No. 607,200. Patented July 12, 1898.

W. A. TURNER.

STATION INDICATOR.

(Application filed Oct. 7, 1890. Renewed Dec. 13, 1897.)

(No Model.) 3 Sheets—Sheet 1.

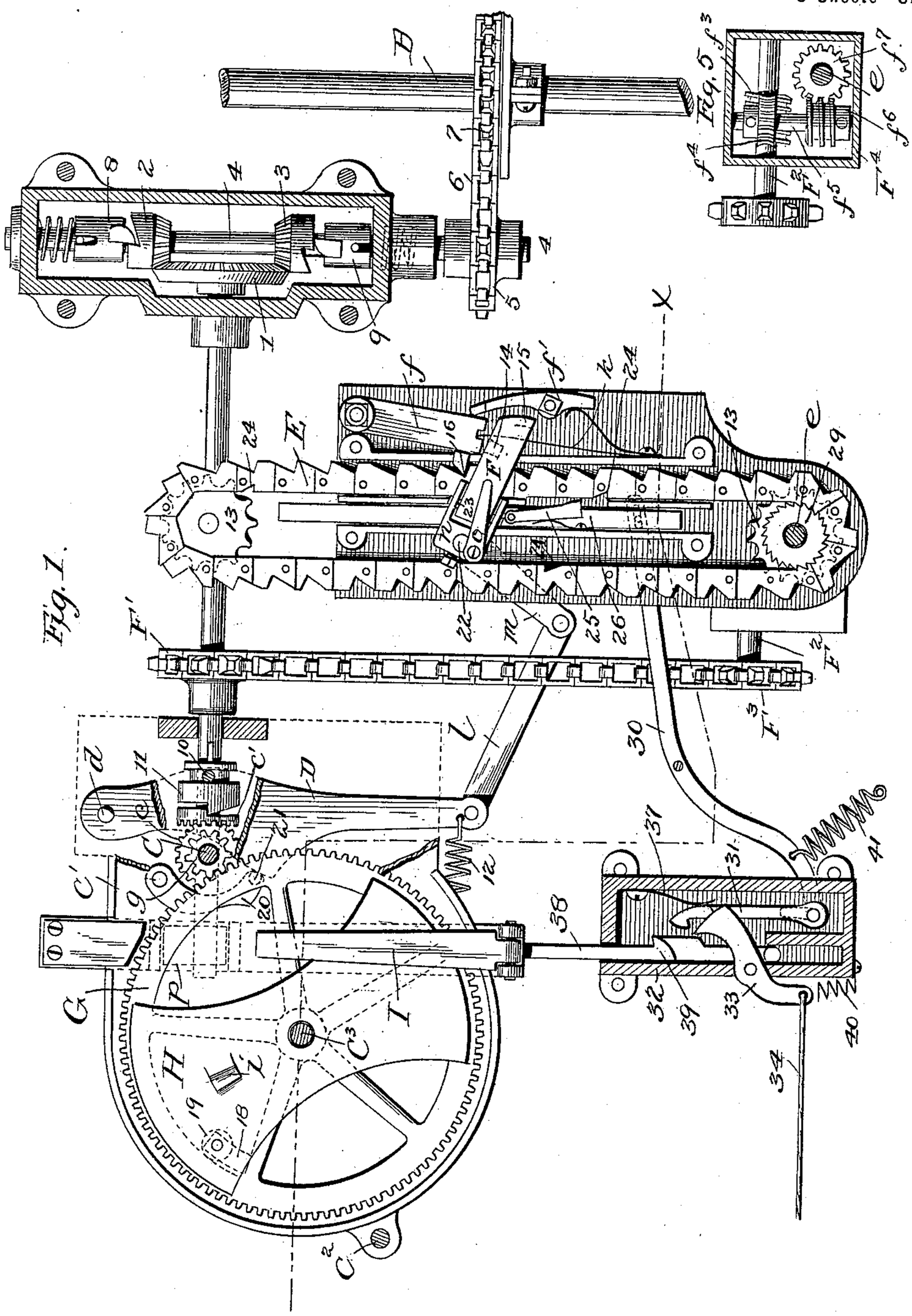

Fig. 1.

