

(No Model.)

3 Sheets—Sheet 2.

E. FONTAINE.
RAILWAY TIME SIGNAL.

No. 467,990.

Patented Feb. 2, 1892.

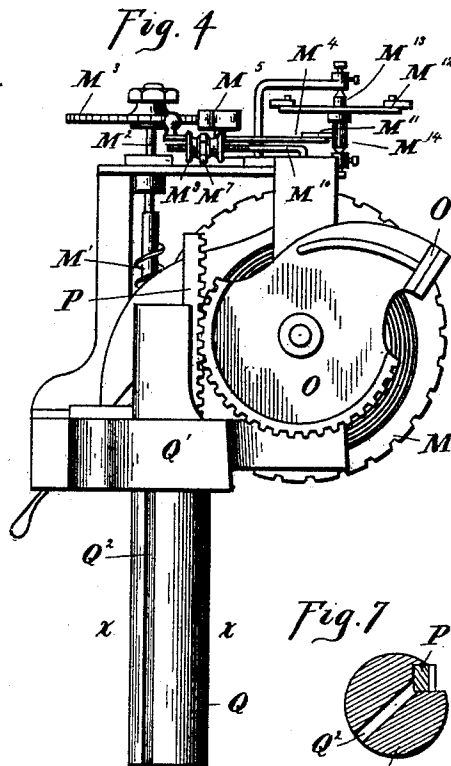
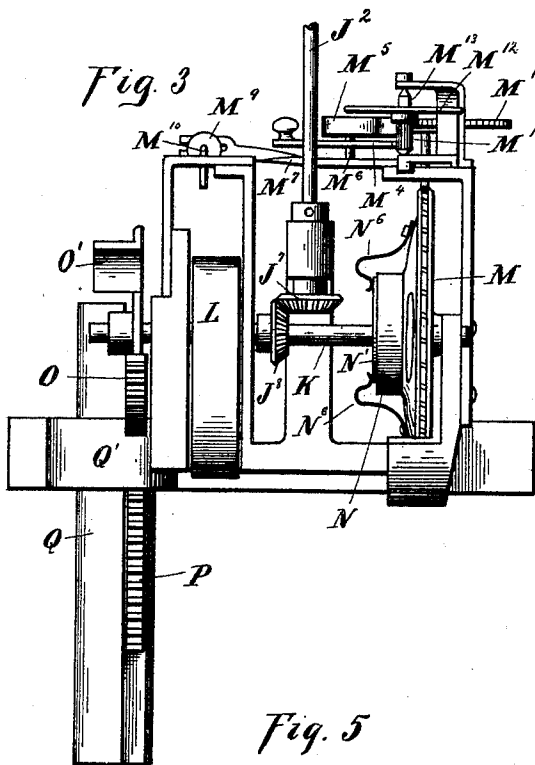


Fig. 5

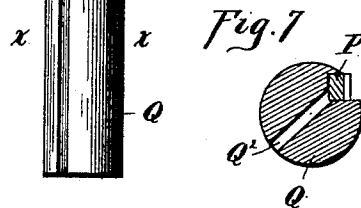
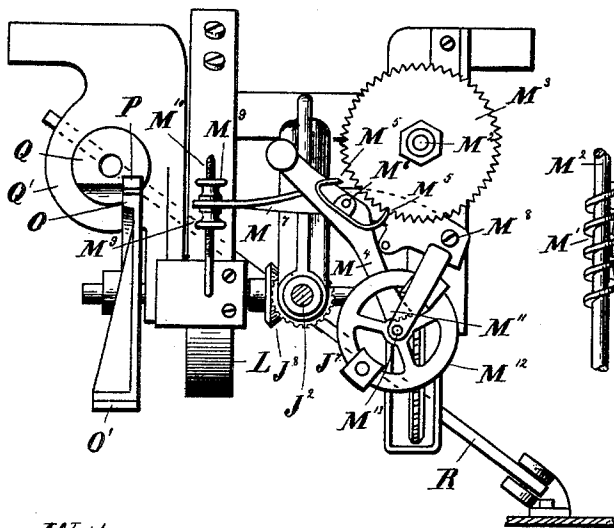


