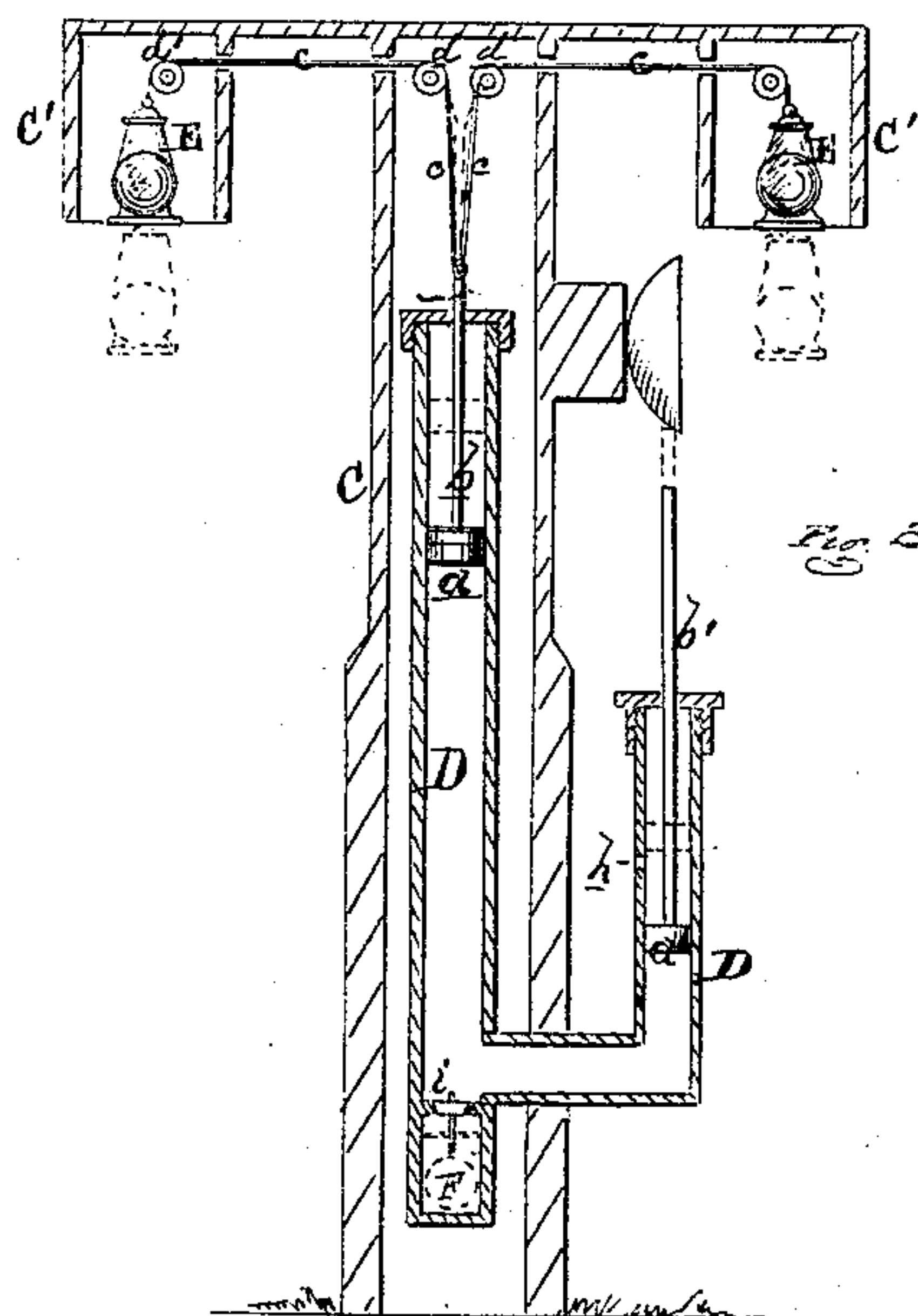
