

(No Model.)

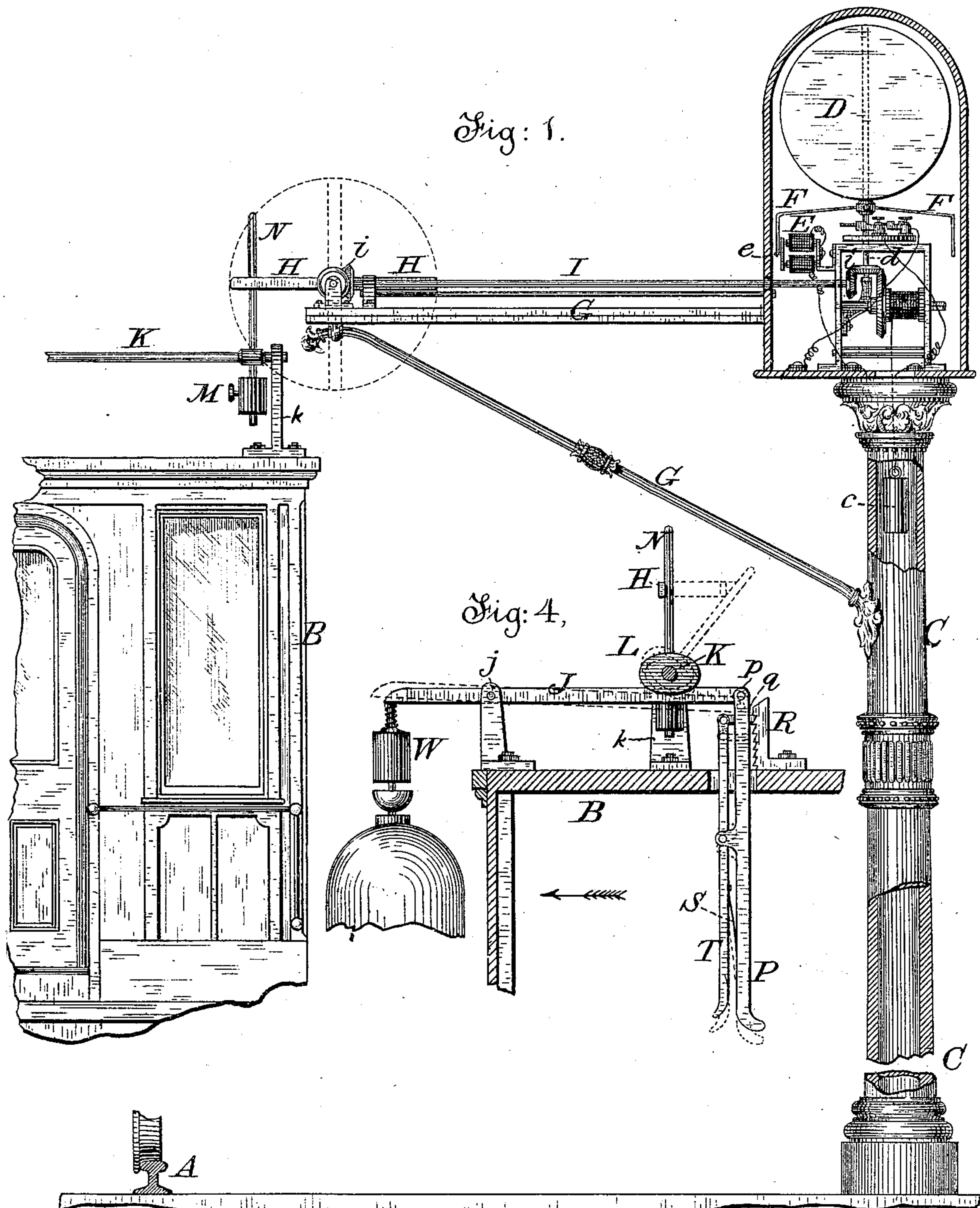
2 Sheets—Sheet 1.

F. L. POPE.

RAILWAY SIGNALING APPARATUS.

No. 253,762.

Patented Feb. 14, 1882.



Witnesses:

K. Lockwood French.

Miller C. Earl

Inventor:

Frank L. Pope

(No Model.)

