4 Sheets—Sheet 1.

J. C. PAIGE.

RAILWAY TIME-SIGNAL.

No. 181,098. Patented Aug. 15, 1876.

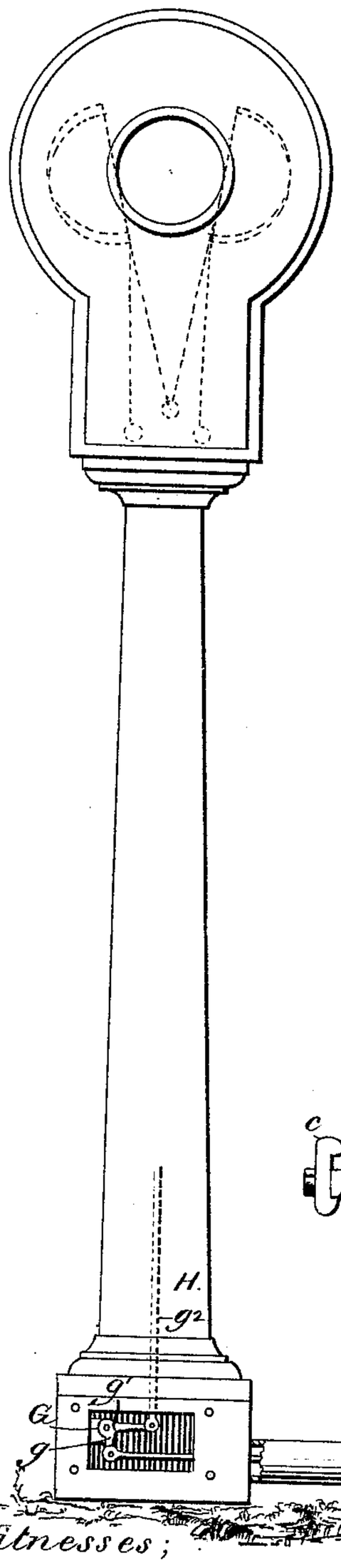


Fig. 1.

Fig. 2.

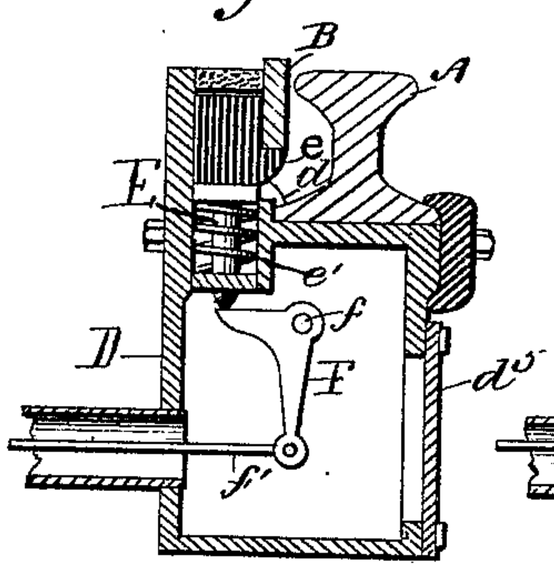


Fig. 3.

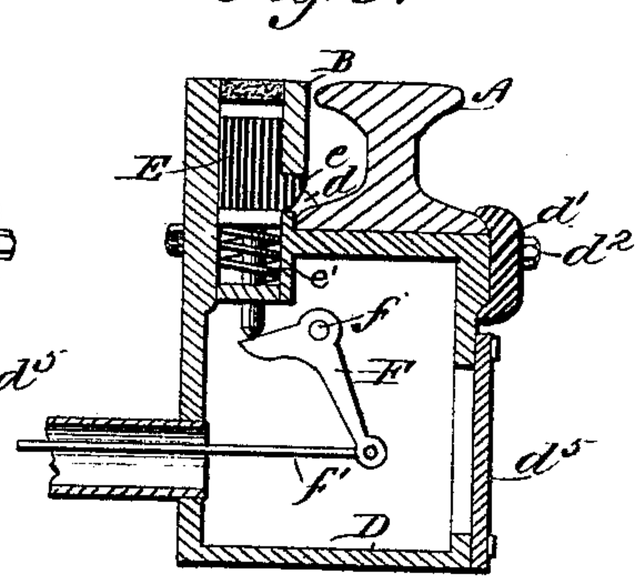


Fig. 4.

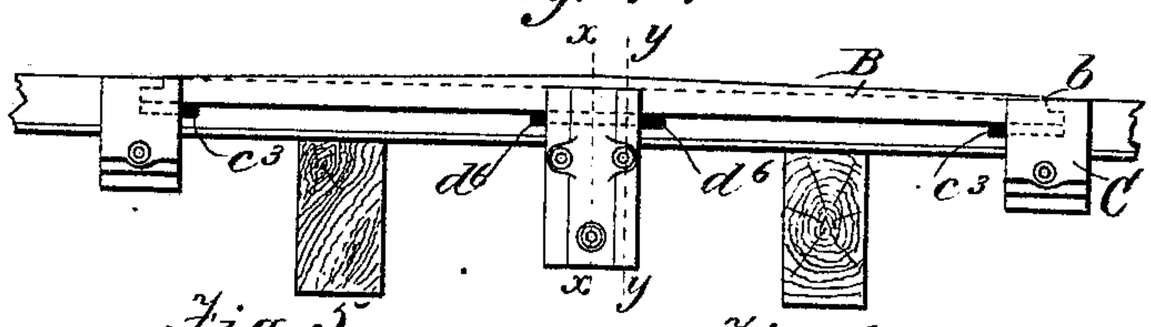


Fig. 5.