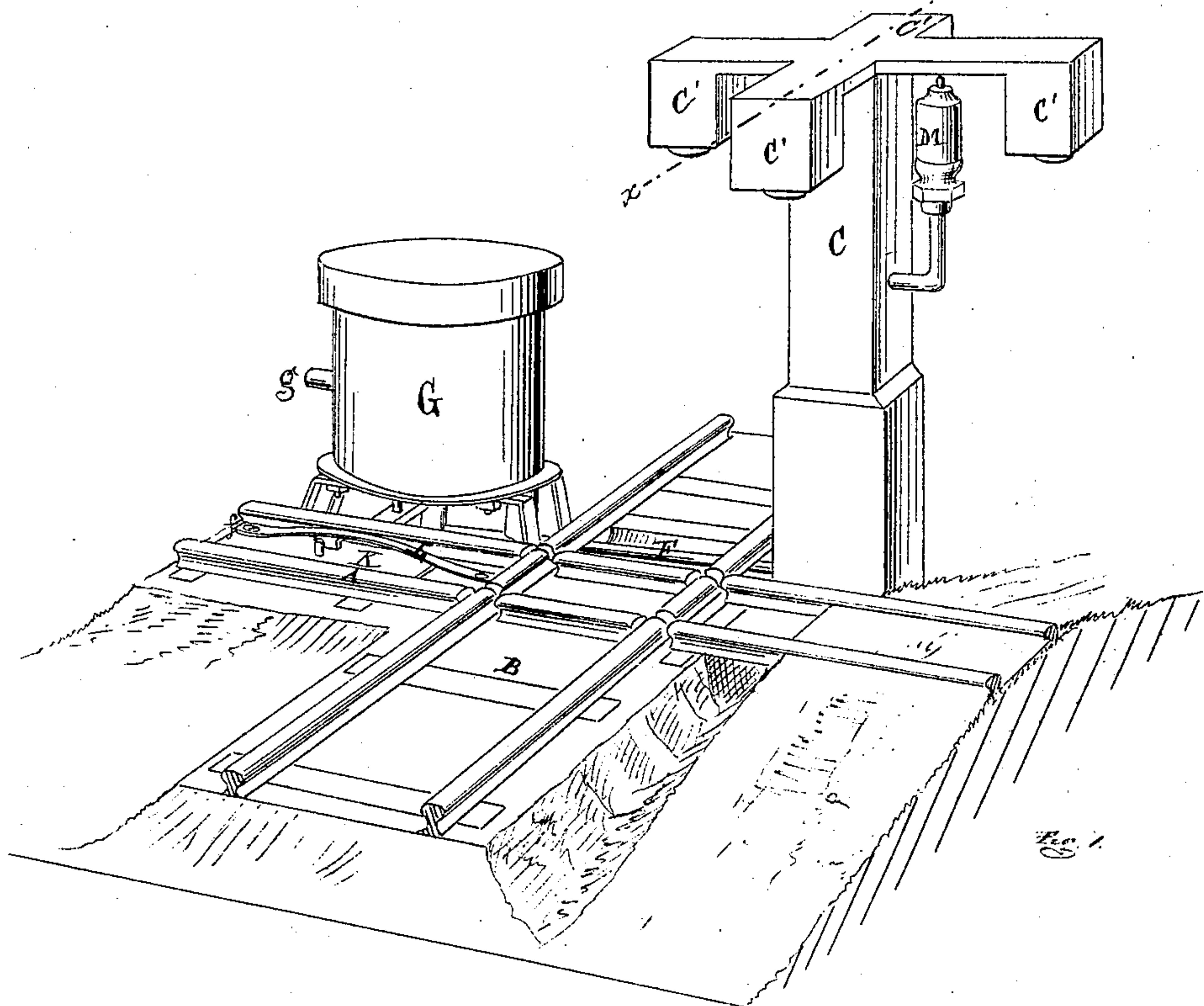


