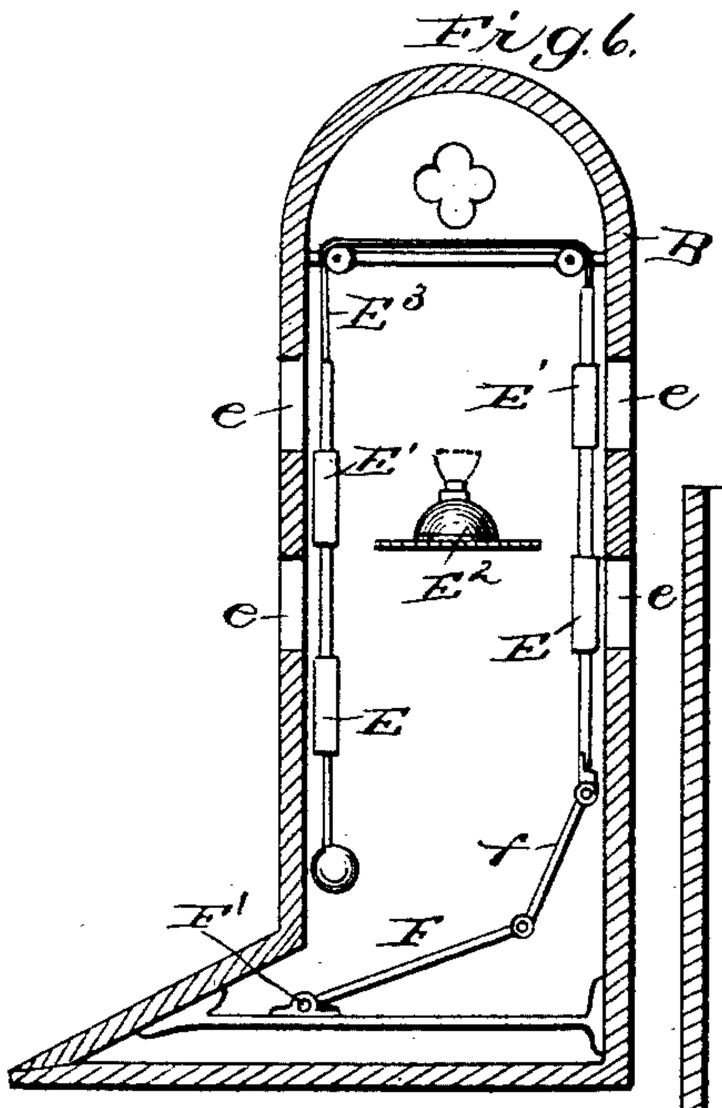
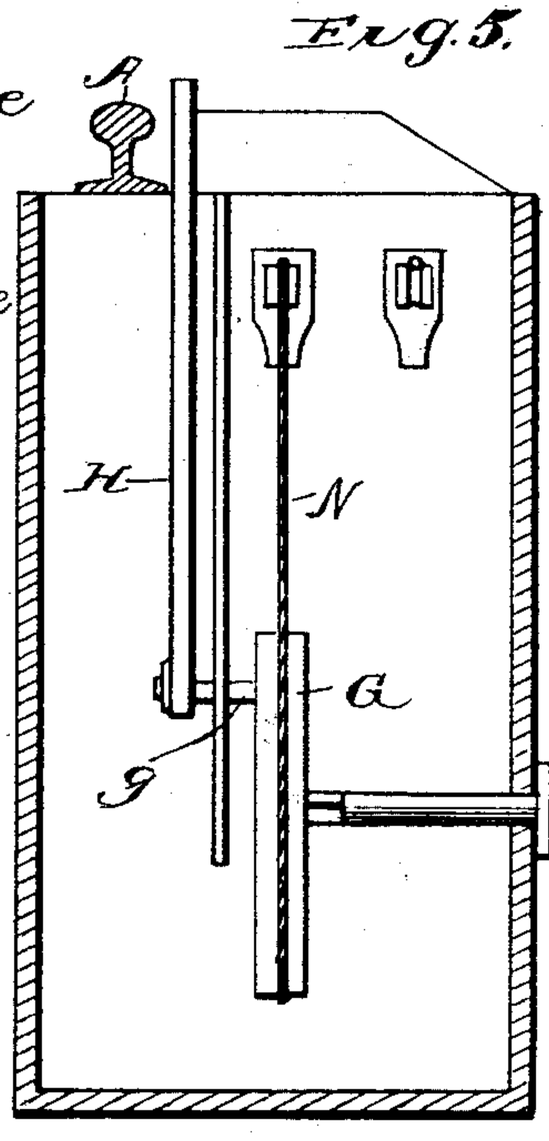