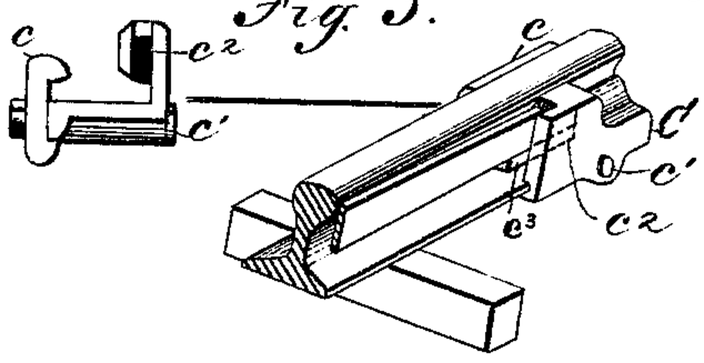
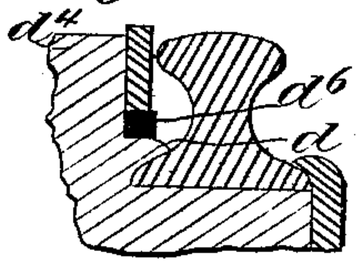


Fig. 6.



Witnesses;

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4 Sheets—Sheet 2.

J. C. PAIGE.

RAILWAY TIME-SIGNAL.

No. 181,098. Patented Aug. 15, 1876.

Fig 7.

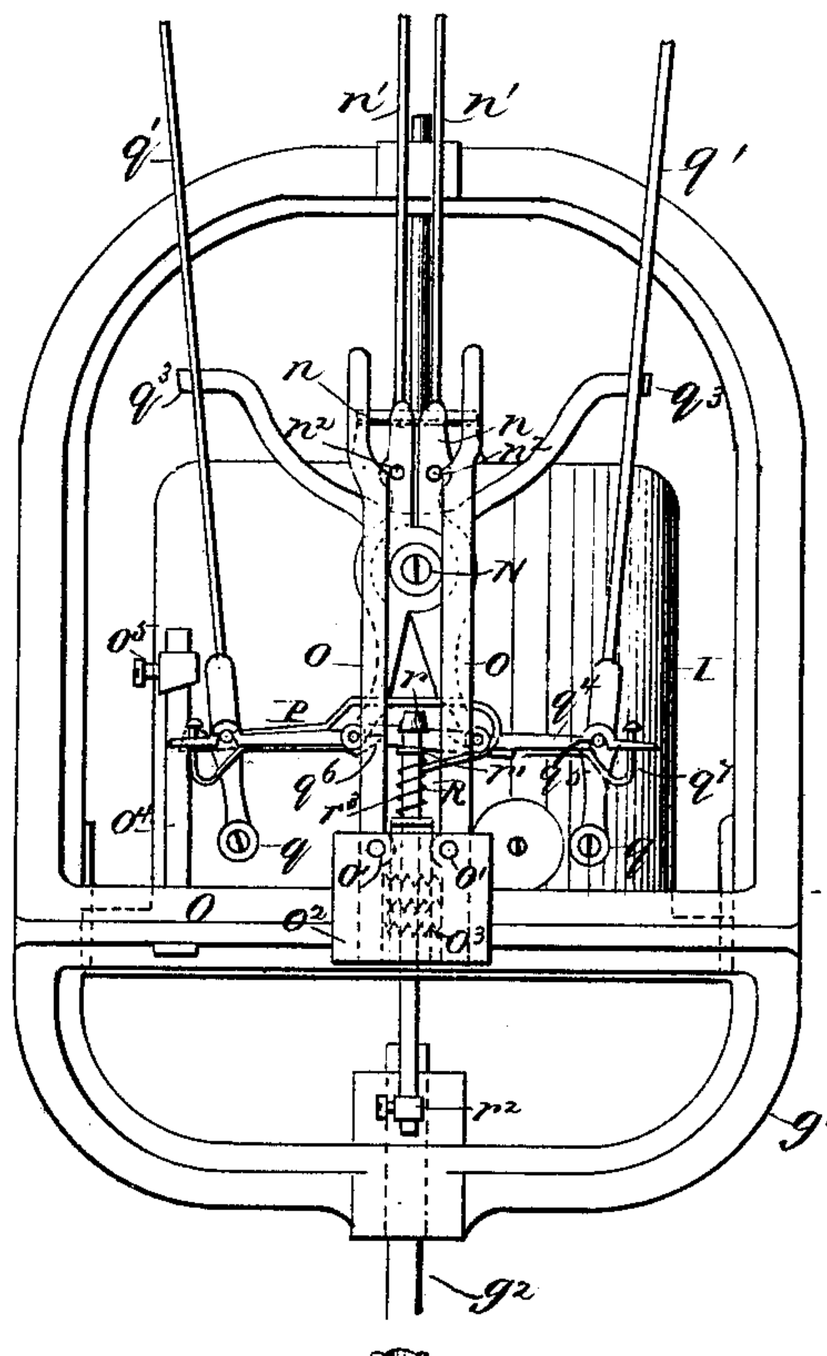


Fig 7a.