**E. R. MARSHALL.**  
**Railroad-Signals.**

No. 144,854.

Patented Nov. 25, 1873.



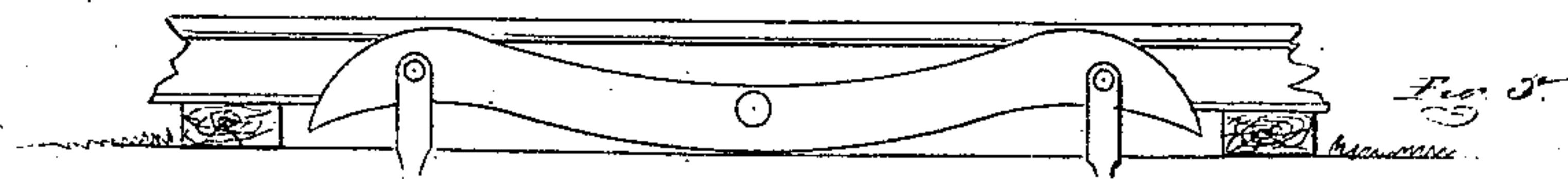
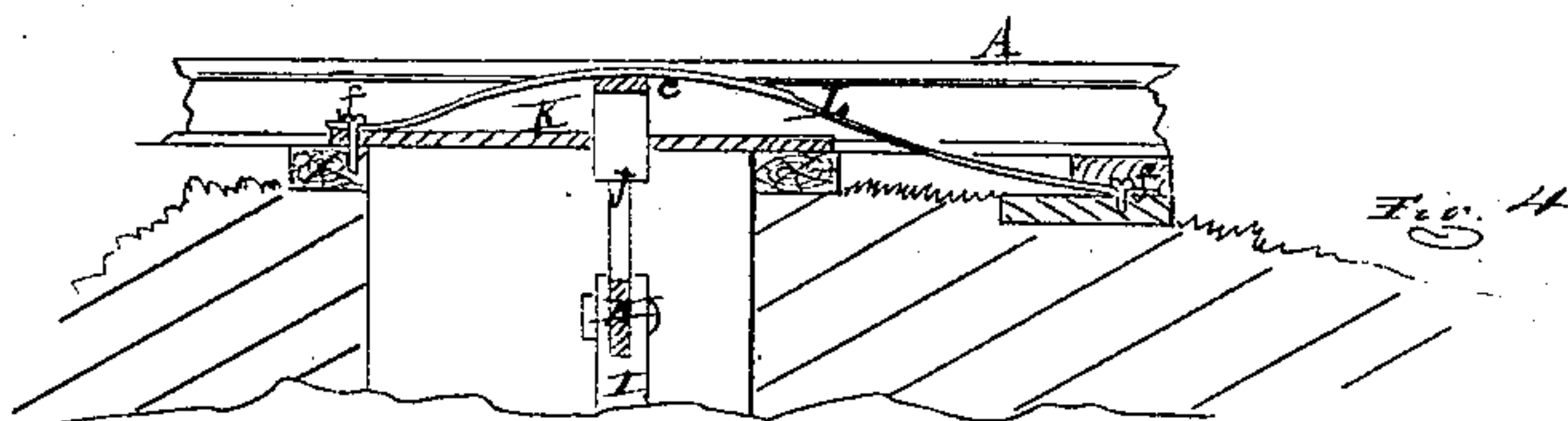
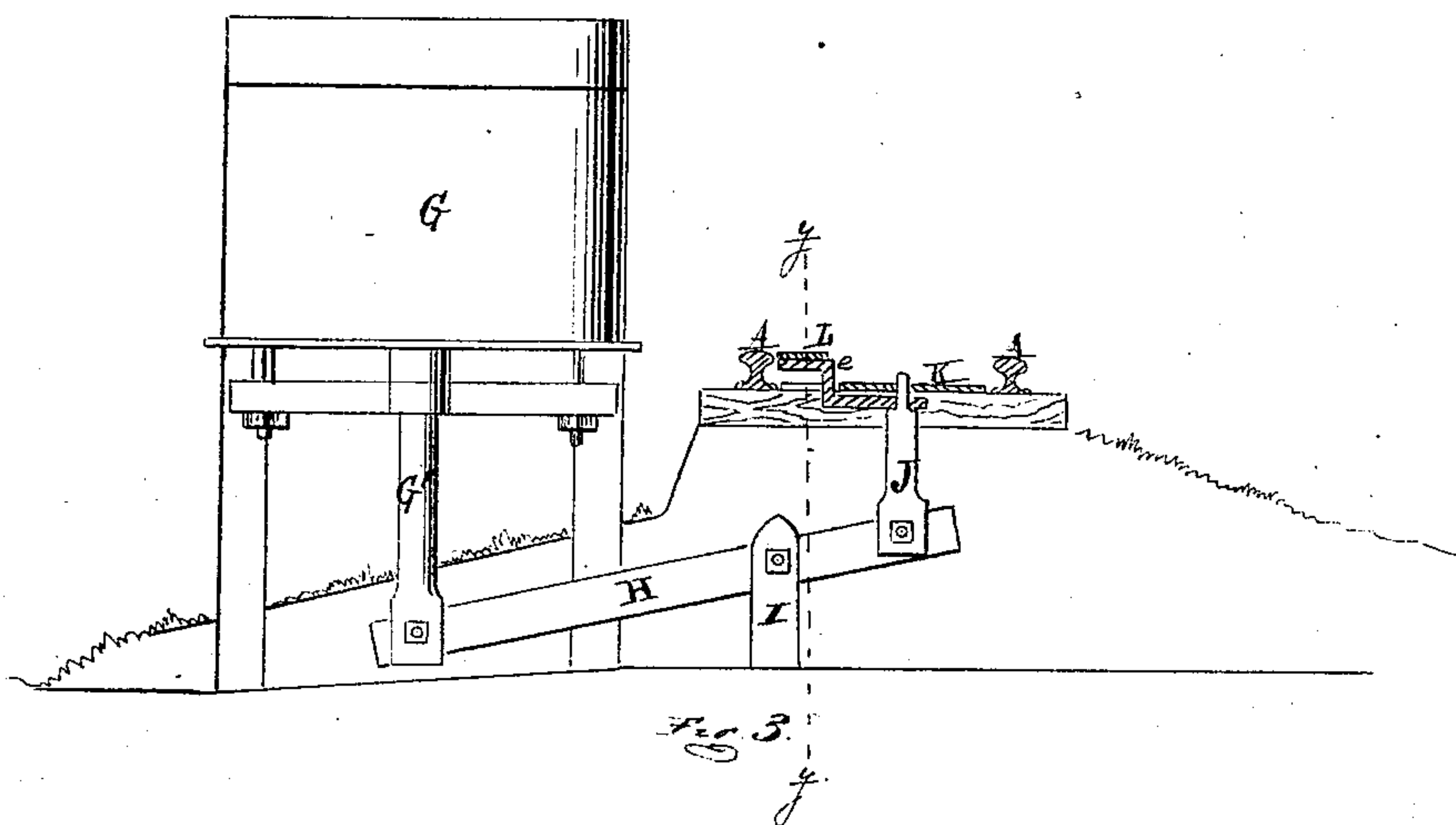
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# UNITED STATES PATENT OFFICE.