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Fig. 2

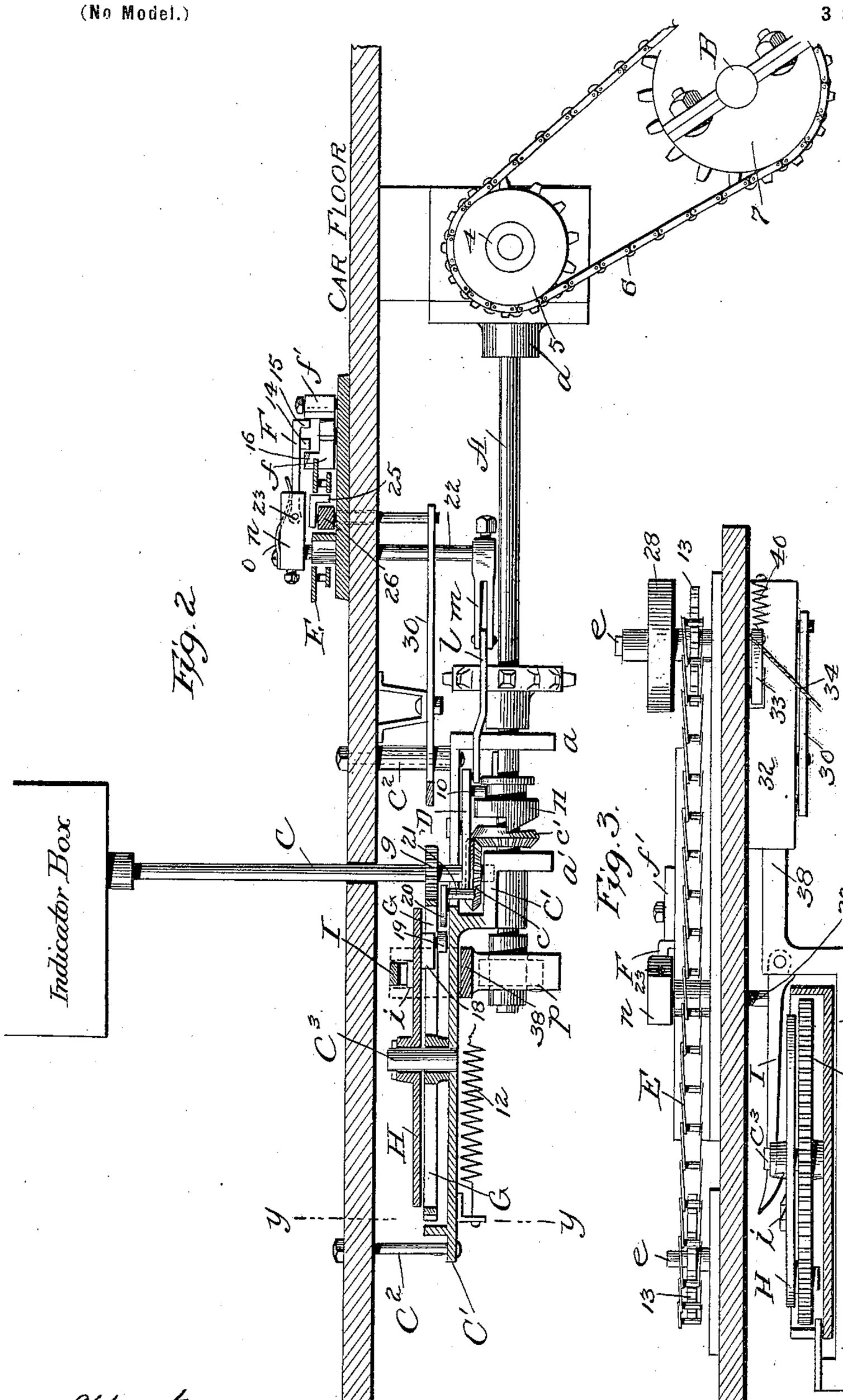

Fig. 3.

