(No Model.)

2 Sheets—Sheet 1.

F. ROBINSON.

RAILWAY TIME SIGNAL.

No. 444,506. Patented Jan. 13, 1891.

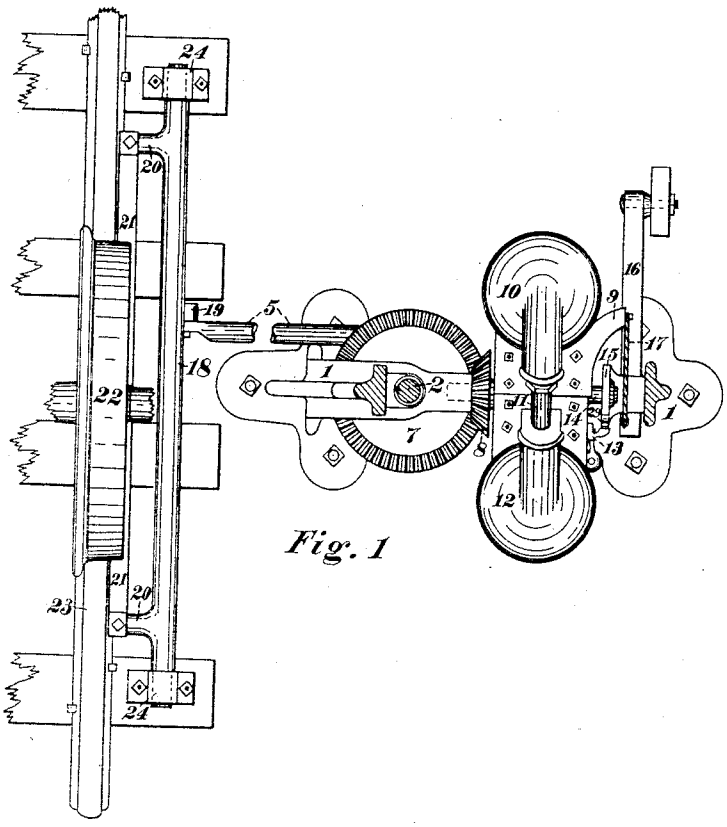


Fig. 1

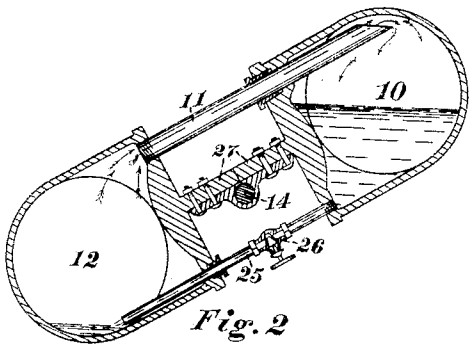


Fig. 2

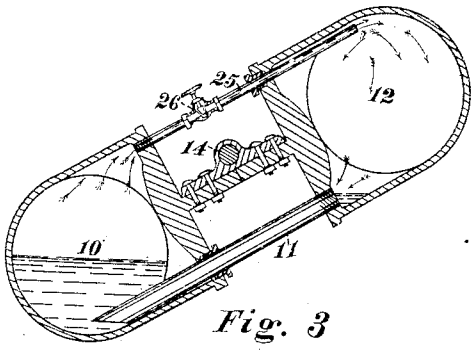


Fig. 3

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4

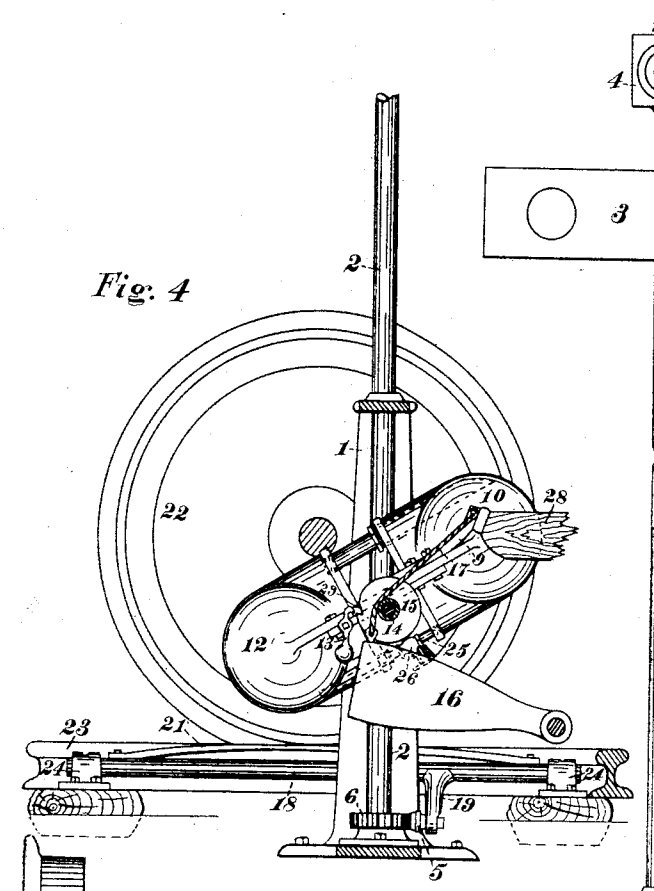
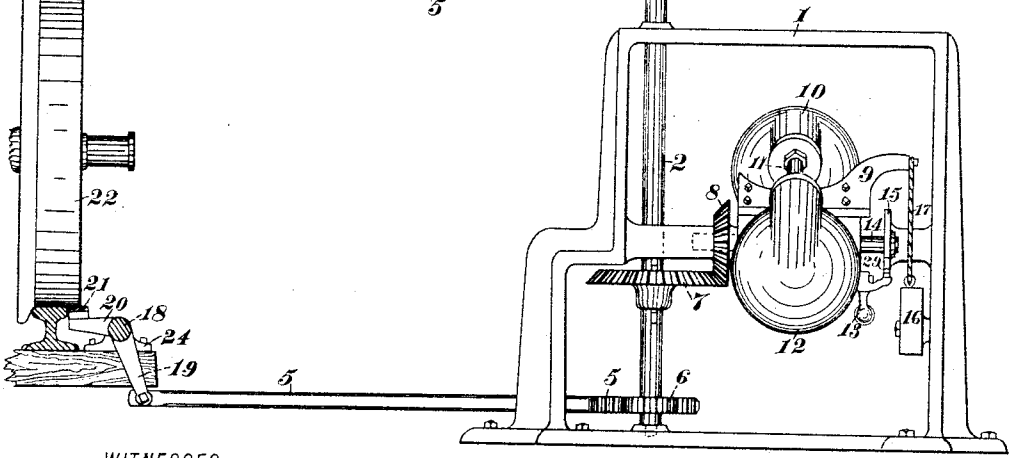


Fig. 5



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UNITED STATES PATENT OFFICE.

FRANK ROBINSON, OF BANGOR, MAINE.

RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 444,506, dated January 13, 1891.

Application filed July 29, 1889. Serial No. 319,122. (No model.)

To all whom it may concern:

Be it known that I, FRANK ROBINSON, a citizen of the United States, residing at Bangor, in the county of Penobscot and State of Maine, have invented a new and useful Railway-Signal; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved gravity system for operating railway signals, gates, and other purposes; and it consists of certain improved mechanism, hereinafter to be described, operated or set by the wheel of a passing train and returned to its former position within a given length of time by means of the equalization of substances.

Throughout the description reference is made to the accompanying drawings in two sheets, in which—

Figure 1 represents a plan view of my device with the frame-standards cut away. Fig. 2 is an inverted sectional elevation of the bulbs forming part of my invention, showing chambers and connecting-tubes. Fig. 3 is a similar view of the same portion with the bulbs in position to be set. Fig. 4 is a side elevation of my invention, showing position when set by a passing train. Fig. 5 is a front elevation of my device in the same position shown in Fig. 4.

