No. 624,385. Patented May 2, 1899.

H. G. SEDGWICK.

RAILWAY CHRONOGRAPH.

(Application filed May 17, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

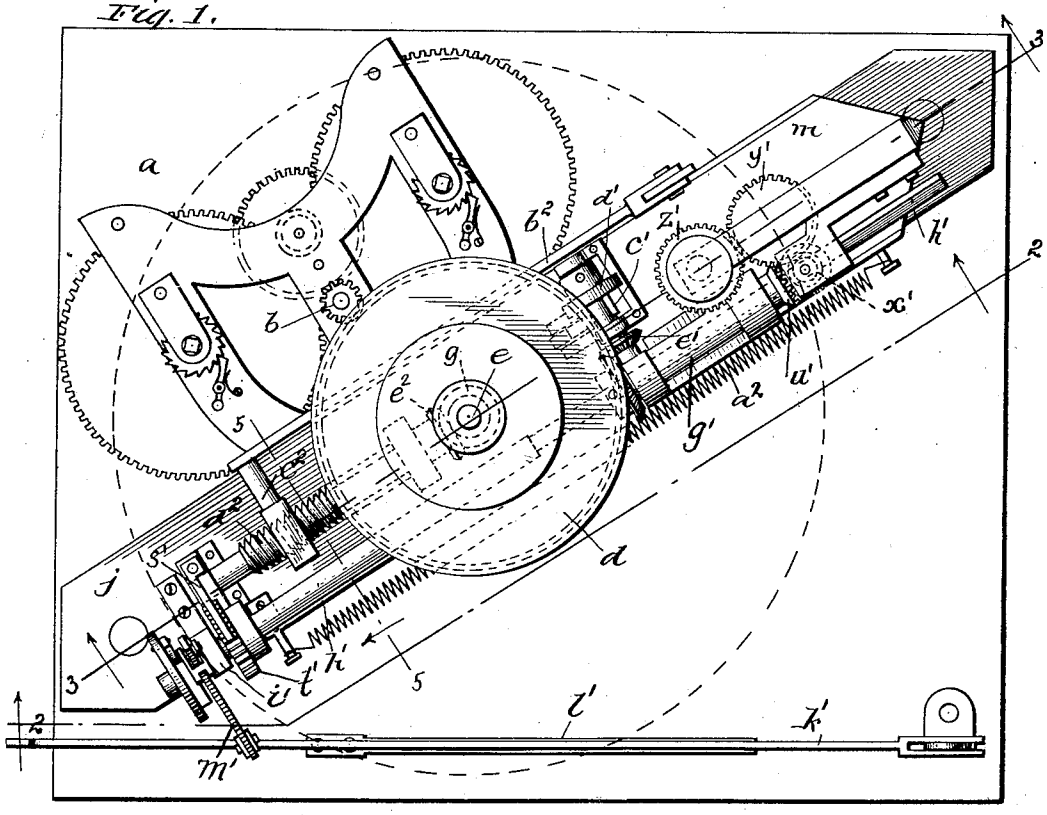
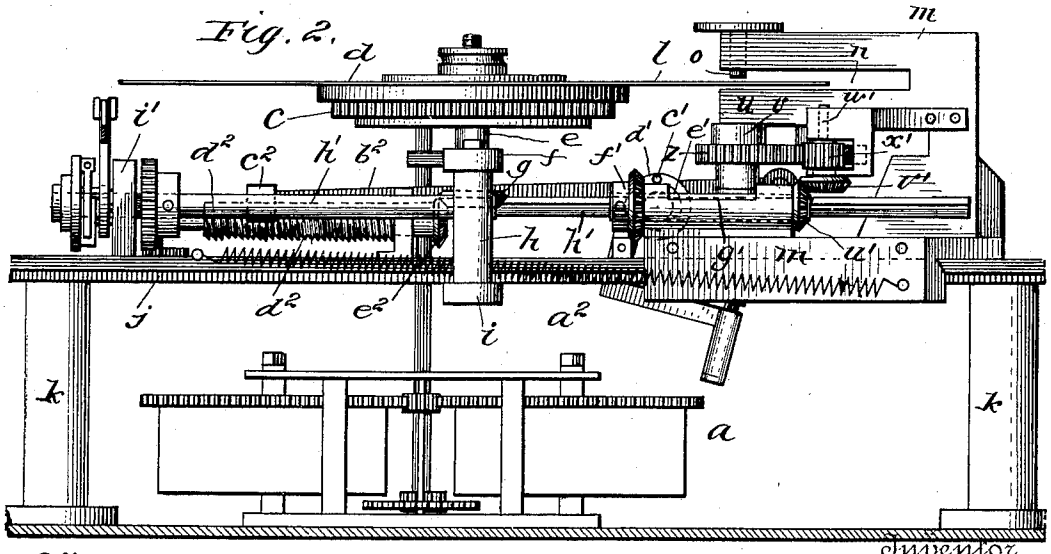