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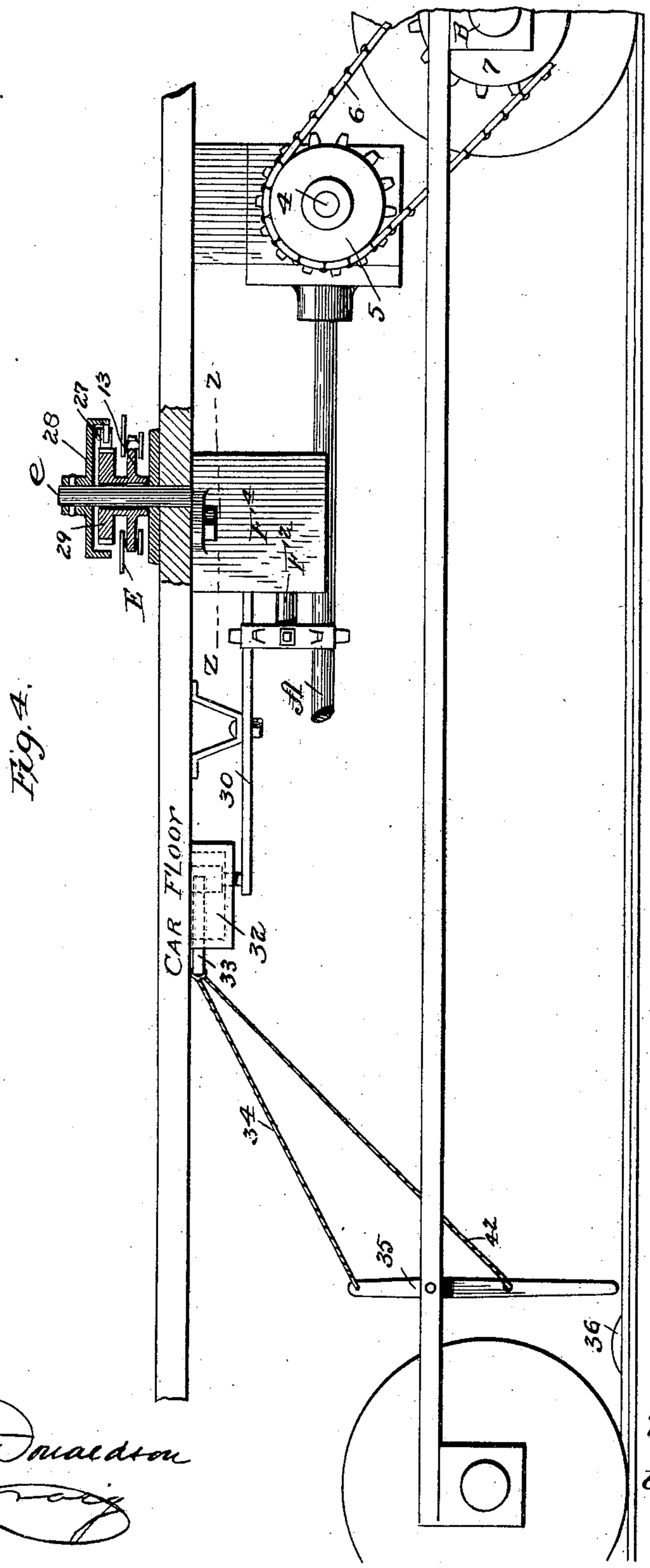

Fig. 4.

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UNITED STATES PATENT OFFICE.

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STATION-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 607,200, dated July 12, 1898.

Application filed October 7, 1890. Renewed December 13, 1897. Serial No. 661,756. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. TURNER, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in the Art of Actuating Street or Station Indicators; and I do hereby declare that the following is a full, clear, and exact description of the said invention.