Fig. 5.



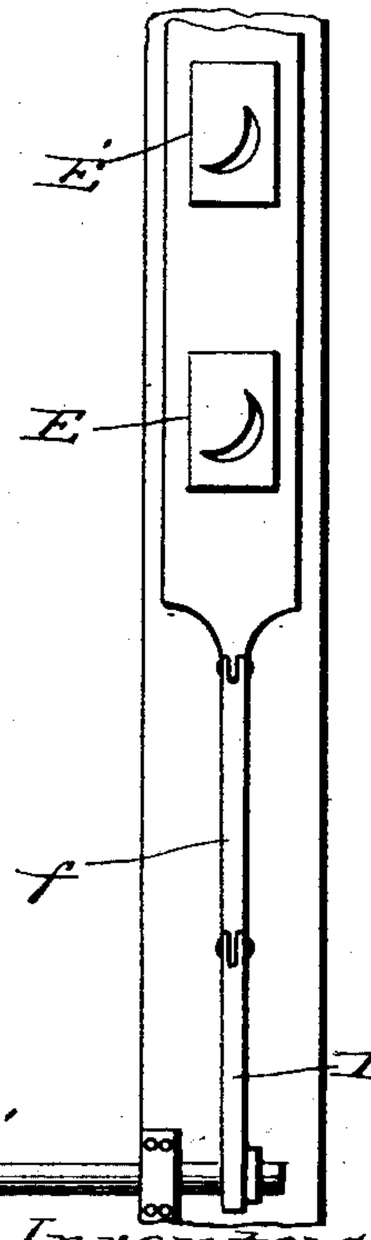


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Fig. 8.