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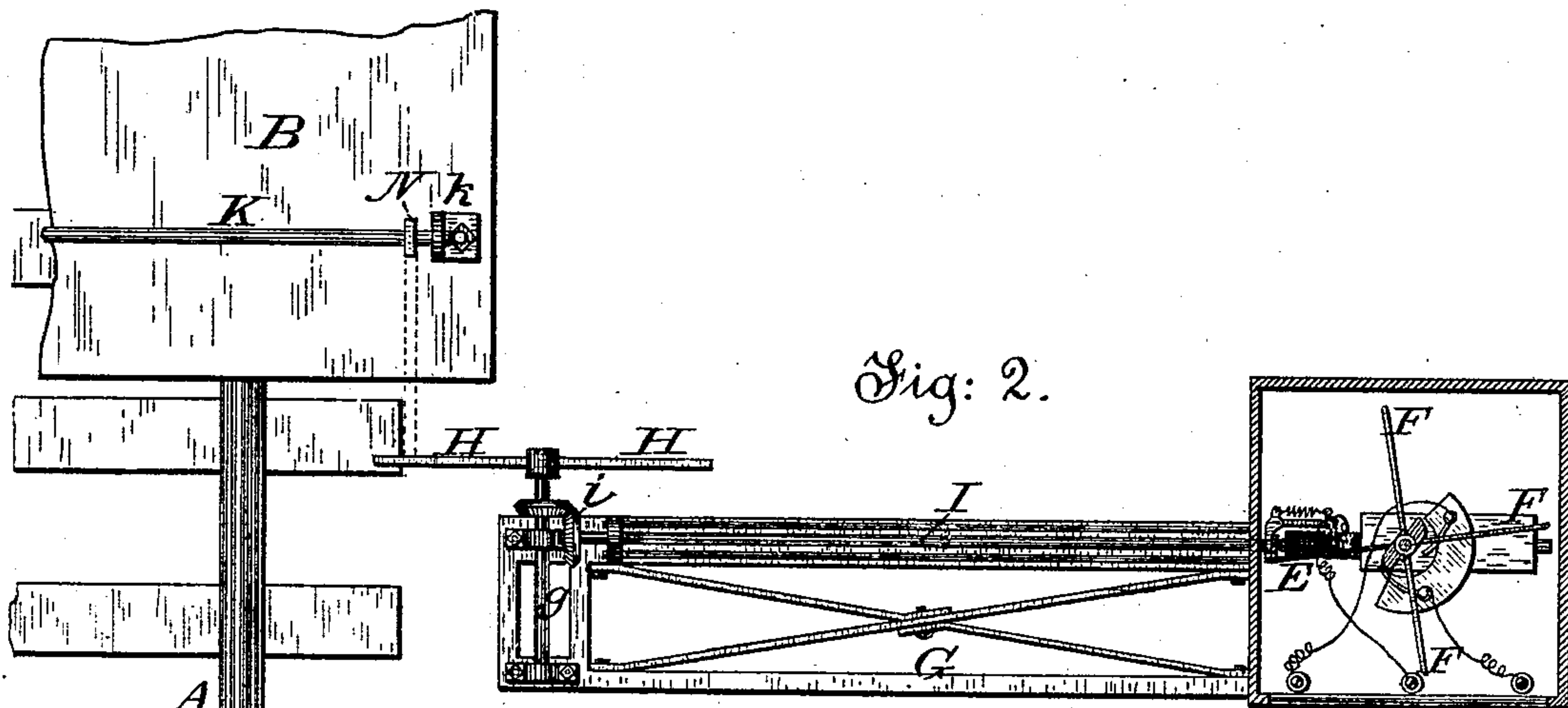


Fig: 2.