This invention relates to street and station indicators of the continuously-operating type—that is, to that class of indicators in which the primary operating mechanism derives a continuous movement from the motion of the car without external operating means, such as tripping-blocks or obstructions near the track. This primary continuously-moving mechanism is automatically and at proper times connected to and released from the station-indicator proper, an indication being made at each connection and the indicator proper remaining stationary when disconnected. My invention includes special means for controlling the connection, so that it shall be made at proper times, and also correcting devices for moving said special means independently of their normal motion for correcting errors in their position.

Other features forming parts of my invention and not specifically set forth here are fully hereinafter described and claimed and are shown in the accompanying drawings, in which—

Figure 1 is a plan view of the whole continuously-moving mechanism, the connections between it and the indicator, the devices for controlling said connections, and the regulator for correcting errors. Fig. 2 is a longitudinal section on the line *x x* of Fig. 1. Fig. 3 is a transverse section on line *y y*, Fig. 2. Fig. 4 is a side elevation to show the connections for the regulator with parts in section. Fig. 5 is a section on line *z z*, Fig. 4.

Fig. 2 represents the arrangement of the apparatus relatively to the floor of the car and to an indicator-box of any desired construction within the car above said floor.

A represents what I shall term the "driving-shaft," journaled in bearings *a a'* and deriving continuous motion from the car-axle B.

The car illustrated in the drawings is supposed to be of the double-ended kind, in which the horses or cable-dummy are attached alternately to opposite ends at the termini of the route. I have therefore provided connections between the driving-shaft and the axle which cause the shaft to rotate always in the same direction, no matter what the direction of the axle's rotation may be. These connections are illustrated in Fig. 1, in which 1 is a bevel gear-wheel keyed upon the end of the shaft A and engaging with two loose beveled pinions 2 3 upon a counter-shaft 4, the latter deriving continuous motion from the axle B by sprocket-wheels 5 7 and sprocket-chain 6. Upon the shaft 4 and guided by a pin and slot, as shown, are two spring-pressed clutches 8 9, which engage alternately with recesses in the pinions 2 and 3, and thus, as will be readily understood, transmit an invariable direction of rotation to the driving-shaft A without regard to that of the axle and counter-shaft 4. It should be noted, however, that where turn-tables are used at termini the mechanism just described may be dispensed with and the motion of the axle communicated directly from the axle and counter-shaft to the driving-shaft A by any desired form of simple gearing.

The vertical indicator-shaft C, Fig. 2, is journaled in a bed-plate C', suspended by hangers C^2 from the car-floor. It passes up through the floor to the box containing the indicator, which it operates intermittently and at proper times by mechanism now to be described, and this mechanism consists, first, of an automatically-operated clutch device for throwing the indicator-shaft into gear with the driving-shaft A, and, secondly, of a controlling device for causing this clutch to operate at proper intervals for making indications and to be released as soon as the indication has been made, and these intervals depend upon the distance between streets, stations, or other points to be indicated at the box.

The driving-shaft A is thrown into gear with the indicator-shaft by a sliding clutch 11, feathered upon the driving-shaft, Fig. 2, and having a groove in which fits a pin 10, secured to a lever D, pivoted at *d* to the bed-

plate C′. The sliding clutch when moved so as to engage with a shoulder on the loose pinion c' will transmit motion to the pinion c, keyed on the indicator-shaft, and will thus operate the indicator as long as the parts named are in engagement.

Assuming now that the parts are in the position shown in Fig. 1—that is, in connection to operate the indicator-shaft—I shall first describe how this connection is controlled, so as to be made at the proper time, and afterward how the parts are released during the time in which the car is traveling between indicating-points.

The controlling device is a chain E, having links notched at intervals to correspond with the distances between indicating-points on the route, and this chain, which has a continuous motion, operates in connection with a detent f, which alternately holds and releases the lever D through intermediate connections to be hereinafter described.