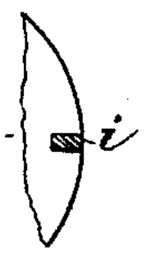
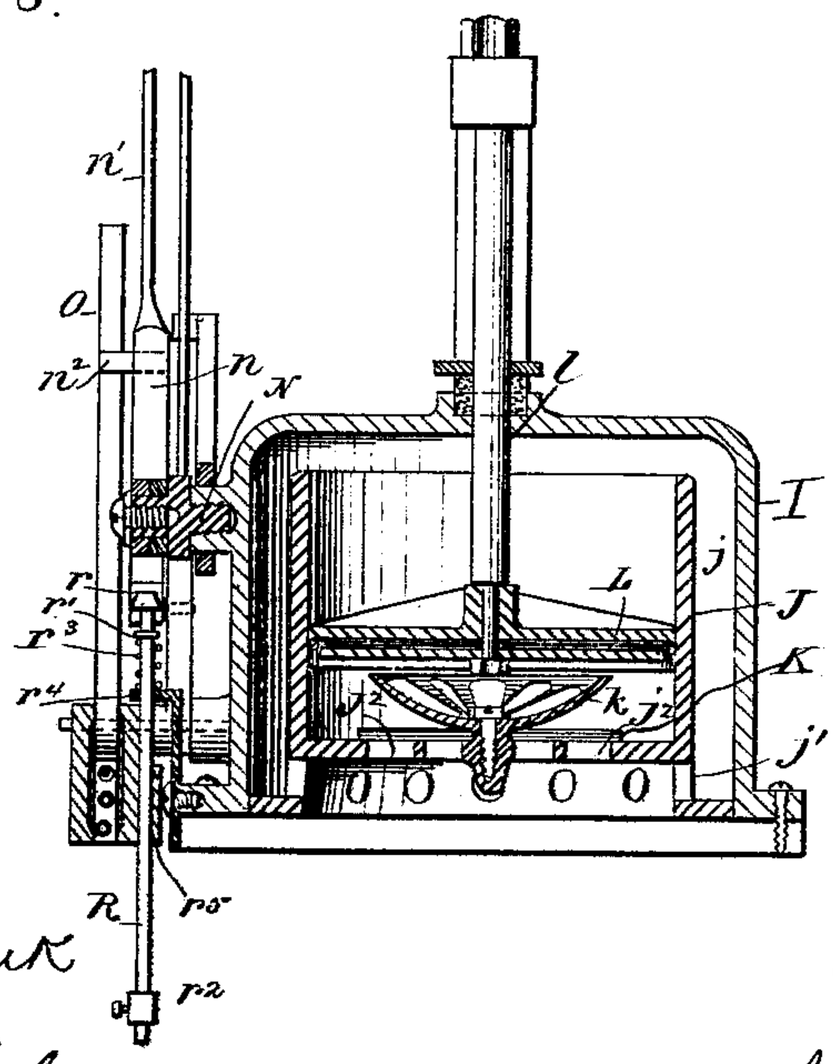


Fig 8.



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4 Sheets—Sheet 3.

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Fig 9.

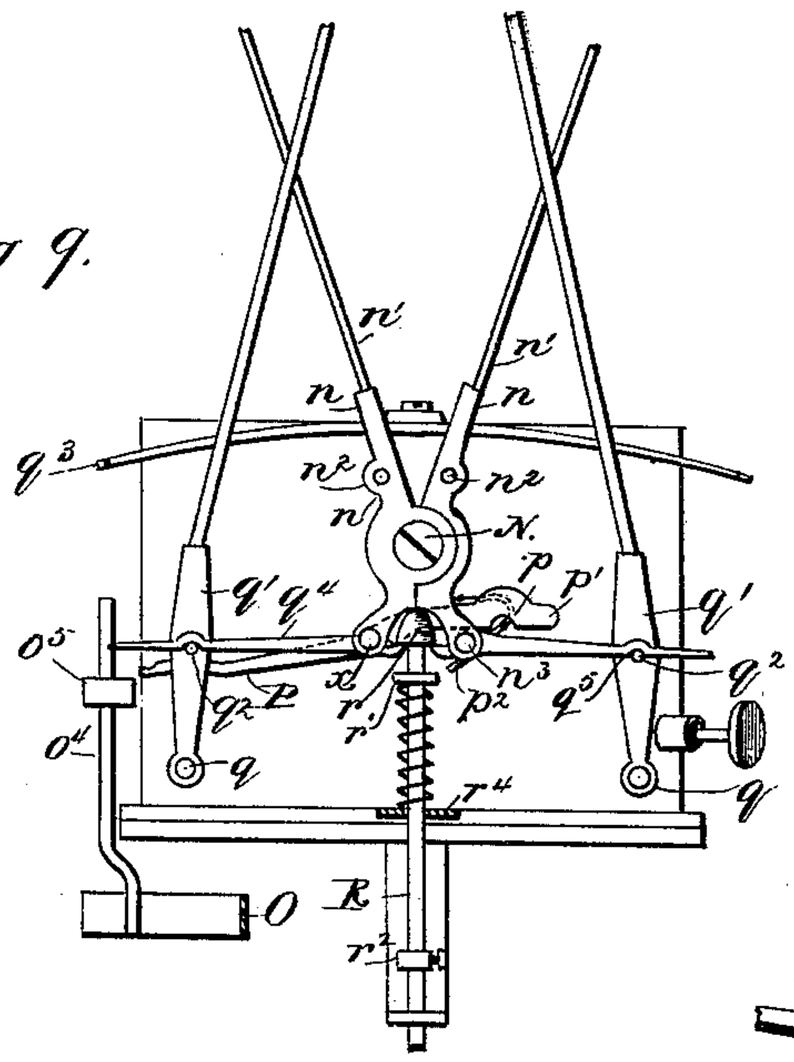


Fig 9 a.