Fig. 6



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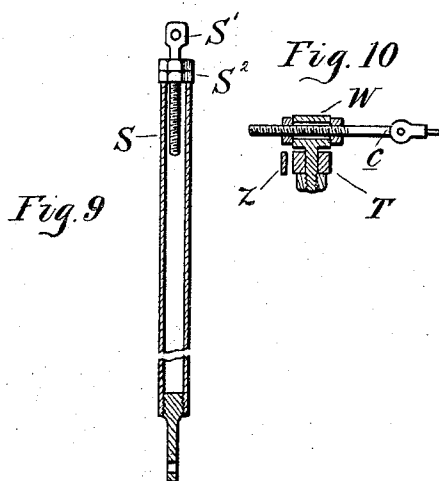
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E. FONTAINE.
RAILWAY TIME SIGNAL.

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No. 467,990.

Patented Feb. 2, 1892.



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UNITED STATES PATENT OFFICE.

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RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 467,990, dated February 2, 1892.

Application filed November 28, 1890. Serial No. 372,953. (No model.)

To all whom it may concern:

Be it known that I, EUGENE FONTAINE, a citizen of the United States, residing at Auburndale, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Railway-Signals, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention applies to that class of railway-signals the object of which is to prevent two trains from following each other too closely by automatically indicating to the succeeding train the time elapsed since the preceding train has passed the signal up to a certain number of minutes, considered as ample time allowance between two trains to be out of dangerous proximity. Signals of this character comprise two kinds of actuating mechanism, a primary actuating mechanism, the object of which is to merely derive a certain force or impulse from the movement of a train in passing the signal, and secondary or transmitting mechanism for utilizing said impulse to operate the index-hand of a clock-dial to indicate the time elapsed up to a certain number of minutes since the primary force or impulse has been received—*i. e.*, since the train has passed.

My invention consists in the improved construction of such secondary or transmitting mechanism and its peculiar combination with a primary actuating mechanism, all as more fully hereinafter described, and pointed out in the claims.

In the drawings which accompany this specification, Figure 1 is a diagrammatic elevation, partly in section, of a railway time-signal embodying my improvements. Fig. 2 is a vertical section at right angles to Fig. 1. Fig. 3 is a detached and enlarged rear elevation of the clock-work forming a part of the secondary actuating mechanism. Fig. 4 is a side elevation of Fig. 2. Fig. 5 is a top plan thereof. Fig. 6 is an elevation of the friction-clutch forming a part of the clock-work. Fig. 7 is a section on line *xx* in Fig. 4. Fig. 8 is a detail of construction of parts indicated by letters of reference and more specifically referred to hereinafter. Fig. 9 is an enlarged central section of the lifting-rod S. Fig. 10 is an en-

larged horizontal section of the connection C' and wrist W.

A A represent the two track-rails, and B represents the primary actuating device of the signal, which may be of any suitable description, whereby the wheels of the locomotive or cars in passing over a prescribed spot in the track impart a pull to a connecting bar, chain, or cable C, such devices being well known to the state of the art for operating switches or signals of all kinds and forming no part of my present invention. For the purpose, however, of explaining the operation of my signal more fully I have shown in Fig. 1 a simple illustration of such a device, in which D is a lever fulcrumed near one rail and having a short end projecting into the path of the wheels of a passing train, while the long end is connected with a dash-pot E and with the cable C through the medium of a spring-arm F.

The wheels of a train in passing will depress the short end of the lever, and the dash-pot will prevent the lever from being actuated more than once by a train in passing, while the spring-arm F prevents the cable C from being pulled too violently. In the practical application of my signal I shall make use, however, preferably, of the device described in Letters Patent No. 438,841, dated October 21, 1890, which I have specially devised for the purpose.