The chain E, which moves transversely on a guide-plate and preferably above the car-floor, Figs. 2, 3, and 4, is carried by sprocket-wheels 13 13, mounted loosely upon vertical shafts e. One of the loose sprockets is geared to its shaft e (see Fig. 4) by a rotary disk 28, fixed on said shaft and carrying a pawl 27, which engages with a loose ratchet-wheel 29, secured to and above the sprocket-wheel. The purpose of this manner of driving the sprockets will be hereinafter set forth in connection with the description of the corrector.

The chain derives its continuous motion from the driving-shaft A through a transverse sprocket-chain F′ F³, Fig. 1, connecting a sprocket-wheel on said shaft A with another on a shaft F², journaled in a box F⁴, secured below and to the floor, Fig. 4.

In order to gear down the chain to the extremely-slow motion required, retarding gearing (shown in Fig. 5) is placed in the box F⁴. The shaft F² has a worm f^3 engaging with a pinion f^4 on a horizontal pin f^5, journaled in the box, and this pin f^5 carries another worm f^6, which meshes with a pinion f^7 on the vertical shaft e of the sprocket-wheel 13. This produces a slow movement of the chain, which makes a complete revolution only once during a trip.

The notched links of the chain during its revolution bear successively upon a projecting dog 16 on the detent f, the latter being pressed constantly toward the chain by a spring k, so that the dog will fall successively into the notches, and when engaged with one of such notches, Fig. 1, a spring 12 pulls the lever D, and thus throws the clutch 11 into engagement, as before described. While the detent is being thrown out by the inclined face of the notch, the clutch is automatically disconnected from the indicator-shaft and held so until the dog 16 falls into the next notch. The means for thus disconnecting the clutch will be described hereinafter; but it is necessary first to explain the means by which it is prevented from reëngaging with the indicator-shaft until the proper time.

It will be remembered that the clutch is controlled by the pivoted lever D, Fig. 1. To the free end of this lever is pivoted an arm l, which is in turn jointed to one end of an arm m, the other end of which is connected to a vertical rod 22, passing up through the car-floor, Fig. 2, and having secured to its top the recessed box n, upon a pin 23 of which is pivoted the latch F. When the lever D is thrown out to disengage the clutch, the connections just described will cause rod 22 to turn and will throw the end of the pivoted latch, pressed down by spring o, over toward the detent f. An inclined projection 14 on the lower side of the latch will be caught by the dog 16, and the latch will thus be held while the dog is rising up the incline and until it drops into the next notch, when the latch is released and the spring 12 pulls the lever D and its connections into the position of Fig. 1 and the clutch into engagement with the indicator-shaft. As, however, the dog 16 may not have risen far enough on the incline to catch the projection 14, I provide a supplementary spring-detent f', the end of which bears against the edge of detent f. If the projection 14 does not catch dog 16, a second projection 15 on the latch will be caught by the end of detent f' and the latch thus be held while the detent f is moving outward. The detent f forces detent f' back, releasing projection 15, but compelling projection 14 to be caught and held by dog 16 until the latter falls into the next notch.

In describing the means for controlling and insuring the connection at proper times between the continuously-moving driving mechanism and the indicator-shaft I have assumed that the said connection would be broken while the indicator-shaft is inactive. I now describe the means for automatically accomplishing this disconnection.