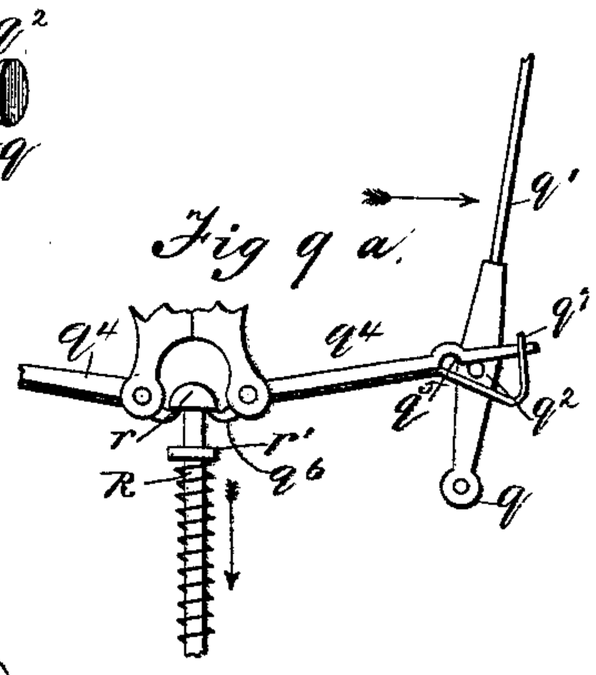


Fig 10.

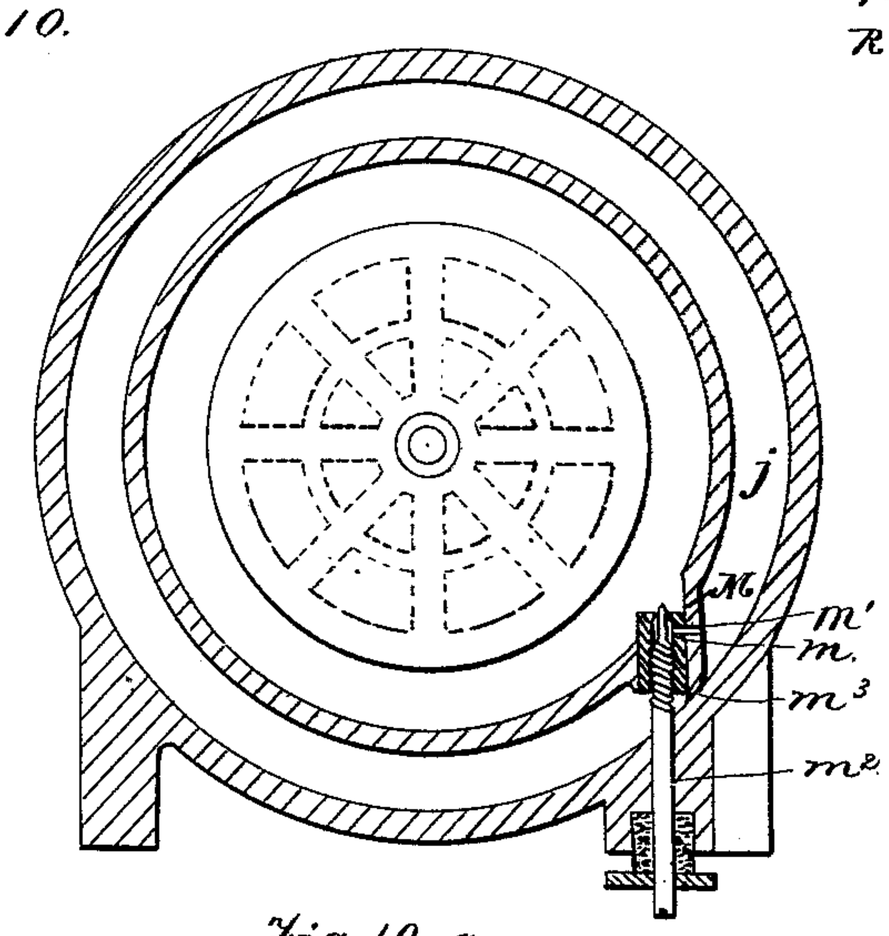
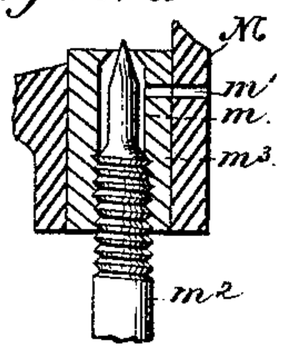


Fig 10. a



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4 Sheets—Sheet 4.

J. C. PAIGE.

RAILWAY TIME-SIGNAL.

No. 181,098. Patented Aug. 15, 1876.

Fig 11.