Fig. 2.



Witnesses

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Fig. 3.

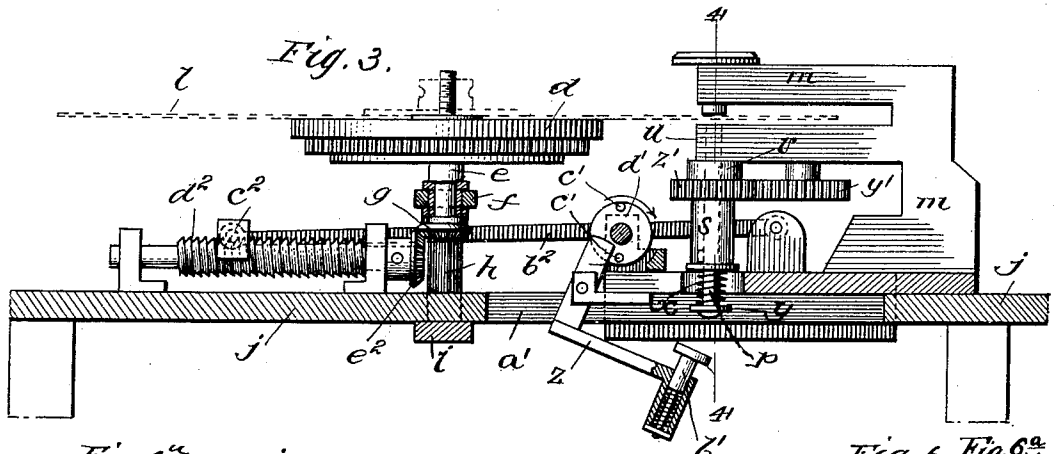


Fig. 4a.

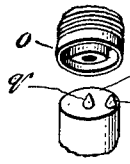


Fig. 4.

Fig. 6. Fig. 6a.

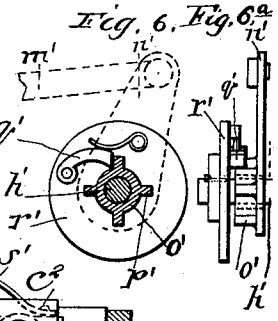


Fig. 5.

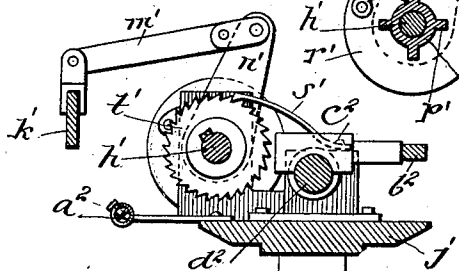


Fig. 7.

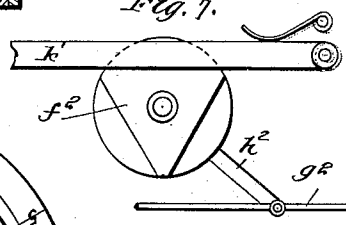


Fig. 9.