EDWIN R. MARSHALL, OF GRAND RAPIDS, MICHIGAN.

## IMPROVEMENT IN RAILROAD-SIGNALS.

Specification forming part of Letters Patent No. 144,854, dated November 25, 1873; application filed November 13, 1872.

*To all whom it may concern:*

Be it known that I, EDWIN R. MARSHALL, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and useful Improvement in Automatic Railway-Signals; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, and being a part of this specification, in which—

Figure 1, Sheet 1, is a perspective view, showing a railway-crossing where a second line of rails and a highway pass across the first line of rails, the said crossings having erected between them my pneumatic semaphore signals, a whistle, and a gong, all of which are operated by an air-pump operated by a locomotive or train approaching the crossing on the first line of rails. Fig. 2 is a vertical section of the semaphore at  $x x$  in Fig. 1. Fig. 3, Sheet 2, is a cross-section of the first line at the air-pump, to show the levers which reciprocate its piston. Fig. 4 is a vertical section at  $y y$  in Fig. 3; and Fig. 5 is a modification of the leverage system shown in Figs. 3 and 4, and is more especially designed to operate two air-pumps, if necessary.

Like letters refer to like parts in the several figures.

This invention relates to a system of signals to be used on railways at crossings, bridges, tunnels, around curves, and at other dangerous places where it is desired to signalize the approach of an engine or train, and to show that passing trains leaving such places have passed the distance-point from which the signals are automatically made by the passage of the train. The said signals may be red balls by day, or lanterns by night, displayed from a semaphore, a whistle, or a gong, or any two or all three combined, all operated by an air-pump at the distance-point, which pump is operated by the passage of a train over the track to which it is contiguous. The system also includes a peculiar means for operating the air-pump, all being arranged to operate as more fully hereinafter set forth.