The secondary or transmitting devices of the signal, which form the subject-matter of this invention, are constructed and arranged as follows:

G is a hollow mast constructed, preferably, of cast-iron or tubing in two sections, the upper section supporting on top of the signal proper and the lower section provided with a base-plate G' and at a distance above ground convenient for easy access with an enlargement or box G², into the top of which the upper section is secured. To the top of this post is detachably secured the frame G³, provided with two segmental disks G⁴, one in full view to a train approaching in one direction and the other to a train approaching in the opposite direction, and as the time allowance of about twenty minutes is accounted ample

to bring two trains succeeding each other out of dangerous proximity the dial is preferably limited to indicate that number of minutes more or less, according to the distance the signals are placed apart. These disks are inscribed in large figures and indicated by division-marks to be plainly seen and easily read at a distance. Below the dials recesses G^5 are formed in the two opposite faces of the frame G^3 , in which the minute-hands H are inclosed to be protected from atmospheric disturbances. These minute-hands are radially secured to bevel-pinions H' on opposite sides of a central bevel-pinion H^2 , with which both are engaged to communicate motion in opposite directions to the minute-hands, and weights H^3 are secured to the minute-hands on their actuating bevel-pinions to counter-balance the weight of the minute-hands.

The minute-hands and their actuating bevel-pinions are mounted upon a base G^6 , upon which the frame G^3 is adjustably secured, and forms a projecting casing over the inclosed parts. The base G^6 is detachably secured upon the top of the post, and forms a tight cover to exclude moisture from the interior of the mast. It also has a raised central bearing G^7 for the bevel-pinion H^2 , through which bearing the vertical shaft, to which said bevel-pinion is secured, projects centrally down into the mast. This shaft is constructed in three sections $J J' J^2$. The upper section J has a squared end engaging loosely into a corresponding socket formed in the section J' and the upper end of the lower section J^2 engages with the middle section J' by means of a tension-joint with a coil-spring J^3 , the tension of which is adjusted to convey the motion in one direction, as will appear more fully hereinafter. This joint, as constructed in the drawings, consists of a pintle J^4 and a corresponding step J^5 , formed on the engaging ends of the sections $J^2 J'$, respectively. The step is partly cut away at its lower end, and a pin J^6 is secured on the pintle, adapted to engage with the cut-away portion of the step. The coil-spring J^3 is secured at one end to the clamping-collar J^9 and at the other end to the clamping-collar J^{10} , which are respectively clamped upon the shaft-sections $J' J^2$. To the lower end of the section J^2 the bevel-pinion J^7 is secured and meshes with a bevel-pinion J^8 on the main shaft K of a clock mechanism. This clock mechanism is inclosed in the box G^2 , which is suitably constructed to protect it from atmospheric disturbances and from being maliciously tampered with.

The clock mechanism is mounted upon a suitable frame detachably secured within the box and having the main shaft K suitably journaled thereto.

The clock mechanism may be of any suitable description adapted to revolve the shaft K at a suitable rate of speed for imparting the prescribed movement to the minute-hand of the dial through the connections described. Preferably, however, I construct it as follows:

A suitable clock-spring L is secured upon the shaft K in the usual manner to cause said shaft to revolve under the control of an escapement. This consists of the screw gear-wheel M , mounted upon the shaft K , the screw M' on the vertical shaft M^2 , engaging with said screw gear-wheel, the escape-wheel M^3 , mounted on the upper end of the shaft M^2 , the escape-lever M^4 , having the pallets M^5 , engaging with the escape-wheel, having its fulcrum at M^6 , the arm M^7 , pivotally secured at M^8 and carrying the pivot M^6 of the escape-lever, the adjoining screw-nuts M^9 and the screw M^{10} for adjustably holding the free end of the arm M^7 , the segmental rack M^{11} , formed on the free end of the escape-lever M^4 , the horizontal balance-wheel M^{12} , mounted on a shaft M^{13} , and the pinion M^{14} on the shaft M^{13} , engaging with the segmental rack M^{11} . The pitch of the screw M' is made sufficient to transmit a small amount of pressure from the spring to the pallets of the escape-lever, so as to produce in the escapement the well-known pulsative movement of a watch or clock escapement, which in like manner controls the unwinding of the spring, and thereby causes the shaft K to revolve in a proper ratio of speed required for the minute-hand of the dial. By means of the adjusting-nuts M^9 the pallets of the escape-lever may be caused to engage more or less deeply into the escape-wheel, and thereby afford means to make the pulsations shorter or longer to regulate the movement to keep proper time. If desired, however, the balance-wheel may be provided with the usual balance-spring, the adjustment of which, as in ordinary time movements is made use of to regulate the movement to keep proper time. I consider, however, my construction preferable for the purpose. The screw gear-wheel is revolved by the shaft K , through the medium of a clutch which I preferably construct as shown in Fig. 6, and in which N is an annular hub secured to or formed on the screw gear-wheel M . Within this is fitted a loose friction-ring N' , which is severed at one point to form a small opening N^2 , into which the wedge-shaped end of a dog N^3 engages. The dog N^3 is hinged to the member N^4 , which is fast upon the shaft K , and is adapted to engage on a stud N^5 on the friction-ring. By this construction it will be seen that if the shaft K revolves in the direction of the arrow in Fig. 6, as it does by the unwinding of the spring, the dog N^3 is wedged into the opening N^2 , forcing the ends of the ring apart, and causes the friction-ring to become fast in the annular hub N by frictional contact, whereas when the shaft revolves in opposite direction, as in winding the spring, the dog will sufficiently withdraw from the opening N^2 to allow the ring to become loose within the hub and be carried freely around by the engagement of the fast member N^4 on the stud N^5 . By a partial severing of the ring at N^4 , diametrically opposite to the severed place N^2 , the ring will

readily expand and contract when the wedge-shaped dog is respectively forced into or withdrawn from the small opening N^2 , between the severed ends of the friction-ring, to keep it engaged within the hub. Guards N^6 are detachably secured to the gear-wheel M.

O is a gear-wheel or segment of a gear-wheel secured upon the shaft K and engaging with a vertical rack-bar P, slidingly secured in a longitudinal slot of the vertical guide-post Q. This post is preferably made round and is adjustably secured in a vertical bearing Q' , formed on the clock-frame. Its lower portion is provided with a vertical slot Q^2 , which registers with the guide-slot in which the rack-bar is inclosed, and its upper end is cut away sufficiently toward the side of the gear-wheel O to prevent its interfering with the free engagement of the gear-wheel and rack-bar.

Below the clock mechanism is pivotally secured at one end the lifting-lever R, the free end of which projects loosely into the slot Q^2 of the guide-post underneath the rack-bar P.

S is a lifting-rod pivotally secured at its upper end to the lever R and at its lower end to one arm of a bell-crank lever T. The lifting-rod is made adjustable in length, preferably as shown in the drawings, wherein it supports at its upper end a screw-threaded extension-piece S' , loosely engaging in a socket formed therein, and by means of adjusting-nuts upon the extension-piece the normal position of the lifting-lever R is adjusted vertically.

The bell-crank lever T is inclosed in a housing U, which is secured to the underside of the flanged foot of the mast in a space provided between two sleepers V, upon which the mast is supported. The bell-crank lever is pivotally secured between the walls on the top of the housing, and its downwardly-projecting arm is provided with a wrist W, pivotally connected thereto. To this wrist one end of the cable C is secured through the medium of a suitable connection C' , so that the slack in the cable may be taken up when required. A suitable stop Z may be placed behind the bell-crank to hold it in normal position. The cable is inclosed in a pipe W' , one end of which is secured to the housing U and the other end to a housing Y, which incloses the primary actuating device.