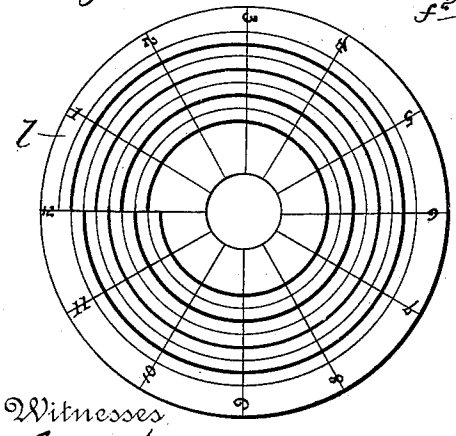
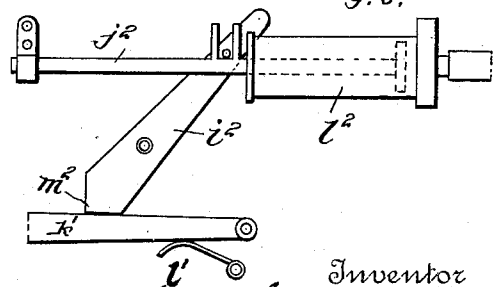


Fig. 8.



Witnesses

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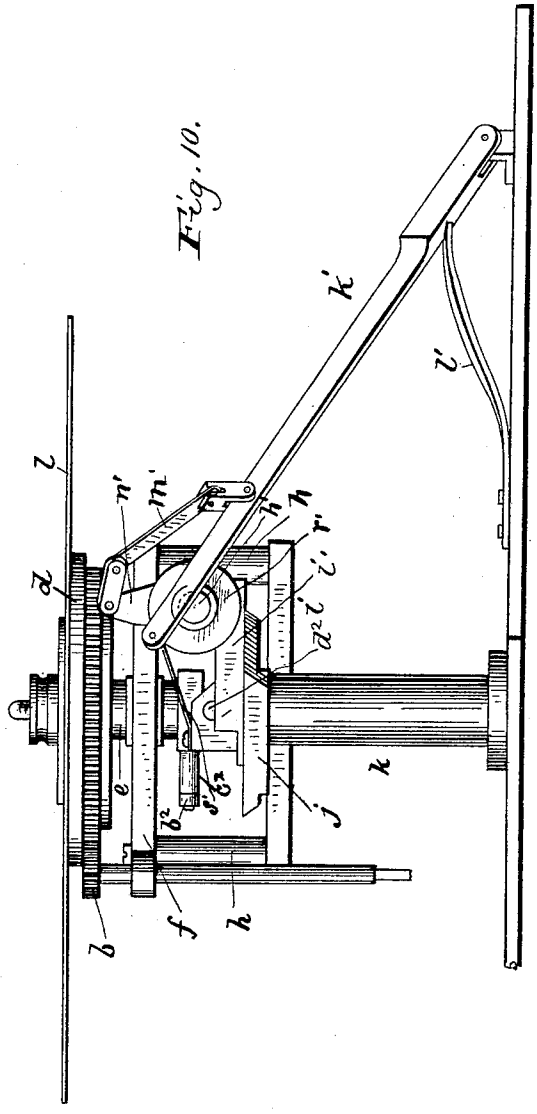
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(No Model.) 3 Sheets—Sheet 3.

Fig. 10.



Witnesses
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UNITED STATES PATENT OFFICE.

HIRAM G. SEDGWICK, OF DES MOINES, IOWA.

RAILWAY-CHRONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 624,385, dated May 2, 1899.

Application filed May 17, 1898. Serial No. 680,981. (No model.)

To all whom it may concern:

Be it known that I, HIRAM G. SEDGWICK, a citizen of the United States, and a resident of Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Railway-Chronographs, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a plan view of the preferred form of my apparatus; Fig. 2, a vertical section on the line 2 2 of Fig. 1; Fig. 3, a vertical section on the line 3 3 of Fig. 1; Fig. 4, a vertical section on the line 4 4 of Fig. 3; Fig. 4ª, a detail view of the punch and die; Fig. 5, a detail vertical section on the line 5 5 of Fig. 1; Fig. 6, a detail section, and Fig. 6ª a detail side elevation, showing the ratchet device for operating the punch feed-rod; Figs. 7 and 8, detail views showing modified forms of devices for operating the punch-actuating lever; Fig. 9, a detail of the record-sheet; Fig. 10, an end elevation of the apparatus, the clockwork being removed.