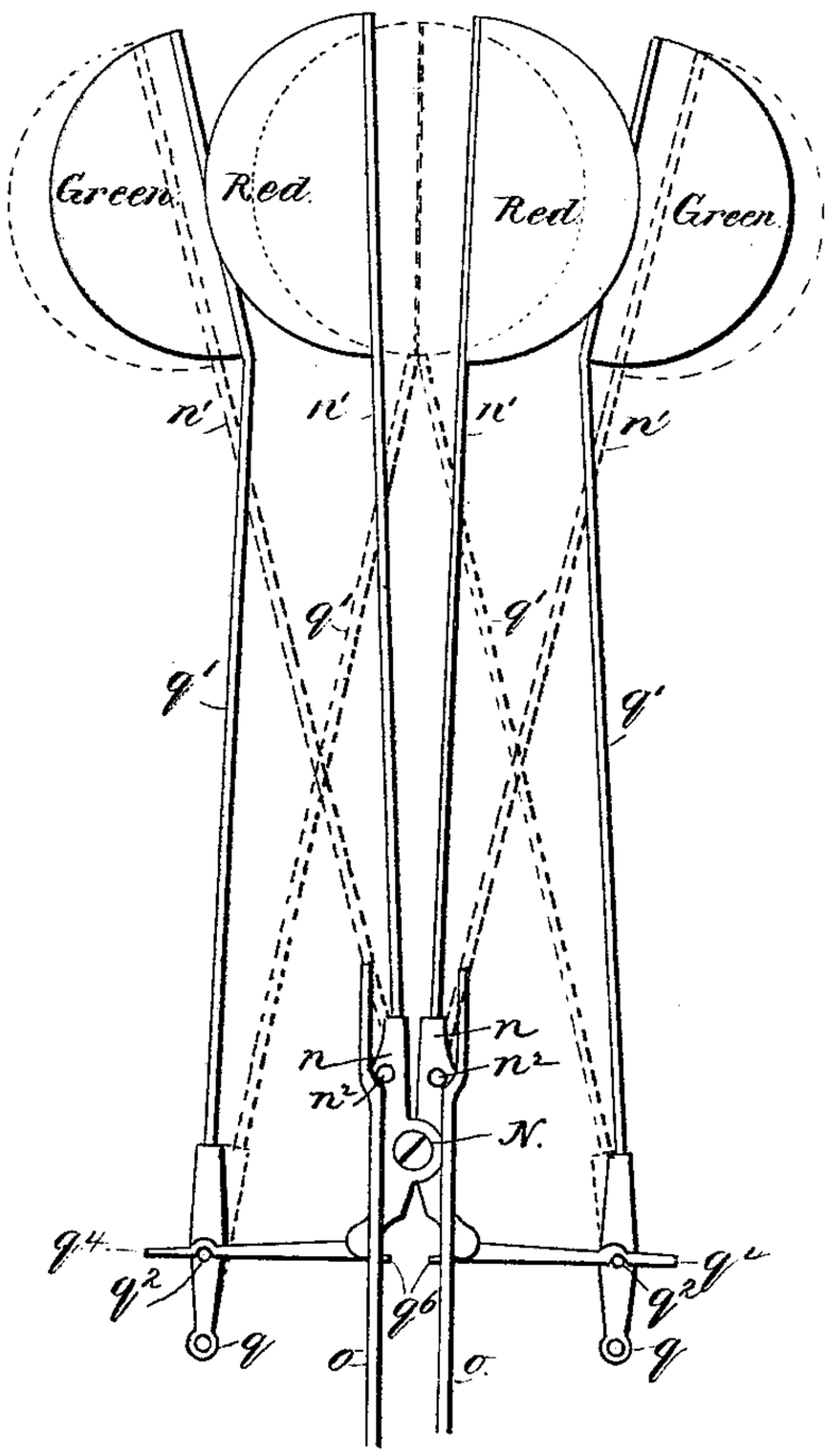
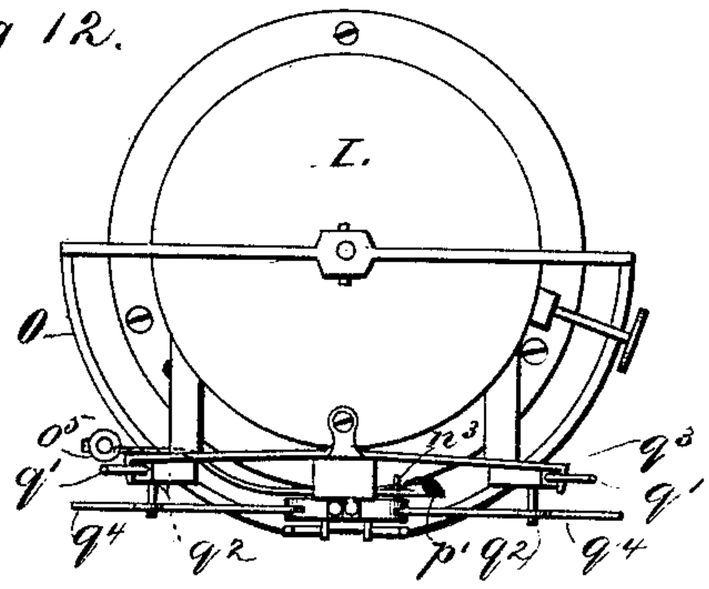


Fig 12.



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UNITED STATES PATENT OFFICE.

JOHN C. PAIGE, OF STONEHAM, MASSACHUSETTS.

IMPROVEMENT IN RAILWAY TIME-SIGNALS.

Specification forming part of Letters Patent No. **181,098**, dated August 15, 1876; application filed November 22, 1875.

To all whom it may concern:

Be it known that I, JOHN C. PAIGE, of Stoneham, in the county of Middlesex, and State of Massachusetts, have invented a new and Improved Automatic Railway Time-Signal; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of this invention is to inform the engineer of an approaching train whether or not a sufficient time has elapsed since the passage of the preceding train to allow him to proceed with safety; and it consists mainly, first, in the combination, with proper actuating mechanism operated by a passing train, and proper indicating mechanism to give the signals, of a piston and dash-pot, for determining the length of time that the warning-signals shall be exposed; second, in the peculiar construction of the signals employed and the mechanism for operating them; third, in the combination, with the rail, of a water-tight fulcrum-box and certain actuating mechanism. It further consists in certain details of construction, all of which will be fully described hereinafter.

In the drawings, Figure 1 represents a front elevation, partially in section, of the entire signaling apparatus; Figs. 2 and 3, sectional elevations upon the line *x x*, Fig. 4, of the primary actuating mechanism secured to the rail; Fig. 4, a side elevation of the back rail and its connections: Fig. 5, views of the clamping-iron which holds the vertically-moving bar B in place; Fig. 6, a partial sectional elevation upon the line *y y*, Fig. 4; Fig. 7, a front elevation of the special mechanism for actuating the signals; Fig. 8, a sectional elevation of the dash-pot and its connections; Fig. 9, a front elevation of the releasing-lever and its connections; Fig. 10, a transverse sectional view of the dash-pot and the adjusting mechanism for regulating its descent; Fig. 11, a front elevation of the sectional signal-disks and their immediate connections; Fig. 12, a plan view of the mechanism shown in Fig. 7.