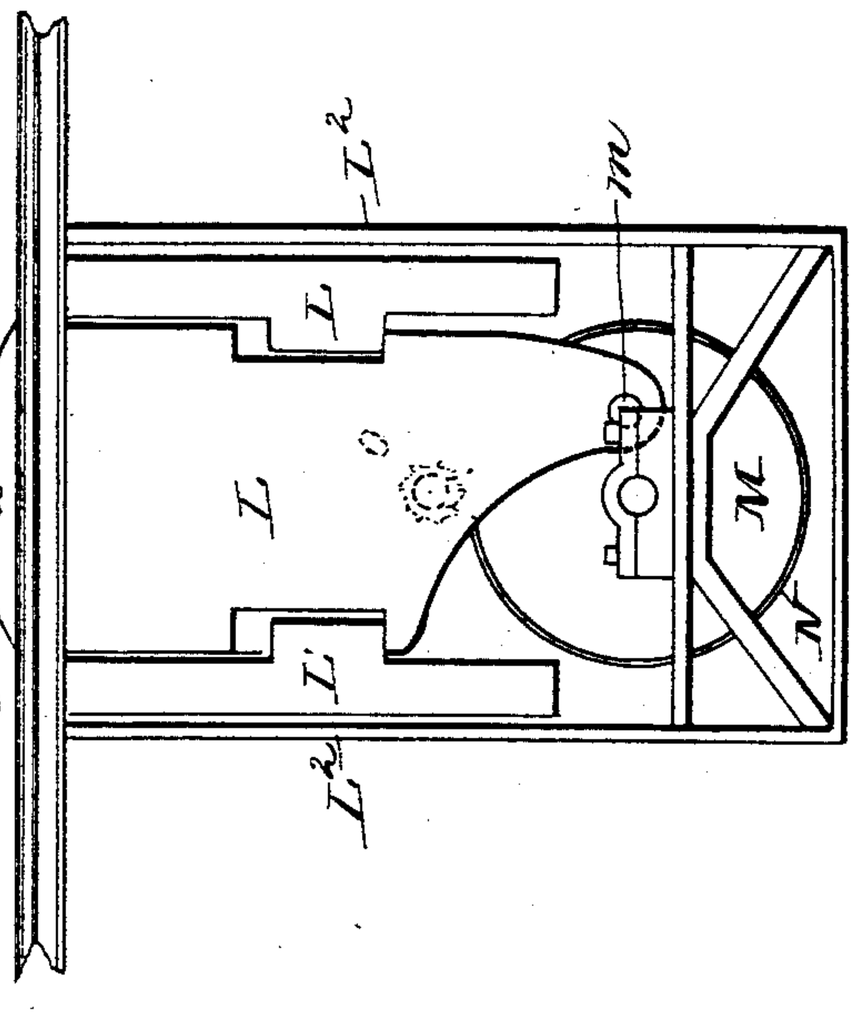


Fig. 9.