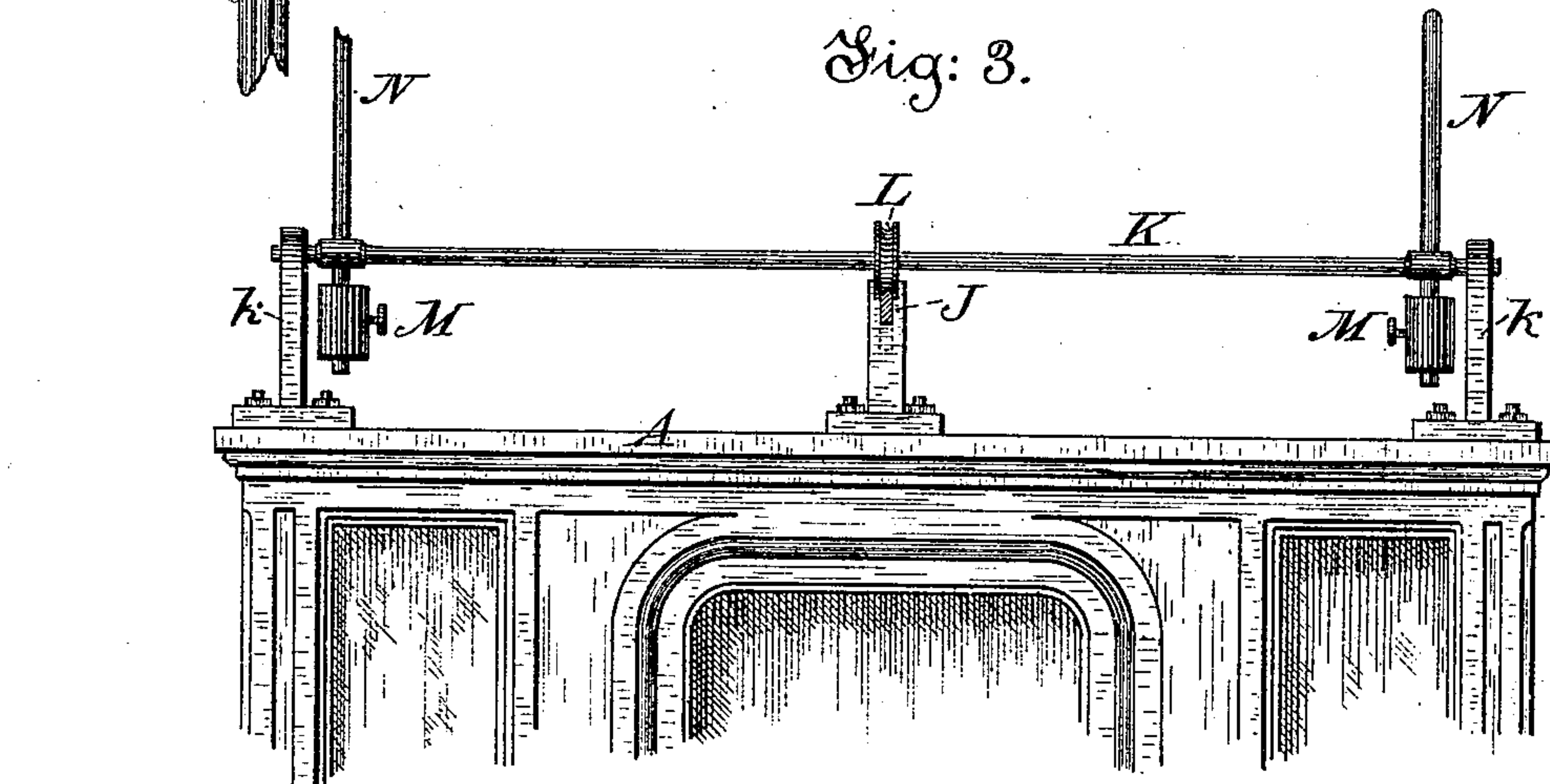


Fig: 3.

Witnesses:

*Lockwood French*

*Willis Earl*

Inventor:

*Frank L. Pope*



# UNITED STATES PATENT OFFICE.

FRANK L. POPE, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF HARTFORD, CONNECTICUT.

## RAILWAY SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 253,762, dated February 14, 1882.

Application filed November 16, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK L. POPE, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Railway Signaling Apparatus, of which the following is a specification.

My invention relates to that class of signals which are employed for the purpose of giving warning to the engineer of a moving locomotive or train upon a railway of any obstruction to the passage of such train, and at a sufficient distance from such obstruction to enable him to stop before reaching it.

In carrying out the systems of signaling heretofore in use for the above-named purpose visual or semaphoric signals have been placed at the necessary points along the line of the railway, which signals were capable of being placed in at least two positions, one indicating "safety" or "line clear" and the other indicating "danger" or "line blocked." These signals have been constructed and operated in various ways according to circumstances. In some instances the signals have been actuated by a signalman stationed at or near each signal. They have also been operated from a distant point by means of wires, ropes, or chains and by currents of electricity, and they have in some instances been so arranged as to be automatically actuated by the movement of a locomotive or train when passing certain points upon the line of railway.

The visual signals hereinbefore referred to, however various in their construction and modes of operation, are alike open to the serious practical objection that their indications cannot be seen in certain conditions of the atmosphere, especially in a snow or rain storm, or during the prevalence of fogs, mists, or smoke, all of which tend to obscure the signal and to render it nearly or quite invisible. Moreover, visual signals are usually illuminated at night by means of a lamp or lamps placed upon or behind them; but if by any accident these are extinguished neither the location nor the indication of the signal can be determined by the engineer of an approaching train in time to prevent the occurrence of accidents in case the track is obstructed.