To enable others skilled in the art to make and use my invention, I will now proceed to describe fully its construction and manner of operation.

For convenience of description the parts of my invention will be referred to under three different heads, as follows: first, that portion connected with the track-rail, which will be termed "the primary actuating mechanism;" second, the dash-pot and its connections, which will be termed "the time-controlling mechanism;" and, third, the remaining parts, which will be termed "the indicating or signaling mechanism."

1. *The primary actuating mechanism.*—A, Figs. 1, 2, and 3, represents the track-rail supported by and secured to sleepers in the usual well-known manner. B represents a long bar, having its upper face inclined from the ends to the center, and provided at each end with a recess, *b*, as shown in Fig. 4. C C, Figs. 4 and 5, represent right-angled irons of peculiar conformation secured to the rail at the proper points by means of the clamping-irons *c* and bolts c^1, as shown, which are provided with recesses c^2, adapted to secure the projecting ends of the bar B, and permit them to move freely in a vertical direction without danger of disengagement or displacement. c^3 c^3 represent rubber blocks held in proper recesses in the irons C, beneath the ends of the bar B, by means of which the latter is supported in its raised position, excepting when depressed by a passing train.

D, Figs. 1, 2, and 3, represents a water-tight fulcrum-box, constructed of suitable material and proper size, and provided with overhanging ears *d d*, Fig. 6, by means of which and the clamping-iron d^1 and bolt d^2 it is securely clamped to the foot of the rail, as shown in Figs. 2 and 3. d^4, Fig. 6, represents an extension, which projects upward parallel to the side of bar B, and bears closely against the same, as shown. d^5, Figs. 2 and 3, represents a hand-hole cover, by removing which the interior of the box is made accessible, when desired. d^6 d^6 represent rubber blocks, resting upon the ears *d d* of the fulcrum-box D, and beneath the bar B, as shown in Fig. 6, which serves, in connection with the similar blocks c^3 c^3, to furnish a yielding support for the bar. E represents a plunger, held in suitable bearings in the fulcrum-box, and provided with a

right-angled arm, *e*, extending beneath the bar B, as shown. *e'* represents a spring, of suitable construction and arrangement, which may be employed, if desired, to return the plunger to its normal position after being depressed by the bar B. F represents a bell-crank lever, pivoted at *f*, the horizontal arm of which bears against the foot of the plunger, as shown, its vertical arm being united, by means of the connecting-rod *f'*, to the vertical arm *g*, Fig. 1, of the bell-crank lever G in the pillar H, as shown. The horizontal arm g^1 of the lever G is united, by means of the connecting-rod g^2, Fig. 7, to the frame g^3, as shown, the latter being adapted to move freely in a vertical direction when properly actuated, as will be hereinafter described.

2. *The time-controlling mechanism, consisting of the dash-pot and its immediate connections.*—I, Figs. 7 and 8, represents a cylindrical casting, suitably supported in place by any proper means, which forms the chamber inclosing the dash-pot, the same being closed at its ends, but provided above with a central orifice for the passage of the dash-pot piston, as shown. *i*, Fig. 7^a, represents slots in the flange, by means of which the vertically-moving frame g^3 is guided in its movement. J, Fig. 8, represents the dash-pot proper, which is centrally located in the inclosing-chamber with an intervening space, *j*, between the walls, and supported below by the perforated flange j^1, as shown. j^2 j^2 represent valve-openings, located in its bottom plate, which, in connection with the perforated flange j^1, afford communication, at the proper time, with the intervening space between the walls. K represents a valve, controlling the openings, and *k* a valve-guard. L represents the piston, of any suitable construction, and *l* the piston-rod, which projects through the central opening in the casting I, and is secured to the vertically-moving frame g^3, as shown. M, Fig. 10, represents an opening made in the side of the dash-pot, below the piston. *m* represents a cylindrical block, fitted into the opening M, which has a central orifice provided with screw-threads at its outer end, and made conical in form at the other, as shown. It is provided, moreover, with a side-delivery opening, m^1, by means of which communication is made with the intervening space *j*.

m^2 represents an adjusting-screw extending through the outer wall, and made tight therein by proper packing, which is adapted by the threaded portion m^3 to be screwed in and out of the block M, and by means of a conical point to regulate the flow of fluid from the dash-pot into the intervening space between the walls.

3. *The indicating or signaling mechanism.*—N, Figs. 7, 8, and 11, represents a horizontal pivot-stud rigidly fixed to the front of casting I, as shown. *n n* represent lever-blocks, of similar construction, pivoted to the stud N, and each provided above with a lever-rod, n^1, carrying a semicircular signal-disk, Fig. 11, preferably of red color.

These lever-blocks are of peculiar construction, resembling somewhat in their manner of operation a glove-stretcher, their movements upon the pivot in either direction being limited to certain fixed and definite points.

n^2 n^2 represent fixed pins projecting in a horizontal direction from the face of the long arm of the lever-blocks, as shown. O, Fig. 12, represents a semicircular band or metallic strip attached to the vertically-moving frame g^3, as shown. *o o*, Figs. 7 and 8, represent vertical standards, secured to the front of the band O by the pivots o^1 o^1, and securely held in proper vertical position by the socket o^2 and the intermediate spring or springs o^3. These standards are bent and curved outward near their upper ends slightly, for the purpose of enlarging the space between them, as shown.