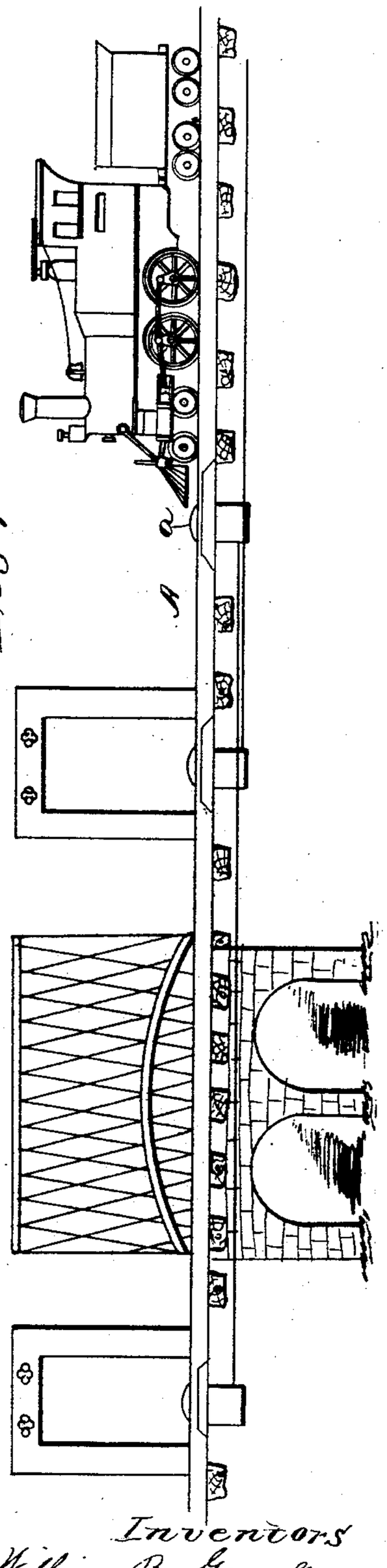
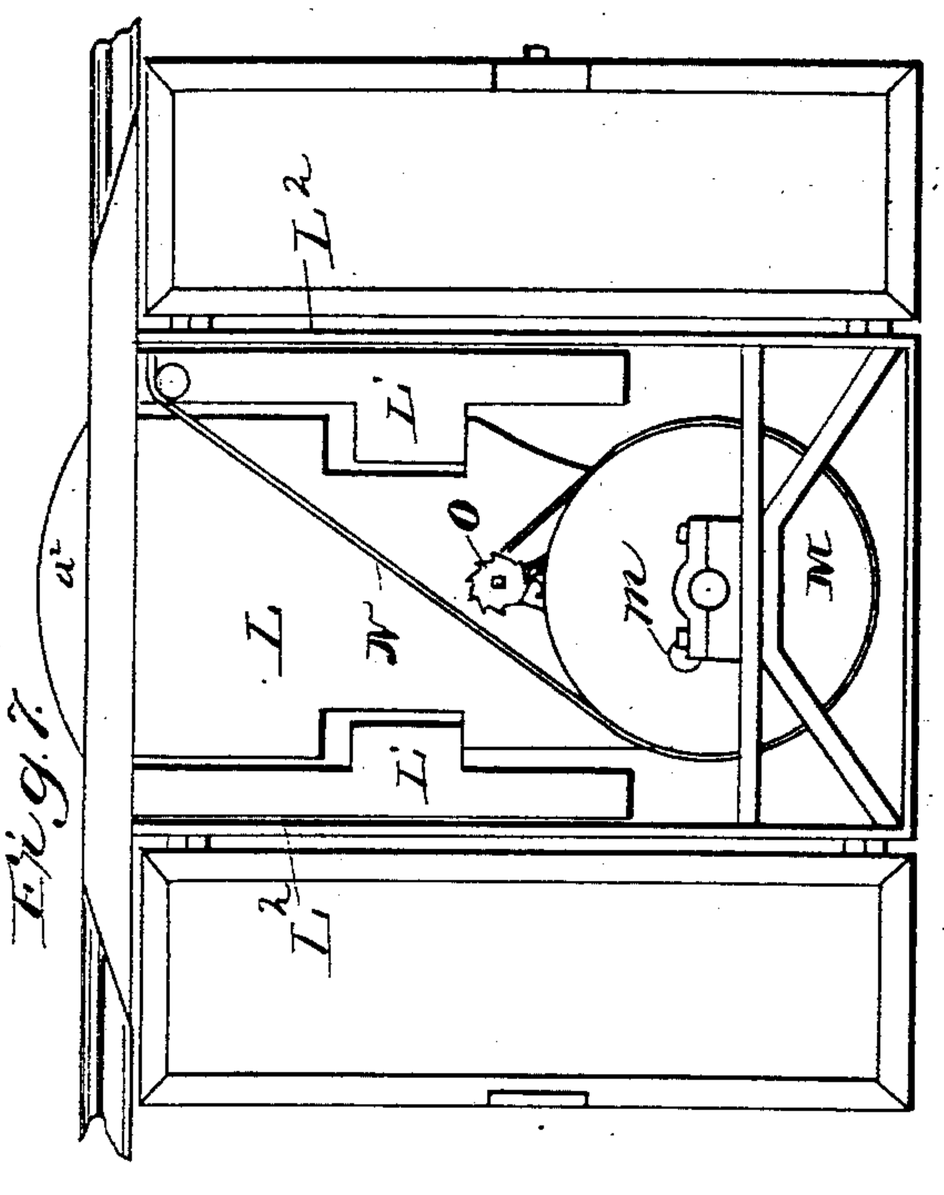


Fig. 7.



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RAILWAY SIGNAL AND SYSTEM.

SPECIFICATION forming part of Letters Patent No. 520,161, dated May 22, 1894.

Application filed June 7, 1893. Serial No. 476,856. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM B. GRAY and HARRY SHEPLEY, of Halifax, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Railway Signals and Systems; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in apparatus and systems of railroad signaling in which the signals are automatically operated by the cars or trains running on the track.

Primarily the invention has for its object to provide a complete automatic system of apparatus adapted for preventing collisions from front or rear of a train, as well as to indicate the approach of a train at street crossings, bridges, stations, &c., or to indicate that a train has passed and is still within a certain distance.

The invention consists in certain novel details of construction and combinations and arrangements of parts all as will be now described and pointed out specifically in the appended claims.