In the drawing, A represents the main line of a railway, which, for convenience, I call the first line, and B the rails of another line cross-

ing the first line at right angles. To the right of this second line, in Fig. 1, will be seen a highway crossing the first line. C is a semaphore with four stationary arms at the top, erected at the crossing. Each arm terminates in a pendent box, C', open at the bottom. Within the semaphore, which is hollow, is erected an air-cylinder, D, in the upper part of which is easily fitted a piston,  $a$ , whose piston-rod  $b$  passes up through the cover, and has attached to it the ends of four cords,  $c$ , which pass over guide-pulleys  $d d'$  to the ends of the arms, where each has suspended to it a signal-lantern, E, by night, or a red ball by day. The weight of the piston and its rod is such that when there is no pressure exerted under the piston it will drop down the cylinder, and draw the lamps up into the boxes C', as seen in Figs. 1 and 2.

The means I employ to exhibit these signals I will now proceed to describe: To the lower end of the cylinder D I connect one end of the tube F, which is carried along the line to the distance-point, or place where a passing train is to give the signal of its passage in time to warn those at the crossing to clear its track, where I erect an air-pump, G, and connect the tube thereto, which then becomes its discharge or blast pipe. G' is the piston-rod of the air-pump, and is pivoted to the outer end of the lever H, whose fulcrum I is in a pit under the rails. To the inner end of the lever is pivoted a rod, J, whose upper end is a stud, which projects up through a plate, K, between the rails, to guide it in its vertical movement.  $e$  is an angle-plate projecting from a shoulder near the top of the rod J, toward and near the inner face of the rail next the pump. To the top of this angle-plate is secured the body of a long and heavy leaf-spring, L, whose ends are secured, by bolts  $f$ , Fig. 4, to cross-ties, the ends being slotted, so that they may move longitudinally on their bolts. This spring lies close to the rail, so that the flange of each wheel will ride over it, and, as it approaches the center, will depress it and the rod J, and through the lever H force upward the piston of the air-pump, and thus force a volume of air through the blast-tube, which raises the piston  $a$  in the cylinder D, and lowers the signals from their boxes into view. As soon as the wheel passes



off the spring, it follows that the spring will raise the rod *J* and depress the air-pump piston, causing the pump to refill through the suction-pipe *g*. As each wheel passing over the spring causes a stroke of the pump to be made, these strokes, being made in quick succession, cause a rapid and violent vibration of the piston *a* and signals, which may be lessened by placing a check-valve, *i*, in the lower part of the cylinder *D*, as shown in Fig. 2.

In addition to the signals above described, a whistle, *M*, may be connected to the air-cylinder by a pipe tapped into the latter at any convenient point below the piston *a*, and will give a succession of short quick blasts as the wheels of the train actuate the air-pump; or, in lieu of the whistle, a gong, *N*, may be placed on the semaphore, and be operated or rung by an air-engine, of which *D'* is the cylinder, connected with the lower part of the cylinder *D* by a lateral pipe. *a'* is a piston loosely fitted in the cylinder *D'*, and its rod *b'* acts as a hammer for the gong. A small opening is made in the cylinder at *h*, Fig. 2—a point just below the piston when the latter is forced up high enough to cause its rod to strike the gong. This opening serves as an exhaust, and as soon as the piston passes above it the pressure is relieved underneath, and it drops below the opening until the pressure again forces it up, thus causing the piston-rod to deliver very rapid blows upon the gong as long as the pressure is kept up by the air-pump.

The semaphore, with the whistle and gong attachments, or either of them, may be employed at other places than crossings, on the approaches to junctions, bridges, tunnels, and around curves, to signalize the approach or passage of trains, the pump being located a half mile or more away from it, dispensing with salaried watchmen in many instances.

In Fig. 5 is shown a modification of the lever for operating the air-pump, being more especially designed to operate two of them, and thus make the pressure-blast continuous and uniform.

This lever is curved to form a double inclined plane for the wheels to pass over, and thus give it an oscillation, being pivoted at its middle, as shown in Fig. 5, which clearly shows its arrangement and application.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The semaphore *C*, having a hollow main trunk and side boxes, *C' C'*, in combination with the interior air-cylinder *D*, having blast-tube *F* and piston *a*, the rod *b*, cords *c c*, guide-pulleys *d d'*, and signals *E*, as described.

2. The cylinder *D*, provided with the side cylinder *D'*, having exhaust-opening *h* and piston-rod, adapted to strike the gong *n*, as described, for the purpose set forth.

EDWIN R. MARSHALL.

Witnesses:

THOS. ARMSTRONG,  
EMIL A. DAPPER.