The mechanism just described is adapted, when the vertically-moving frame is raised by the primary actuating mechanism, to move the lever-blocks into proper position to bring together the semicircular signal-disks, and expose them as a complete signal at the proper opening in the signal-pillar, this result being accomplished by the upward movement of the standards *o o*, which, by means of the curved or bent parts, draw together the pins n^2 n^2, as indicated in Fig. 11.

The mechanism for throwing back the signal-disks at the proper time will now be described.

o^4, Figs. 7, 9, and 12, represents a standard rising from the band O at the proper point, which is provided with the adjustable collar o^5, as shown. P represents a lever pivoted at *x* to the end of the short arm of one of the lever-blocks *n*, the end of the long arm of which lever P projects when the lever-blocks are in their closed position beneath the adjustable collar o^5 of the standard o^4, as shown in Fig. 7. The short arm of this lever is provided with a recess, *p*, Fig. 9, adapted when in proper position to fit over a pin, n^3, attached to the end of the short arm of the other lever-block, and has also a weighted end, p^1, as shown, to insure its dropping onto pin n^3 when in position. p^2 represents a spring wire or rod attached at one end to the lever P, near its center, which is extended beyond the recess *p* in the short arm, and bent in a downward and backward direction about the recess in such a manner that its free end forms an inclined plane, as shown.

By means of this construction it follows that when the vertically-moving frame descends, the long arm of lever P is also caused to descend by contact with the adjustable collar o^5, by which means the lever-blocks *n* are operated to throw back the signal-disks in the following manner:

When the frame g^3 is raised, the position of the lever P, relative to the lever-blocks *n*, is as shown in Fig. 7, it being in a horizontal position pivoted to one of the short arms of

the lever-blocks n, and having its recess p over the pins n^3 of the other, the spring p^2 partially inclosing, also, this same pin.

Now, when the long end of lever P is depressed by the downward movement of the collar o^5, its short or recessed end is raised from off the pin n^3, and being pressed by the inclined part of the spring p^2 bearing against it, as shown in Fig. 9, the two semicircular disks at the top of the signal-rods are given a sudden inclination outward, and are allowed to fall back out of the line of vision.

In connection with the foregoing mechanism for actuating what I term the "stop" signal, certain auxiliary mechanism for actuating what I term the "cautionary" signal may be employed, this being displayed for any desired length of time after the stop-signal has been withdrawn.

q q, Figs. 7, 9, and 11, represent pivot studs projecting from the casting I, as shown. q^1 q^1 represent signal-rods carrying semicircular signal-disks, Fig. 11, preferably of green color, which are pivoted at their lever ends to the studs q q, as shown. q^2 q^2 represent pins projecting in a horizontal direction from the face of the rods, as shown. q^3, Figs. 7, 9, and 12, represents a rod or plate, (secured to the casting,) which is provided with bent ends adapted in form and position to limit the outward movement of the signal-rods. q^4 q^4 represent catch-bars of identical construction, pivoted at their inner ends to the ends of the short arm of the lever-blocks n, and provided upon the lower sides with recesses q^5 q^5, and at their inner ends with hooks or catches q^6 q^6, as shown. q^7 q^7 represent spring wires or rods attached at their inner ends to the inner ends of the bars q^4, which, extending outward below the lower surface of these bars, are bent at their ends into a V shape, as shown. By means of this construction it follows that when the lever-blocks are moved into position to display the stop-signal, the catch-bars resting on the pins q^2 are moved in an outward direction by the corresponding movement of the short arms of the lever-blocks to which they are attached, until the recesses q^5 engage with the pins q^2, by which means connection is made with the signal-rods q^1. When, therefore, the catch-bars are drawn in again by the corresponding movement of the short arms of the lever-blocks n, which takes place when the stop-signal is thrown out of position, the rods of the cautionary signal are properly moved to unite the semicircular disks and expose them at the central opening in the signal-pillar. This signal in its turn is moved out of position by the following mechanism. R, Figs. 7, 8, 9, and 9^a, represents a rod adapted to move vertically in proper bearings upon the casting I, which is provided above with the conical head r, and shoulder r^1, and below with the adjustable collar r^2.

r^3 represents a coiled spring surrounding the same between the shoulder r^1 and the fixed flange r^4 upon the casting, as shown. r^5 represents an ear upon the inner side of the band O, which has a proper opening through which extends the rod R, as shown in Fig. 8.

By means of this construction it follows that when the vertically-moving frame is raised the rod R, which has been depressed, is also raised by the reaction of the spring r^3 into such a position that when the short arms of the lever-blocks n are brought together by the descent of the frame g^3, for the purpose of throwing the stop-signal out of position, as before described, the hooks q^6 of the catch-bars are brought beneath its conical head, as shown in Fig. 9 and 9^a. The parts remain in this position until a further movement of the frame, as indicated in Fig. 9^a, causes the ear r^5, Fig. 8, to come in contact with the adjustable collars r^2, so that the rod R is depressed against the force of spring r^3, and the catch-bars are consequently tilted upon their pivots.

In consequence of the movement of the catch-bars the recesses are disengaged from the pins q^2 of the signal-rods, and the latter are allowed to fall backward, assisted by the pressure of the inclined face of the springs q^7, as shown. The springs p^2 and q^7 q^7 fulfill the double office of insuring the hooking on of the lever P and catch-bars q^4 q^4, when brought into position, and of giving the signal-disks a sudden start backward at the instant the pins n^3 and q^2 q^2 are disengaged from the recesses in the lever P and catch-bars q^4 q^4.