Referring to the accompanying drawings: Figure 1 is a diagrammatic view illustrating the system when arranged to prevent rear end collisions. Fig. 2 is a top plan of the same. Figs. 3 and 4 are elevations of the "tower lock" or mechanism located in proximity to the towers for operating the signals with the doors open and back of the casing removed in the said figures respectively. Fig. 5 is an elevation showing the connection between the tower and its lock. Fig. 6 is a section through a tower showing the signals. Figs. 7 and 8 are elevations of the "dumb lock" or mechanism for operating the signals from a distance with the doors open and back of the casing removed in the figures respectively. Fig. 9 is a view corresponding to Fig. 1, and illustrating the manner of setting the signals ahead of the running train. Figs. 10 to 13 are details of the tension devices.

Similar letters of reference in the several figures indicate the same parts.

The letter A in the accompanying drawings indicates the track or tracks of a railway system, broken away in order to show a section of the signaling system more completely.

B′, B², &c., are diagrammatic representations of signal towers adapted to display signals on each side, so as to be read as the tower is approached, and also after it has been passed, the signals on opposite sides, however being preferably reversed as will presently appear. The roadway is divided off into blocks or sections of convenient length, usually determined by the distance apart it is desired to run trains, and at the end of each section a signal tower is located, which tower in the embodiment shown in Fig. 1, indicates to one train whether the preceding train has passed beyond a certain predetermined point, before which time the second train cannot proceed. These towers in the simplest form, consist of a housing or casing B (Fig. 6) having on each side, openings *e*, preferably two on each side, one adapted to display a day and the other a night signal. As shown, such signals consist of tablets E and transparencies E′ with a lamp or light E² for rendering the transparencies visible at night. The signals on opposite sides of the tower are connected by suitable means, such as a flexible connection E³, so as to operate simultaneously in opposite directions, that is to say, when a signal of one kind is displayed on the rear side, a different signal is displayed on the front side. The signals are moved by means of the crank arm F connected thereto by the link *f* and itself mounted on the end of a shaft F′ which passes from the tower out to a convenient point for the location of the mechanism which is operated by the train wheels.

The end of the shaft F′ at each tower is provided with a drum or wheel G having a crank pin *g* thereon located at a point normally at one side of the vertical center of the drum and adapted for the attachment of the lower end of a vertical operating plate or bolt H. This plate or bolt lies parallel with, and in proximity to one of the tracks where it is adapted to be struck and depressed by the wheels of the car. Its upper end is rounded to prevent obstruction of the track and secure a gradual depression, and the supporting bearings I in the box K are made suffi-

ciently loose to permit of a slight lateral movement, or the crank pin enters a slot in the lower end of the bolt as shown in Fig. 4. The movement of the bolt is limited by shoulders *i* and *k* on the bolt and box respectively. This operating mechanism is designed to operate the signals as the train passes the tower itself, thus, if as in Fig. 1, the arrangement is to prevent rear end collisions the signals on the rear side of the tower will be moved to danger, and those on the front side to safety, indicating to the passing train that the signal is properly set and to the succeeding train that a train is ahead and that it must not proceed farther.

The operating mechanism at the tower, we have designated as a tower lock and at a suitable point along the track, depending entirely upon the point from which it is desired to release the signals, we shall locate what we shall term a dumb lock or tower signal operating mechanism for restoring the signals to normal.

The dumb locks are similar to the tower locks in essential construction, as will be seen by reference to Figs. 7 and 8, wherein L indicates the bolt guided vertically by bearings L′ and casing or box L^2 and adapted to cooperate at the bottom with a crank pin *m* on a drum or wheel M. The drums or pulleys in every instance are adapted to have connected to them, the ends of wires or cables N extending from each tower lock drum to its dumb lock drum over suitable pulleys or guides alongside the track.

The ends of the wires are secured to the drums, by means of ratchet pulleys O on the drums thus the wires may be brought to the desired tension without changing the relative positions of the locks.