On the indicator-shaft C and above its driving-pinion c is keyed a pinion g, which meshes with a large skeleton pinion G, journaled on a pin C³ on the supporting-plate C′ below the floor of the car and having teeth in about the proportion of ten to one on the pinion g. Above the pinion G on the pin C³ is a loosely-pivoted plate H of about the same length as the diameter of the pinion and carrying on its lower surface a projection 18 and roller 19. This projection is struck by one of the spokes of pinion G when the indicator-shaft begins to move and is carried around until the roller 19 strikes a pivoted arm 20, Fig. 1, and forces a stud 21 on the latter against the lever D, which is thus thrown out against the tension of its spring 12. This results in disengaging the clutch 11 and also in locking the latch F to the detent f, as before explained. Now as the intermittently-moving part of the apparatus stops as soon as the clutch is disengaged and as the roller 19 is pressed up against the arm 20 and lever

D at the moment of stopping it is necessary to carry the plate H and its roller a little farther in order to permit the lever D to spring back at the proper time. This is done by the slide 38, working in a guide-box 32, Fig. 3, and operated by an eccentric *p* at the end of driving-shaft A, (dotted lines in Fig. 1,) from which, of course, it derives a continuous reciprocating motion. Pivoted to the slide is a hooked arm I, which travels back and forth above the plate H until the latter has been carried around into position to throw out the lever D and stop. At this time the hook I catches over a tooth *i* on the plate and draws said plate forward until its roller has passed the end of the arm 20 and it is in position to be struck by a spoke of wheel G when the next indication is made.

I have up to this point described a station-indicator of the continuous type, with means for controlling the indications and for causing them to be displayed intermittently at proper points on a route. Under the most favorable conditions the apparatus will indicate with approximate accuracy; but as in practical railroading these ideal conditions cannot exist the apparatus is subject to disadvantages common to all indicating apparatus of the continuous class. If from any cause the continuous mechanism fails to act—for instance, through the wheels slipping on the track when the brakes are used—the car goes ahead, while the wheels and indicator stop. Repetitions of this may accumulate sufficient loss on a single trip to destroy the practical accuracy of the apparatus. Such a loss in the present case would be expressed by a falling behind of the chain E, so that on the arrival of the car at a street or station the proper notch in the chain will not have advanced far enough to permit the detent *f* to drop into it.

The point where the indication should be made being known and the proper position of the chain being thus established I provide a correcting device which at a certain time or times during the trip will be positively moved, and should the chain have fallen behind the correcting device will seize it and pull it up to the proper point. Should the chain have reached its correct position, the corrector will act, but without affecting the chain. The correcting devices are illustrated in Figs. 1, 2, and 4 of the drawings. In proximity to the inner edge of the chain E is a sliding bar 26, which carries a pivoted spring-latch 25, pressed constantly toward the chain, Fig. 1. A pin passes down through the floor and connects the bar 26 with the slotted end of a pivoted lever 30, Fig. 2, the other end of which extends into the box 32, where it is connected to the slotted end of a hook 31, pressed by a spring 37 toward the slide 38, previously described. Normally, however, the hook 31 is held back by a pivoted dog 33, Fig. 1. A cord 34 connects the dog to a swinging lever 35, which is pivoted to some fixed part of the car-truck or running-gear and extends down so that its face end is in close proximity to the track.

At points on the line where it is desired to correct I place obstructions 36 near the track, which will be struck by the lever 35. This draws on the cord 34 and causes the dog 33 to release the hook 31, which is then thrown over toward the continuously-reciprocating slide 38. A shoulder 39 on the slide catches the hook 31 and through the lever 30 pulls the slide 26 and its latch 25 forward. If chain E has fallen behind, the latch will catch in a correcting-notch 24 on the chain and will pull the chain forward to its proper position, the throw of the slide 38 and hook 31 being such as to produce the exact amount of motion required. This independent movement of the chain is permitted by having the sprockets 13 loose on their shafts *e*, as before described. A spring 40 throws the dog 33 back in position to release and hold the hook 31, Fig. 1, and another spring 41 returns lever 30 to its normal position. While the corrector will thus be caused to act at all the points provided for it, it is evident that if the chain has not fallen behind the throw of the correcting-latch will not affect it. I have shown in Fig. 1 three correcting-notches in the chain, which would require the same number of tripping-blocks on the route; but as the frequency of corrections depends upon such conditions as the length and character of the route traversed experiment will be required to show the average and maximum loss to be expected, and the tripping-blocks will be so arranged as to meet the conditions thus imposed. In practical use on a route of five miles of cable-road with heavy grades and frequent use of the brakes I have found two corrections sufficient.