The general operation of this invention is as follows: Whenever a train passes the signal the bar B is necessarily depressed by the passing wheels, and consequently movement is given by means of the plunger F, and the intermediate lever-connections to the vertically-moving frame g^3. The latter, being raised, lifts also, by means of the connecting-rod l, the piston in the dash pot, and, consequently, the fluid in the intervening space J is drawn in through the perforated flange j^1 and valve-openings j^2 into the dash-pot below the piston.

It is obvious now that the piston cannot descend until the fluid below is displaced, and as this has no outlet, excepting through the opening M, it follows that by adjusting the size of this opening in the manner described, that the amount of the fluid can be regulated, and consequently also the rapidity of the descent of the piston.

By the descent of the piston, and the attached frame, which acts as an impelling or actuating weight, the signal mechanism is attached to throw the signals out of position; hence, it follows that the length of time that a signal will remain exposed depends mainly upon the rate of the movement of the piston in the dash-pot, which may be easily regulated by means of the adjusting screw m^2 to suit the necessities of the case.

When the vertically-moving frame is raised the rods of the stop-signal are drawn together

by the upward movement of the standards *o o*, for the purpose of uniting the sections of the signal and exposing it at the proper opening. This remains exposed until the downward movement of the piston, and the attached frame actuates the releasing-lever P in the manner before described. The same movement which throws out of position the stop-signal brings into position the cautionary signal, in the manner before described in detail, and this remains exposed until the further movement of the frame actuates the releasing-rod R.

The relative time of exposure of the stop and cautionary signals may be varied by adjusting the collar upon the standard o^4 and rod R, as before described.

Some of the advantages of the described construction are as follows: By the employment of the water-tight fulcrum-box in the manner described the primary actuating parts are effectually protected from injury by freezing. By suspending the fulcrum-box from the rail the two may be rigidly fixed together, so that if the rail be moved by the action of frost or other cause its relative position to the fulcrum-box will be unchanged, and consequently no injury will result. By the employment of the dash-pot for timing purposes a simple, reliable, and effective agent is obtained, which may be easily and instantly regulated to vary the time of exposing the signals, as may be desired. By means of the adjustable collars the time of exposing the stop and cautionary signals relatively to each other may be varied at will. By means of the spring below the face of standards *o o* the latter are permitted to yield in case of sudden shock, and thus prevent injury to the parts.

By the employment of a double signal-disk certain marked advantages are obtained, as follows: The size of the signal case or pillar may be reduced. The power, acting upon duplicate mechanism, is balanced, as it were, so that no special strain is exerted to either side. The vertical motion necessary to expose the signals is much less than if an entire disk was employed, the double disk having only about one-half of the motion of an entire disk, other things being equal, and hence its movement is proportionately less sudden. A decrease of friction and increased durability of the parts consequently result from the construction described.

The various mechanisms herein described may be used independently of each other, if desired. For instance, the primary actuating mechanism may be used with other timing and signaling mechanism, and the timing mechanism with other primary actuating mechanism and signaling mechanism, and the signaling mechanism with clock-work, if desired.

I do not limit myself to the combination of these various mechanisms.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with primary actuating mechanism, substantially as described, operated by a passing train, and indicating mechanism to give the signals, a piston and dash-pot, substantially as described, for determining the time that the signals shall remain exposed.

2. The combination of the semicircular signal-disks with mechanism, substantially as described, for uniting them before the display-opening, for the purpose of exposing the signal and mechanism, substantially as described, for separating them for the purpose of throwing them back out of the line of vision, substantially as described.

3. The combination of the close fulcrum-box, having the side opening, as described, and the bar B, adapted to protect the opening, as described.

4. In combination with a water-tight fulcrum-box, having a side opening, the plunger E, having the right-angled arm *e* adapted to protrude through the opening, as described.

5. The combination of the vertically-moving frame g^3, the casting I, the piston-rod *l*, and piston *l'*, with the dash-pot, substantially as described.

6. The combination of the vertically-moving frame g^3, having band O and standards *o o*, with the lever-block *n*, having pins n^2, as described.

7. The combination of the vertically-moving frame, having standard *o*, with the releasing-lever P and lever-blocks *n*, substantially as described.

8. The combination of the lever-blocks *n* with the catch-bars q^4 and signal-rods q^1, substantially as described.

9. The combination of the catch-bars q^4, signal-rods q^1, and releasing-rod R, as described.

10. The combination of the catch-bars q^4, signal-rods q^1, and releasing-rod R with the vertically-moving frame g^3, as described.

11. The combination of the releasing-rod R and its spring r^3 with the catch-bar q^4, as described.

12. The combination of the releasing-rod and the ear r^5 of the frame with the catch-bars q^4, as described.

13. The combination of the pivoted standards *o o* with the intermediate spring o^3, substantially as described.

14. In combination with the adjustable collar o^5, connected to the vertically-moving frame g^3 and adapted to actuate the releasing-lever P, the adjustable collar r^2 upon the releasing-rod R, adapted to determine the time of release of the catch-bars, by means of which the time of exposure of the two signals relative to each other may be determined, as described.

15. The combination of the catch-bars q^4 and the springs q^7 with the signal-arms q^1, as described.

16. The combination of the releasing-lever P and its spring p^2 with the catch-bars q^4, as described.

17. In combination with the sectional signals and the duplicate mechanism for actuating these signals, substantially as described, the descending weight g^3, as set forth.

18. The combination of the following elements: first, primary actuating mechanism for raising a weight and displaying the signals; second, a descending weight; third, independent mechanism operated by the weight for throwing the signals out of the line of vision; and, fourth, mechanism, substantially as described, for controlling the descent of the weight.

This specification signed and witnessed this 12th day of June, 1875.

JOHN C. PAIGE.

Witnesses:
WILLIAM F. WALKER,
HARLIN O. PAIGE.