In practice, the parts being constructed and arranged as shown and described, the device is intended to operate as follows: The pull imparted to the cable C through the primary actuating device by the wheels of a locomotive or train of cars, which in passing must depress the short end of the lever D, is directly transmitted through the cable to the bell-crank T and through the connecting-rod S to the lever R. The lever R in its upward movement pushes up the rack-bar P, and thereby causes the gear-wheel O to revolve and wind up the spring the necessary amount for making the clock-work go the twenty min-

utes more or less for which it has to operate. During such winding the clutch will disconnect the shaft K from the escapement. Simultaneously with the winding of the spring the bevel gear-wheel J^8 , revolving with the shaft K, imparts motion to the bevel gear-wheel J^7 , shaft $J^2 J' J$, and bevel gear-wheel $H^2 H' H'$, thereby causing the minute-hands H to be set from their advanced position to zero. When the parts are actuated in this manner, the spring J^3 transmits by its tension the motion from the shaft-section J^2 to the section J' , at least to the limit of the loose joint, and thus the motion is eased and no breakage or damage to the parts can result. As the spring L on the shaft K resists with its power the turning of the shaft, it will have the effect of a buffer-spring to prevent destructive results from the impulse, which, when derived from the wheels of a fast-going train, naturally must be more or less in the nature of a blow. As the primary actuating device returns to its normal position as soon as the train has passed, the lever R will simultaneously drop back and the spring L becomes free to react. This throws the clutch mechanism immediately into gear, and the unwinding of the spring can now take place under the control of the escapement, which, being constructed to produce the required ratio of speed, will impart the proper travel to the minute-hands. It will be observed that as the shaft K is now revolving in an opposite direction the two sections $J' J^2$ are now in positive engagement with each other and no lost motion can take place. While the hands are advancing on the dials, the rack-bar P will gradually drop back, and when the hands indicate twenty minutes, further movement will be stopped by the impingement of the lower end of the rack-bar against the lever R, or it may be stopped, if desired, by the action of any other suitable stop in the mechanism, such as by a stop O' on the gear-wheel O striking against the frame. If another train passes the signal before the full-time indication, the operation is the same as before—that is, the minute-hands will be set back to zero and then resume their travel. It is obvious that in such a case, the rack P not having fully dropped back to its normal position, the spring will only be wound the amount it has lost, so no overwinding can take place.

It is obvious that instead of a clock-spring a suitable weight may be used; also, instead of two hands and dials but one hand and dial may be used. It is evident, however, that in the latter arrangement it would have to face parallel to the track, or else it would be restricted to indicate only for trains going one way.

It will be seen that my clock mechanism differs from other clock mechanisms in that the time-indication is derived directly from the winding-shaft, so that the winding also carries the hands back to an initial position.

Furthermore, this action is entirely accomplished by the mechanical transmission of the initial impulse from the passage of the train.

5 I am aware that time-signals embodying the elements of my invention have been known to the state of the art heretofore, and the one described in Letters Patent No. 413,825, October 29, 1889, which has been granted to me heretofore, embodies a clock mechanism of similar
10 nature to the one I have herein described; but I have found by long practical experiments that the mechanical construction of the various details requires much inventive skill to make a device of this kind a practical success. Thus
15 I have found that only by positive mechanical transmission beginning at the rail and continuing throughout the entire mechanism to the index-hand is it possible to insure reliable indication; but the difficulty is to carry this
20 out so that it will make no difference whether the signal receives its positive impulse from a slow-going freight-train or from an express moving, perhaps, at a rate of sixty miles an
25 hour, the impulse from which is almost instantaneous and liable to destroy any mechanism devised for indicating time. I overcome this difficulty by making the connection between the shaft K of the clock mechanism and the minute-hands in such a manner that while this connection is absolutely positive when indicating
30 the time it is flexible when it transmits the direct impulse which sets the hands to zero. The various details of construction have also their peculiar advantages in this respect. Thus the
35 peculiar arrangement and combination of the cable, bell-crank, connecting-rods S, lever R, rack P, and gear-wheel O and shaft K preclude the presence of any lost motion when
40 the device is in its normal position, and it positively opposes the power or pressure of the spring to the impulse it will receive from the primary actuating device. This is supplemented by the action of the weight of some
45 of these parts, which all assist to prevent any destructive results from a violent pull transmitted by a fast-moving train.