Similar figures of reference refer to correspondingly-like parts throughout the different views.

The object of my invention is to produce a positive-acting railway-signal that will be set by a passing train and automatically return to its former position within a given time.

Referring to the drawings, 2 represents a long upright shaft (hereinafter designated as a signal-mast) stepped at its lower end into a suitable bearing and supported and held in a vertical position by passing through a supporting-frame 1, constructed to sustain it. The upper portion of signal-mast 2 is provided with the usual signal-vane or cross-arm 3 and danger-lantern 4, which are visible along the line of track, and are turned or operated by the mechanism hereinafter to be described to denote the desired signal for the engine-driver.

Fastened upon signal-mast 2, near its lower end, is a pinion-wheel 6, whose cogs mesh into a horizontally-supported rack 5, having an uncogged extension of sufficient length to extend and be pivoted to the tripping mechanism fastened at the side of one of the rails of a railroad-track. This tripping mechanism is as follows: A horizontal shaft or trip-rod 18, having short arms 20 projecting outward near each end and a third and slightly-longer arm or lever 19 extending downward at or near a right angle from the arms first mentioned, is confined to the track-sleepers parallel with the rail 23 by having its ends turn in suitable bearings or boxes 24, rigidly bolted to the said sleepers. The longer arm or lever 19 of trip-rod 18 is pivoted at or near its end to the free end of the extension of rack 5, and the remaining arms 20, protruding toward the rail 23, are bolted to the ends of a flat steel spring 21, which latter bridges the space between the two short arms, lies as close to the upper surface and edge of the rail 23 as is possible to allow deflection without touching the latter, and bows upward at its center about two inches when its ends are flush with the top of said rail.

Now it can be readily understood that when a car or locomotive wheel (shown by 22 in the drawings) running on rail 23 passes upon and over spring 21 (as it necessarily will do, the tread of a car-wheel, being wider than the top of a rail, extending over the latter, as shown in Figs. 1 and 5) it must by the weight thereon press down the said spring with the short arms 20, which partly rotates the trip-rod 18 and forces the end of the long arm or lever 19 toward the signal-mast 2. Then by means of the connecting-rack 5, meshing in pinion 6, confined to the signal-mast, the latter will be turned one-quarter way round, the size of gear and connections being such as to accomplish this result.

The steel spring 21 of the tripping-gear should be stiff enough to overcome friction of bearings without buckle and still not rigid enough to throw or derail a train should the rest of the mechanism be clogged and not work. This tripping portion of my device

can be located either upon the inner or outer side of a rail; but I consider the latter position preferable in cold climates, as it then leaves the space between the rails free from obstruction to flange-diggers or other machinery used upon railroads.

After the signal-mast 2 has been turned, as above described, by a passing train, and the danger-signal, which is vane 3 or lantern 4 set to indicate that a train has passed into the station, I hold this signal a given number of minutes, seconds, or even hours, if need be, before returning it to its former position by making use of the mechanism now to be described, and thus give said train plenty of time to clear the track.