The object of my invention is to provide simple attachments to a stationary visual signal and to a moving locomotive or car, whereby a suitable audible signal or alarm thereupon will be sounded in case the said locomotive overruns or passes beyond one of the ordinary visual signals when the latter is in a position denoting "danger" or "line blocked," but which, on the contrary, will not be sounded upon passing the signal provided the latter is in a position indicating "line clear."

My invention may readily be adapted to be used in connection with any known form of visual signal which is employed in the manner hereinbefore stated for indicating "danger" or "safety," as the case may be, to the engineer of a moving locomotive or train.

In the accompanying drawings, Figure 1 is an elevation of one form of visual signal to which my invention has been applied, showing also a portion of the fixtures upon the locomotive or car. Fig. 2 is a plan view of the same, partly in section; and Figs. 3, 4, and 5 illustrate certain details in the construction of the mechanism.

In Fig. 1 I have shown at A one of the two rails of a railway-track, which is traversed by a locomotive or other vehicle, B. At the side of the track, and preferably a few feet therefrom, is placed a signal-post, C, of suitable height, upon which is mounted a visual or semaphoric signal. The particular construction and mode of operation of this visual signal form no part of my invention. Any visual signal consisting of an object capable of being placed in two different positions designed to indicate "danger" or "safety," respectively, may be used with advantage in connection with the apparatus hereinafter described.

I have shown in the drawings a disk-signal, D, turning horizontally upon an upright spindle or shaft, *d*, by the action of a weight, *c*, but normally held in check by the armature of an electro-magnet, E, having a stop, *e*, projecting therefrom, which engages with one of four radial arms, F, projecting from the spindle *d* at an angle of ninety degrees from each other. When the disk D is in a position indicating "danger" it stands at right angles to the line of the track, presenting its face to the approach-



ing train, as shown in Fig. 1. When one of the radial arms F is disengaged from the pin e by the action of the electro-magnet E, the disk makes one-quarter of a complete revolution, and is thus brought into a new position parallel to the track, in which case its edge is presented to the eye of the engineer, and the signal becomes practically invisible, thus denoting "safety."

A frame, G, is attached to the signal-post C, extending toward the track A, its extremity being near, and preferably somewhat, above the top of the passing train. Upon the outer end of the frame G is mounted a short shaft, g, parallel to the track, (best seen in Fig. 2,) which carries projecting arms H H. The shaft g is mechanically connected with the upright shaft or spindle d by means of a horizontal shaft, I, revolving in suitable bearings upon the frame G, and provided with bevel-gearing ii, so arranged that the horizontal shaft g revolves synchronously with the upright spindle d. The angular position of the arms H H upon the shaft g is such that when the disk D is in the position shown in Fig. 1, denoting "danger" or "line blocked," the arm H will project horizontally beyond the extremity of the frame G, as shown in Figs. 1 and 2; but when the disk is in the position indicated by the dotted lines, denoting "safety" or "line clear," the arms H H will assume a vertical position, as shown in dotted line in Fig. 1. Thus it will be understood that the arms H H receive their motion from the signal-spindle d, and hence their position is dependent at all times upon the position of the signal-disk D, and must necessarily correspond therewith. The construction of this portion of apparatus will necessarily vary within certain limits, in accordance with the construction of the particular visual signal to which it is attached.

The essential feature of the apparatus thus far described is the movable arm H, so constructed as to project when the visual signal denotes "danger" and to be withdrawn when the said signal denotes "safety."

Upon the locomotive or car B, moving upon the track A, I place a suitable audible signal, which may consist of a bell, gong, torpedo, or other similar means for producing sound, although I prefer to make use of a device illustrated in Fig. 4 of the drawings, which consists of a whistle, W, capable of being blown either by steam from the locomotive-boiler or by compressed air from the atmospheric-brake reservoir. This whistle is actuated by a lever, J, pivoted at j, the short arm of which, when raised, opens a valve within the whistle in a well-known manner.

Upon the cab of the locomotive A, or, if preferred, upon the roof of one of the cars of the train, is mounted a horizontal shaft, K, turning in bearings upon suitable standards, k k.

Upon the shaft K is rigidly fixed an eccentric or cam, L, which bears against the free end of the lever J, as shown in Figs. 3 and 4. The

cam L is maintained in its normal position, (which is that seen in Fig. 4,) by means of a weight or counter-balance, M, which is placed upon the shorter extremity of an upright projecting arm, N. The arm N is fixed at such a point upon the transverse axis K that its path, when the locomotive or train is in motion and passing the signal-post, intersects that of the rotary arm H upon the stationary frame G. The pendent handle P is pivoted at p to the free end of the whistle-lever J, and extends down through an aperture in the roof of the cab, so as to be within convenient reach of the engineer as he stands at his post of duty. A catch or dog, Q, is fitted to slide in a slot passing transversely through the handle P, and engages with the teeth of a stationary rack, R, being normally held in that position by the pressure of a spring, S, against a lever, T, attached to the handle P, as shown in Fig. 4.