The object of this invention is to provide a simple apparatus for automatically recording the time of the movements of railway-switches, semaphores, drawbridges, &c., the record being kept upon a suitable detachable record-sheet and preferably covering several days, as more fully hereinafter set forth.

In the drawings, *a* designates a clock mechanism of the ordinary construction, which is fastened to a suitable base and has secured on the upper end of the vertical hour-shaft a pinion *b*, this pinion meshing with a gear *c*, carried by a horizontal disk *d*, whose vertical shaft *e* is journaled in a bearing supported by a transverse bar *f* and has a beveled gear *g* secured to its lower end. The bar *f* is supported at its ends by posts *h*, which are in turn supported upon the ends of a lower transverse bar *i*, this latter bar being fastened to a long bar or plate *j*, running diagonally of the base and supported above the same by posts *k*. The record-disk *l* is removably clamped by suitable means to the disk *d* and is divided off by suitable lines into a plurality of segments, preferably twelve, and these segments are divided by a spiral line running from near the center to or nearly to the edge, as shown in Fig. 9 and as more fully hereinafter described; but it is evident that the record-sheet may be divided up in any other suitable way.

A punch-carrying carriage *m* is mounted to slide upon bar *j* to and from the center of the record-disk, said carriage being bifurcated at *n* to embrace the disk and carry the punch devices to near the center thereof. The punch devices consist of a die *o*, supported directly over the time-sheet upon the upper member formed by the bifurcation *n* and being adjustable to and from the upper surface of the paper. The punch proper consists of a vertical rod *p*, supported upon the carriage *m* directly in line with die *o*, but below the paper, this rod preferably carrying a central punch-point *q*, adapted to enter a central depression in the die *o*, and an auxiliary punch *r*, adapted to enter a circular channel in said die *o*, this punch *r* being located to one side of the center of the rod, whereby when the punch-rod is rotated said auxiliary punch *r* will rotate about the central punch *q* and enter the channel in the die at different points. The punch-rod *p* has a limited vertical movement independently of the supporting-sleeve *s*, but is adapted to rotate therewith, said rod being provided with a lug or feather *t*, working in a suitable vertical slot or recess in said sleeve. The sleeve *s* is rotatively fastened to the lower side of arm *u* of the carriage by means of a plate *v*, attached to the under side of said arm *w*, the said plate being provided on its upper side with an annular groove for the reception of an annular flange *w* on the sleeve, whereby the sleeve is free to rotate, but is held against vertical movement. Punch-rod *p* is held normally down by a spring *x*, encircling it below the lower end of sleeve *s*, the rod being provided with a washer or shoulder *y* at its extreme lower end to receive the pressure of the spring. The punch-rod is forced upward into the paper by means of an angle-lever *z*, pivoted upon the inner end of the carriage and depending through a slot *a'* in bar *j*, into which slot the lower end of said rod *p* extends and works. Said lever *z* has its lower arm extending under the carriage and provided with a spring-actuated buffer *b'*, which abuts against the lower end of rod *p* when said lever *z* is operated, said buffer serving to cushion the impact and also

avoid the necessity of a fine adjustment of the parts. The upper end of lever z is operated by lateral pins c', carried by a disk d', fixed on a short transverse shaft journaled upon the inner end of the punch-carriage, one end of said short shaft carrying a bevel-gear e'. Meshing with wheel e' is another bevel-gear f', fastened to a sleeve-shaft g', journaled on the inner end of the carriage at right angles to the shaft-carrying wheel e' and parallel to the movement of the carriage.