Upon the signal-mast 2, within the supporting-frame 1, I attach a crown or bevel gear 7 (a geared quadrant would be sufficient) and mesh this gear into a smaller gear-wheel 8, confined to a horizontal shaft 14, turning in suitable bearings at each end. I further attach to the horizontal shaft 14 the operating-bulbs 10 and 12, which are two hollow balls of equal size, each constructed with a short neck 27, cast upon and projecting from their centers to furnish means for their connection and confinement to horizontal shaft 14. The interior or chambers of these bulbs 10 and 12 are connected by tubes 11 and 25, inserted through opposite sides. Tube 11 is of quite large diameter, one end being screwed through the shell of bulb 12, and its opposite end passes into bulb 10 to within a short distance from its bottom. Tube 25 is considerably smaller in size and is connected to the bulbs in inverse order diametrically opposite tube 11—that is, one end is screwed into shell of bulb 10, and its opposite end extends into chamber of bulb 12 to very near the bottom. One of these bulbs is now partly filled with a non-freezing liquid, and their relative position upon shaft 14 is such that when vane 3 is turned parallel with the track (consequently spring 21 projects above rail 23) the bottom of bulb 12 is at or very nearly on a horizontal line with the top of bulb 10, as shown in Fig. 3. In this position all the liquid must necessarily be in the lower bulb and the machine is at rest. When a car or locomotive wheel passes over spring 21, by means of the intermediate connections hereinbefore described mast 2 is turned one-quarter way round, setting vane 3 at right angles with the track, and as mast 2 turns gear 7, meshing with gear-wheel 8, rotates the latter one-half way, which movement reverses the position of the bulbs, causing the previously-lower bulb 10 to occupy the higher position. As bulb 10 was previously filled or partly filled with a liquid, this substance passes by gravitation through the smaller tube 25 into the bottom of the now lower bulb 12, and the air thus displaced rushes through the larger tube 11 above the liquid into bulb 10. The time required to displace this liquid can be regulated either by the amount put in the bulb or by a valve 26, located upon the smaller tube 25. As soon as sufficient liquid has entered the lower bulb 12 to overbalance the weight of the upper they reverse to their former positions with the assistance of a weight 16, connected to arm 9 by a chain or rope 17, and return the vane 3 parallel with the track, placing the machine in position to be tripped or set by the next train. The arm 9, to which weight 16 is attached, projects from bulb 10 above the central axis when the signal is set, and a rope 17 extends from this arm over the support for this end of shaft 14 to weight 16, thus making the draft of the weight almost in direct line with the balance of the machine when in this position; but when bulb 12 drops under shaft 14 by the overbalancing weight of the liquid running therein the force of weight 16, coupled with the momentum attained, tends to rotate shaft 14 in a reverse direction one-half way, thereby returning bulb 12 to the upper position and vane 3 parallel with the track. As bulb 12 is turned uppermost into the position shown in Fig. 3 of the drawings, the liquid therein instantly returns through the large tube 11 into bulb 10, thus leaving them in the first position and ready to be set by the next passing train.

When my device is set by a train passing at high speed, the lower bulb 10 is thrown into the upper position with considerable force, which shock should be received by a stop or buffer 28, placed behind the arm 9, and as the use of a buffer would unavoidably cause a rebound, which might interfere with the time in displacing the liquid, I have devised a centrifugal clutch to overcome this would-be objection. This clutch 13 is pivoted to the neck 27 of the bulb 12, and is constructed like a hook above its pivotal connection and a weight or small ball below. The hooked end of clutch 13 projects inward toward the horizontal shaft 14 and engages a notch 29, filed in the disk-shaped casting 15, (which latter forms a bearing for this end of shaft 14,) when the signal is set, as shown in Fig. 4 of the drawings.

The momentum acquired by the bulbs 10 and 12 revolving round shaft 14 when the signal is being set throws out the weight of clutch 13 sufficiently to press its hooked end against the periphery of disk 15, and the moment arm 9 strikes the buffer 28 the hooked end of clutch 13 slips into notch 29, cut in said disk, by the centrifugal or outward force of the weighted end of the clutch, thus checking the rebound. As soon as the rebounding pressure diminishes and the bulbs remain at rest the weighted end of clutch 13 falls into the perpendicular, and by so doing withdraws its hooked end from the notch 29 and presents no further interference with the return of the bulbs or workings of the machine.

This signal apparatus when once adjusted requires no attention whatever, and as all parts except the tripping-spring can be boxed or covered the liability of its becoming clogged

in practice is very small. The operation of my device by the passing of the first wheel of a train is positive, and the time for the return of the liquid is absolute and will not vary without outward interference. The same result may be accomplished by means of shot or sand in the bulb in place of liquid herein described, or the rolling of a ball in a tube located in a similar manner.

I do not intend to confine my invention to the sole operation of railway-signals, for the same mechanism may be useful in operating railway-gates and as a time-lock for safes and various other purposes.