The mode of operation is as follows: If a locomotive or train, B, moving upon the track A, is approaching, a visual signal which stands in a position indicating "danger" or "line blocked," and if, at the same time, from any cause the engineer of the train should fail to observe the signal or to bring his train to a stop before reaching it, then, upon passing the signal-post A, the upright arm N upon the locomotive or train will come in contact with the projecting arm H upon the signal-post and will be depressed thereby in the manner shown by the dotted lines in Fig. 4, in which the train is assumed to be moving in the direction indicated by the arrow. The arm N should be but slightly overweighted by the counter-balance M, so that it may easily be depressed while passing beneath the arm H in either direction, after which it will immediately resume its normal or upright position by the action of gravity. The movement of the arm H will act through the shaft K upon the eccentric cam L, which will depress the arm of the lever J, and thereby cause the whistle W to sound, as hereinbefore explained. When the lever J has thus been depressed the dog q slips under one of the inclined teeth of the rack R, and is held there by the elastic force of the spring S. Hence the lever J remains depressed, and the whistle or other audible signal is continued in operation, notwithstanding the return to its normal upright position of the arm N. In this manner, and by means of the audible signal upon the locomotive, the engineer is infallibly warned that he has passed a visual signal while in a position indicating "danger."

In order to stop the action of the audible signal, it is only necessary for the engineer to grasp the pendent handle P and its attached lever T in such a manner as to compress the spring S, when the dog q will be withdrawn from the rack R and the lever J will be released.

The whistle W may be sounded specially whenever desired by grasping the pendent



handle P, releasing the dog *q*, and then pulling the handle downward. By this means the same whistle may be employed for giving and receiving signals.

5 In case the locomotive or car A is made to pass in both directions upon either a single or double track road by being turned round at the end of each trip in order to run in an opposite direction, it will only be necessary to  
10 make use of one upright arm N upon the shaft K. This will ordinarily be placed on the right-hand side of the train, in the direction in which it is proceeding; but if, as is sometimes the case, the locomotive or car is run in both di-  
15 rections without being turned at the end of each trip, it will be necessary to place one of the arms N near each end of the transverse axis K.

It will usually be found preferable in practice  
20 to place a roller, V, upon that face of the projecting-arm H which comes in contact with the upright arm N, as shown in Fig. 5, in order to lessen the friction, especially if the trains are required to move rapidly.

25 I claim as my invention—

1. The combination, substantially as herein-  
before set forth, with a locomotive or car, of an audible signal, a movable lever whereby the same is actuated, a shaft capable of rotation  
30 in its bearings, an eccentric cam, and upright projecting arm mounted upon said shaft, whereby, when said arm is depressed, the audible signal is sounded by the action of said cam.

2. The combination, substantially as herein-  
35 before set forth, with a locomotive or car, of an audible signal, a lever for actuating the same, a double-acting cam, and projecting arm

attached thereto, which arm, when deflected in either direction, acts through the cam to sound the audible signal. 40

3. The combination, substantially as herein-  
before set forth, with a locomotive or car, of an audible signal, mechanism for putting said sig-  
45 nal in action automatically, controlled by a stationary signaling mechanism situated at fixed points along the track traversed by said loco-  
motive or car, and means, substantially such as described, for locking the actuating mechanism of the audible signal, after it has been au-  
50 tomatically started, until released by the at-  
tendant.

4. The combination, substantially as herein-  
before set forth, of a visual or semaphoric sig-  
55 nal mounted upon a vertical axis and capable of two positions at right angles to each other, and a rotating arm mounted upon a horizontal axis and moving synchronously therewith, for actuating an audible signal upon a moving lo-  
comotive or car.

5. The combination, substantially as herein-  
60 before set forth, with a locomotive or car, of an audible signal, a projecting arm whereby the same is actuated, a stationary visual signal, an arm mechanically connected with said sig-  
65 nal, which engages with the first-named arm, and a friction roller mounted thereon.

In testimony whereof I have hereunto sub-  
scribed my name this 12th day of November,  
1881.

FRANK L. POPE.

Witnesses:

MILLER C. EARL,  
CHARLES A. TERRY.