Passing through sleeve g' is a shaft h', which at one end is free and at its other end is journaled in a standard i', secured to bar j, near one end thereof, upon the opposite side of the record-disk, said shaft being fastened to the sleeve by a spline and feather j', whereby the shaft may slide endwise through the sleeve, but is compelled to rotate therewith. Any suitable devices may be employed to rotate shaft h'; but I prefer the devices shown, which consist, mainly, of a lever k', pivoted upon the base and normally held up by a spring l' and connected at its free end by a suitable jointed link m' to the upper end of an arm n', journaled loosely on shaft h' and provided with a lateral boss o', through which said shaft passes and which is provided with a series of radial projections p', said projections being adapted to engage against the end of a spring-pawl pivoted on the adjacent face of a disk r', fastened to said shaft h', whereby the vibration of arm n' (by means of lever k' and link m') will intermittently rotate shaft h' through the medium of lugs p', pawl q', and disk r', said shaft h' being prevented from rotating in the reverse direction by means of a spring-pawl s', fastened to an adjacent part of the frame and engaging a ratchet-wheel t', carried by the shaft h'.

Fastened upon the sleeve g', at the end opposite bevel-wheel f', is another bevel-wheel u', which meshes with a bevel-wheel v', secured upon the lower end of a short vertical counter-shaft w', journaled on the carriage m, this counter-shaft carrying a pinion x', which meshes with a transmitting-gear y', also carried by the carriage, this gear y' in turn meshing with a gear z', fastened to sleeve s at a point just below part v. By means of this simple arrangement of gearing it will be observed that the punch-rod is rotated simultaneously with the rotation of shaft h'.

The carriage m is normally drawn toward the center of disk d by means of a contractile spring a^2, connecting the carriage to a stationary part of the frame. Its movement is regulated from the clock mechanism by any suitable mechanism, preferably by means of a link b^2, pivoted at one end to the carriage and carrying at its free end a worm-nut c^2, which rests in engagement with a worm-shaft d^2, journaled upon bar j upon the opposite side of the center of the disk and parallel with the line of movement of the carriage, said worm-shaft receiving its motion through a bevel-gear e^2, meshing with the before-described gear g, carried by the disk-shaft.

It will be observed that the record-sheet is rotated regularly by the clockwork and that the punch-carrying carriage is simultaneously therewith moved toward the center of the disk through the medium of the spring a^2, worm-shaft, and connecting devices. When it is desired to operate the punch, it is simply necessary to depress lever k' far enough to cause one of the pins c' to impinge against the upper end of lever z and force the buffer or hammer b' up against the punch-carrying rod, this rod being forced up until its punch-points puncture the record-paper. As soon as pin c' passes above the end of lever z the spring x will throw the punch-rod down quickly away from the paper and the parts will be in position for another operation. Simultaneously with the reciprocation of the punch-rod it will also be rotated by the gearing shown far enough to bring the auxiliary punch r to a new place on the paper, whereby the number of times the punch is operated will be registered upon the disk of paper, the punctures being made by the auxiliary punch being of course arranged in a circle around the central punch-rod, as described and claimed in my copending application, Serial No. 680,504, filed May 12, 1898. It will be observed that when the carriage reaches the limit of its inward travel it may be drawn outward again in position to start a new record by simply disengaging the half-nut c^2 from the worm. The record-disk may contain the record for any number of days and may be divided up by radial lines into any suitable number of divisions of time. In the drawings the disk is shown divided by radial lines into twelve segments, one segment for each hour, and the segments are divided by a spiral line, which indicates the line of travel of the punch over the surface of the disk, one complete spiral showing the movement for twelve hours. The record-disk shown in Fig. 9 is sufficient to receive the record of four days, and, as shown, the day-records are distinguished from the night-records by making the spirals indicating the latter records darker than those indicating the former.

This apparatus is especially designed to show the time of operating railway-switches, semaphores, drawbridges, railway-gates, railway-brakes, &c.; but it is obvious that it may be used for a great variety of other purposes. The lever k' is to be connected up in any suitable manner with a movable part of the switch or other apparatus, so that at each operation said lever k' will be depressed automatically. In some instances it is of advantage not only to know when the switch or other device is operated, but also the number of times it is operated at that particular instant of time, in which case the devices for rotating the punch, and thereby registering the number of times the same is operated, will be of value. As shown in Fig. 7, lever k' may be made to rest