Having thus described my invention and the manner in which it is used, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an improved railway time-signal, the combination, with a vertical shaft or mast provided with a vane and a lantern at its top and having a gear-wheel and a pinion secured to its lower portion, of a rack having a suitable operating mechanism at the end next the track and engaging with the pinion with its opposite end, a shaft journaled at right angles to the mast, having a gear-wheel and two bulbs or chambers connected therewith, said gear-wheel meshing with the gear-wheel on the mast, and the chambers having their interiors connected and one of the chambers being provided with a non-freezing liquid.

2. In a railway-signal, the operating device for the same, consisting of the combination of a signal-mast having the usual vane and lantern, pinion 6, confined to said mast, rack 5, meshing with said pinion and pivoted to lever-arm 19, depending from trip-rod 18, the tripping-rod situated parallel with the track and having horizontally-extending arms 20, connected at their outer ends by tripping-spring 21 in a manner to be depressed by a passing train, gear 7, confined to signal-mast 2 and meshing with gear-wheel 8, located upon shaft 14, bulbs 10 and 12, connected and confined to shaft 14, said bulbs having their interior or chambers united by tubes 11 and 25, diametrically opposite each other, for the purpose described, one of said bulbs filled with a non-freezing liquid or other suitable substance, all connected and adapted to operate in the manner set forth and substantially as shown and described.

3. An improved railroad-signal consisting of the combination of signal-mast 2, provided with vane and signal-lantern, gear 7, meshing into gear-wheel 8, turning shaft 14, bulbs 10 and 12, one of which is filled with a non-freezing liquid or other suitable substance for the purpose described, said bulbs fastened to shaft 14 and their chambers connected by tubes 25 and 11, of unequal diameter, secured diametrically opposite each other, arm 9, projecting from bulb 10 and connected by rope or chain to weight 16, centrifugal rebound-clutch 13, pivoted to one of the bulbs and adapted to engage notch 29, cut in stationary disk 15, for the purpose described, with suitable tripping-gear located at the side of a rail and connected to and adapted to set signal upon mast 2 by the passage of a car-wheel, all substantially as shown and described, and for the purpose set forth.

4. In combination with the operating mechanism of a railway time-signal, the tripping device for the same, consisting of a horizontal shaft located parallel with a track-rail and turning in suitable bearings confined to the rail-sleepers, horizontally-projecting arms projecting from said shaft near each bearing thereof and extending toward said rail, convex depression-spring secured to the ends of said arms in such manner as to project above the surface of said rail in the manner described, and a longer arm or lever depending downward from said horizontal shaft, this latter arm provided with means for attachment to a connecting-rod running to the signal device to operate or set said signal by a passing wheel upon said rail, all substantially in the manner shown, and for the purpose described.

5. In combination with the setting and reversing mechanism of a gravity railway time-signal, the centrifugal rebound-clutch consisting of the combination of a metallic hook, with depending extension and weight at the extremity of said extension, pivoted to the revolving portion of the signal-setting device, with a stationary disk located at the edge of said hook in such manner that the latter revolves around and is held against the periphery of the disk by centrifugal force in the manner described, said disk having a notch cut in its edge, into which the hook engages at the moment of rebound, substantially as shown, and operated in the manner described.

6. The combination, with a railway time-signal, of mechanism for operating the same by the passage of the train, and mechanism for automatically returning the signal to its original position, consisting of two bulbs or chambers, each provided with an arm for connecting it to a shaft transversely between them, two tubes for connecting the bulbs, one of which is smaller than the other and is provided with means for regulating the passage of liquid through it, one end of one of said tubes communicating with the shell of one of the bulbs, and one end of the other tube communicating with the shell of the other bulb, the opposite end of each of said tubes extending nearly to the bottom of the interior of the opposite bulb, and means for connecting said bulbs and shaft with the signal-mast.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

FRANK ROBINSON.

Witnesses:
A. J. CHAPMAN,
EBEN D. CROSBY.