It is evident that the correcting device may be non-automatic, if desired, in which case the tripping-blocks and lever would be dispensed with and the cord 34 carried within reach of the conductor, who at the proper times would operate it by hand. It will also be understood that with double-ended cars, such as illustrated, a second connecting-cord 42, Fig. 4, should extend from the dog 33 to a point on lever 35 below its pivot, so as to pull the dog on the return trip.

What I claim is—

1. In a station-indicating apparatus of the continuous type, the combination of a continuously-moving driving-shaft, an indicator-shaft, a clutch for intermittently connecting said shafts, a mechanism for controlling said clutch and causing its connection with the indicator-shaft at proper times, and a corrector for moving said controlling device independently of its normal motion, to correct errors in its position, substantially as described and shown.

2. In a station-indicating apparatus, the combination with the continuously-moving driving-shaft, of a chain geared thereto, a re-

ciprocating slide operated by said shaft, a sliding corrector in proximity to the chain, connections from said corrector to the reciprocating slide, held normally out of engagement therewith, and a releasing-cord for permitting said connections to engage with said slide whereby the corrector is operated, substantially as and for the purposes set forth.

3. In a station-indicating apparatus the combination of a driving mechanism operated continuously by the motion of the car; an indicating apparatus operated intermittently by said driving mechanism; a continuously-moving endless controller for controlling the engagement of the said driving mechanism and indicating apparatus at proper times; and connections operated intermittently by the indicating mechanism for disengaging said driving mechanism from the indicator apparatus, substantially as described.

4. In a station-indicating apparatus the combination of a driving mechanism operated continuously by the motion of the car; an indicating apparatus operated intermittently by said driving mechanism; a continuously-moving endless controller for controlling the engagement of the said driving mechanism and indicating apparatus at proper times; connections operated intermittently by the indicating mechanism for disengaging said driving mechanism from the indicating apparatus, and a corrector for moving said controlling mechanism independently of its normal motion, to correct errors in its position, substantially as described.

5. In station-indicating apparatus the combination of a continuously-operated driving-shaft; an indicator-shaft; a sliding clutch for connecting and disconnecting said shafts; a lever connected to said clutch; connections operated by the intermittent motion of the indicator-shaft for positively moving said lever to disengage the clutch; a continuously-moving notched chain; and connections between said chain and lever for alternately holding the clutch out of engagement and permitting its engagement with the indicator-shaft at proper times, substantially as described.

6. In station-indicating apparatus of the continuous type, the combination of a continuously-operated driving mechanism, an indicator-shaft operated intermittently thereby through a sliding clutch, and means for disengaging said clutch automatically after each indication, consisting of a lever connected to said clutch, a wheel geared to the indicator-shaft, and a device operated by the rotation of said wheel for moving said lever and disengaging said clutch, substantially as set forth.

7. In station-indicating apparatus of the continuous type, the combination of a continuously-operated driving mechanism, an indicator-shaft operated intermittently thereby through a sliding clutch, and means for disengaging said clutch automatically after each indication, consisting of a lever connected to said clutch, a wheel geared to the indicator-shaft, and a rotary plate operated by said wheel for moving said lever and clutch, substantially as described and shown.

8. In a station-indicator and in combination, a continuously-operating driving-shaft, and intermittingly-operated indicator-shaft, a clutch for engaging and disengaging said shafts, a gear-wheel G geared to said indicator-shaft, a pivoted plate H, operated by said gear-wheel, and a slide 38 connected to said driving-shaft and adapted to move said pivoted plate when said clutch is disengaged substantially as described.

In testimony whereof I have hereunto affixed my signature, the 25th day of September, 1890, in presence of two witnesses.

WILLIAM A. TURNER.

Witnesses:
L. W. SEELY,
GEO. T. KNOX.