The outdoor conditions under which the signal has to operate make it also imperative
50 to safely protect all the mechanism from climatic atmospheric influences, as well as against malicious tampering, and afford at the same time ready access to examine and adjust, if necessary, any part which need be.
55 This protection is afforded by my construction and ample provisions are made for readily adjusting any part without dismounting the signal. The connections between the primary device and the shaft K cannot be affected injuriously by any variations of temperature, and the sliding connection between the shafts J and J' takes up all expansion or contraction in the other parts liable to be affected.

65 What I claim as my invention is—

1. In a railway time-signal, the combination, with a primary actuating device oper-

ated by a passing train, of transmitting mechanism comprising a clock-work with dial indication and a positive mechanical connection
70 between the winding-shaft of said clock mechanism and the primary actuating device and between the said winding-shaft and the indicating-hand on the dial for winding the clock mechanism and setting the indicating-hand
75 by the direct transmission of the initial impulse from a passing train, substantially as described.

2. The combination, with the primary actuating device of a railway-signal, of indicating
80 clock mechanism having its winding-shaft connected to said primary device for winding it by a direct impulse therefrom and having a dial indication, the index-hand of which is moved in either direction by intermediate
85 connection with the winding-shaft, said intermediate connection being arranged to operate the hand positively by the movement of the clock mechanism and yieldingly in the opposite direction, substantially as described. 90

3. The combination, with the clock mechanism for operating the index-hand of the dial, of the gear-wheel O on the winding-shaft of said clock mechanism, the rack-bar P, secured in vertical guide-bearings, the lifting-
95 lever R, adapted to operate said rack-bar, the lifting-bar S, the bell-crank lever T, having one arm connected to said bar, and the cable C, connecting the other arm of said bell-crank with the primary device, substantially
100 as described.

4. The combination, with the clock mechanism for operating the index-hand of the dial, of the gear-wheel O on the winding-shaft of said clock mechanism, the rack-bar P, engaging
105 therewith, the vertical guide Q, in which said rack-bar is guided, the lifting-lever R, engaging into a vertical slot of the guide Q to operate said rack-bar, the vertical lifting-bar S, adapted to lift said lever, having the extensions S' adjustably supported thereon,
110 having one arm connected to said bar, the cable C, connecting the other arm of said bell-crank lever with the actuating primary device of the signal, and a device for adjusting the
115 length of said cable, substantially as described.

5. The combination, with the actuating clock mechanism of the signal, of the gear-wheel O, secured upon the winding-shaft of
120 said clock mechanism, the vertical rack-bar P, engaging with said gear-wheel, the vertically-adjustable post Q, provided with a vertical guide-groove in which said rack-bar is held, the lifting-lever R, guided in a vertical
125 slot Q² in the post, the adjustably-jointed lifting-bar S, actuating the lifting-lever, the bell-crank lever T, having one end connected to the connecting-bar, the wrist W, pivotally secured to the bell-crank lever, and the cable C
130 and screw-threaded coupling-link C', adjustably connecting said wrist with the primary actuating device of the signal, substantially as described.

6. In a railway time-signal, a clock mechanism adapted to operate the index-hand of a dial in either direction by the movement of the winding-shaft through a direct connection between the index-hand and said winding-shaft, said connection being adapted to rigidly connect the two in the movement of unwinding and yieldingly connect the two in the movement of winding, substantially as described.

7. In a railway time-signal, a clock mechanism adapted to operate the index-hand of a dial in either direction by the movement of the winding-shaft through intermediate gearing between the index-hand and said wind-

ing-shaft, said gearing having a flexible shaft connection consisting of the shaft-sections J' , J^2 , a lost-motion connection between the same, and a tension-spring J^3 , connecting the two shaft-sections to take up the lost motion between the same in one direction and form a limited flexible connection in the opposite direction of the movement of said shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE FONTAINE.

Witnesses:

M. B. O'DOHERTY,
N. M. HULBERT.