Where the distance between the tower and dumb lock is great, it may be found desirable, if not necessary, to provide devices for increasing the power of the dumb locks, for which purpose a lever arrangement or tensor is provided at an intermediate point, such devices consisting essentially of a pivoted member as the lever D, Figs. 10 and 11, to which the wires may be attached at different points, or a pair of differential drums as C and C′, Figs. 10, 12 and 13, or both of said devices may be employed. When differential drums are employed they may be adjusted one upon the other by means of the series of holes *c* and pin *c′*.

The system being divided into blocks, and as it is desirable to leave a clear block between trains, the dumb lock for each tower is preferably located near the second tower ahead, thus if reference be had to Figs. 1 and 2, it will be seen that the signals B^2 and B^3 are operated by dumb locks lettered a^2 and a^3 respectively and the tower locks are lettered respectively b^2 b^3. This order is preserved throughout the system where it is designed for preventing rear end collisions, and in operation, it will be seen, that as a train passes a tower, it sets the danger signal behind it, as a warning to succeeding trains, and as it passes the dumb lock at the end of the second section ahead, it releases or resets the signals to the safety point, when the second train may proceed until another tower displays the danger signal. At the same time that the danger signal is set on the rear side of the tower, the safety signal is displayed on the front side, enabling the engineer to see that the signal has been properly operated. Obviously, the signals may be set forward of the train, if desired for special objects, as for instance, to warn people at crossings, to notify station keepers that a train is approaching, for draw bridge purposes, or for single tracks where trains are running in opposite directions, in the latter case it being simply necessary to reverse the order of operation, that is to say, the dumb lock will set the signals and the tower locks will release them, and a duplicate system is employed arranged to operate reversely, thereby preventing collisions in either direction.

In Fig. 9, we have illustrated a track with a signal adapted to be set forward of the train to indicate that the train is approaching a draw bridge, and in this figure it will be noted that the tower P is located on the side of the bridge farthest from the train, the dumb lock *a* serving to set the signal to show that the train is approaching and the tower lock to release the signals as the train passes the tower.

Experience teaches that the form or contour of a signal can be appreciated more readily by the average person than the color of the same, and in carrying out this invention we make use of signals which vary in contour, *i. e.*, represent different conventionalized objects to indicate the different conditions existing, thus in Fig. 5, it will be noted that for regular track signals, moons are employed, and for the draw-bridge, quarter-foils are employed, stars, lions, &c., are used at different points to indicate danger to the train or at crossings, &c., and the engineer needs pay attention only to those which control the train, this being easily determined without reference to color, although the signals are also preferably colored in addition to being formed as described.

Having thus described our invention, what we claim as new is—

1. In an automatic mechanically operated block system of signals for railways, the combination with the towers, of an operating mechanism for the signals consisting of the vertically sliding bolt, the vertical bearings for holding the bolt in juxtaposition to the track, the rotary drum, the crank pin connecting the drum and bolt, the shaft on which the drum is mounted, the crank arm on said shaft and a connection extending from said arm to the signal; substantially as described.

2. In an automatic mechanical system of block signals for railways, the combination

with the signals of the pairs of drums, for operating said signals, the wire or equivalent connecting said drums, the vertically sliding bolts in proximity to the drums and track whereby they are adapted to be struck by the wheels of the train, and crank pins connecting the bolts and drums; substantially as described.

3. In an automatic mechanical system of block signals for railways, the combination with the signals, the pairs of drums connected with the signals for operating the same and the bolts lying in juxtaposition to the track for operating the drums, of the wires connecting the drums whereby they are moved in unison and the ratchet pulley to which the end of the wire is secured carried by one of the drums whereby the tension of the wire may be increased; substantially as described.

4. In an automatic mechanical signaling system the combination with the bolts and operating drums located at different points, of the intermediate tensor consisting of the different sized drums or pulleys adjustably connected together and the wires connected to the peripheries of the different sized drums or pulleys; substantially as described.

5. In an automatic signaling apparatus, the combination with the signal towers having the openings on each side of the same, of the oppositely arranged signals in said towers, connections between said signals whereby they operate simultaneously in opposite directions and an operating mechanism for the signals; substantially as described.

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