upon a three-sided cam f^2, connected to a switch or other rod g^2 by means of an arm h^2, whereby at each complete rotation of the cam said lever k' will be operated three times whichever way the cam is rotated. This device may be employed in connection with a switch at the junction of the three sets of tracks and will show the various movements of the switch. The device shown in Fig. 8 may be employed where the recorder is used in connection with air or steam brakes, a suitable oscillating lever i^2 being operated by the movement of piston-rod j^2, projecting from the air or steam cylinder l^2 of the usual construction, said lever i^2 having one end formed angular, as at m^2, whereby at each oscillation of the lever the lever k' will receive a complete vibration, whereby a complete stroke of the brake-piston will show two supplemental punctures in the record-sheet. It will be observed that any other suitable arrangement of devices may be employed to adapt the apparatus to special uses, and it will also be observed that any devices other than the punchers shown may be employed to puncture or record upon the record-sheet the time of operating the punch-carrying rod.

It will be observed that an essential feature lies in the construction whereby the spring a^2 performs the work of moving the carriage toward the center of the record-disk and the clock mechanism simply the work of retarding or controlling (through the medium of the worm, the half-nut c^2, and link b^2) the movement of the carriage against the spring, whereby the work of moving the carriage is thrown entirely on the spring and the clock mechanism is caused to run with more accuracy.

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

1. In the recording device, the combination of a record-sheet holder and clock mechanism for rotating it, a carriage carrying the recording device, a spring for normally moving said carriage across the face of the record-sheet, means whereby the normal movement of the carriage is retarded and regulated from the clock mechanism, whereby the spring performs the function of moving the carriage and the clock mechanism is relieved of that work, said means consisting essentially of a worm-shaft receiving motion from the clock mechanism, a traveling nut engaging said worm and being disengageable therefrom, and a part connecting said nut to the carriage, as and for the purpose set forth.

2. In a recording instrument, means for holding, and clock mechanism for rotating, a record-disk, a carriage carrying a recording device, means for moving said carriage radially with respect to the recording-disk and simultaneously with the rotation thereof, said means consisting essentially of a spring adapted to normally draw the carriage toward the center of the disk and devices adapted to retard and control the normal movement of said carriage against the action of its actuating-spring, whereby the clock mechanism is relieved of the work of moving the carriage.

3. In a recording device, the combination of a record-sheet holder and clock mechanism for rotating the same, a carriage carrying the recording device, a spring for normally moving said carriage across the face of the record-sheet, means whereby the normal movement of the carriage is retarded and regulated from the clock mechanism, whereby the spring performs the function of moving the carriage and the clock mechanism is relieved of that duty.

4. In a time-recorder, the combination of a base, a record-disk holder and clock mechanism for rotating it, a carriage carrying a record-punch, means for moving said carriage radially with respect to the disk, said means being controlled from the clock mechanism and consisting essentially of a worm journaled upon the base substantially parallel to the line of movement of the carriage, means for operating said worm from the clock mechanism, a half-nut resting upon said worm, and a swinging rod connecting said half-nut to the carriage.

5. The combination of a base, a record-disk holder and mechanism for rotating the same, a carriage and means for moving the same radially with respect to the disk, a reciprocating punch carried by the carriage below the record-disk, a die supported above the disk, an angle-lever carried by the carriage and adapted to engage the punch, a rotating part supported upon the carriage and adapted to operate said lever, a sleeve journaled upon the carriage approximately parallel with its line of movement and carrying a bevel-gear engaging said rotatable part, a shaft h' journaled upon the base and passing through said sleeve and adapted to rotate with it and move endwise independently of it, and devices for rotating said shaft h' at intervals, substantially as described.

6. In a time-recorder, the combination of a base, a record-disk holder and clock mechanism rotating it, a carriage carrying a record punch-rod, said punch-rod consisting of a reciprocating rotary rod carrying a main punch and an auxiliary punch, means supported on the carriage for rotating and reciprocating said punch-rod, a shaft supported on the base and engaging said devices upon the carriage and adapted to operate them, and means for rotating said shaft.

Signed by me, at Washington, District of Columbia, this 27th day of April, 1898.

HIRAM G. SEDGWICK.

Witnesses:
C. D. DAVIS,
WM. R. DAVIS.