

Jan. 26, 1937.

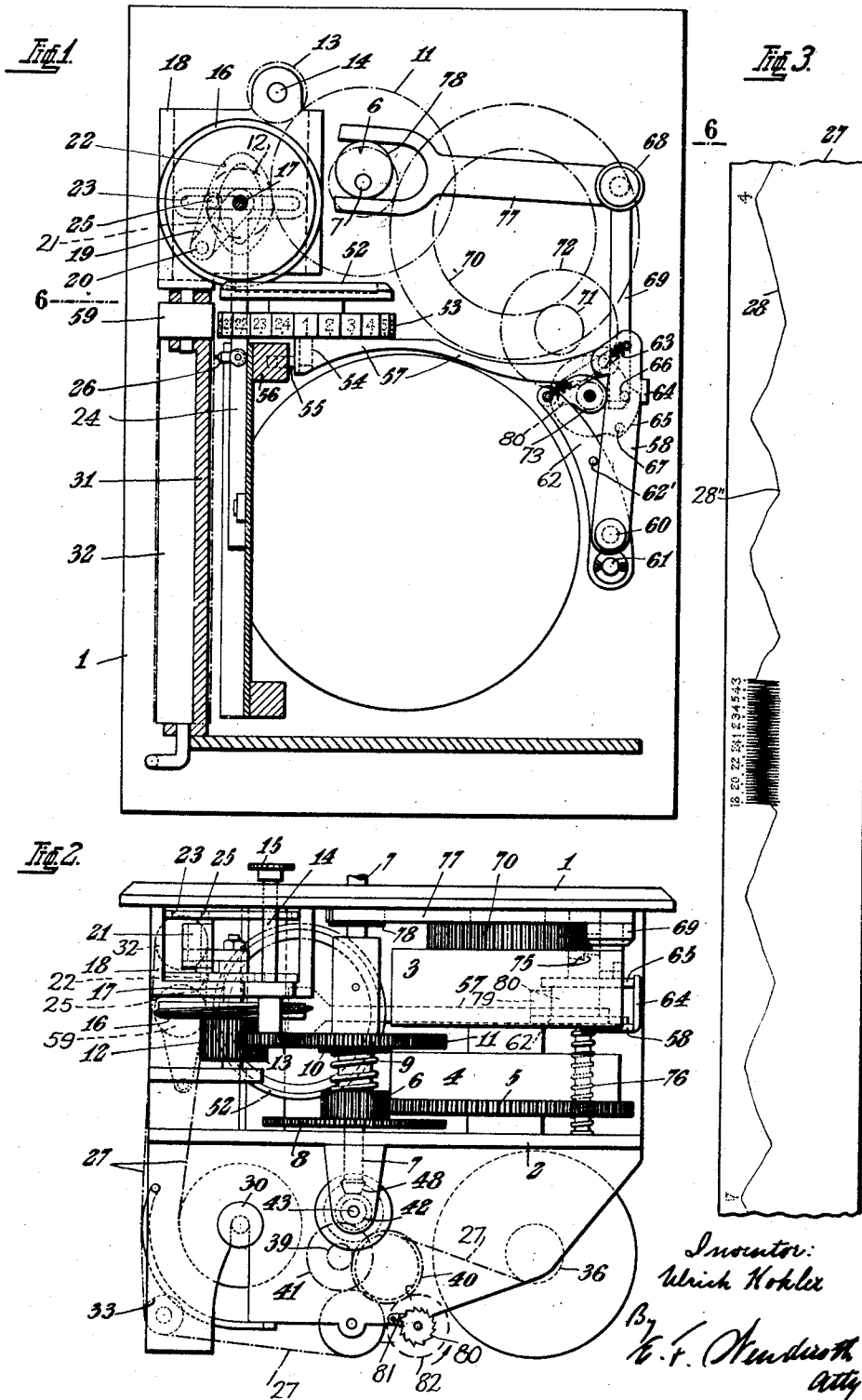
U. KOHLER

2,069,152

RECORDING TACHOMETER

Filed Jan. 31, 1933

2 Sheets-Sheet 1



Jan. 26, 1937.

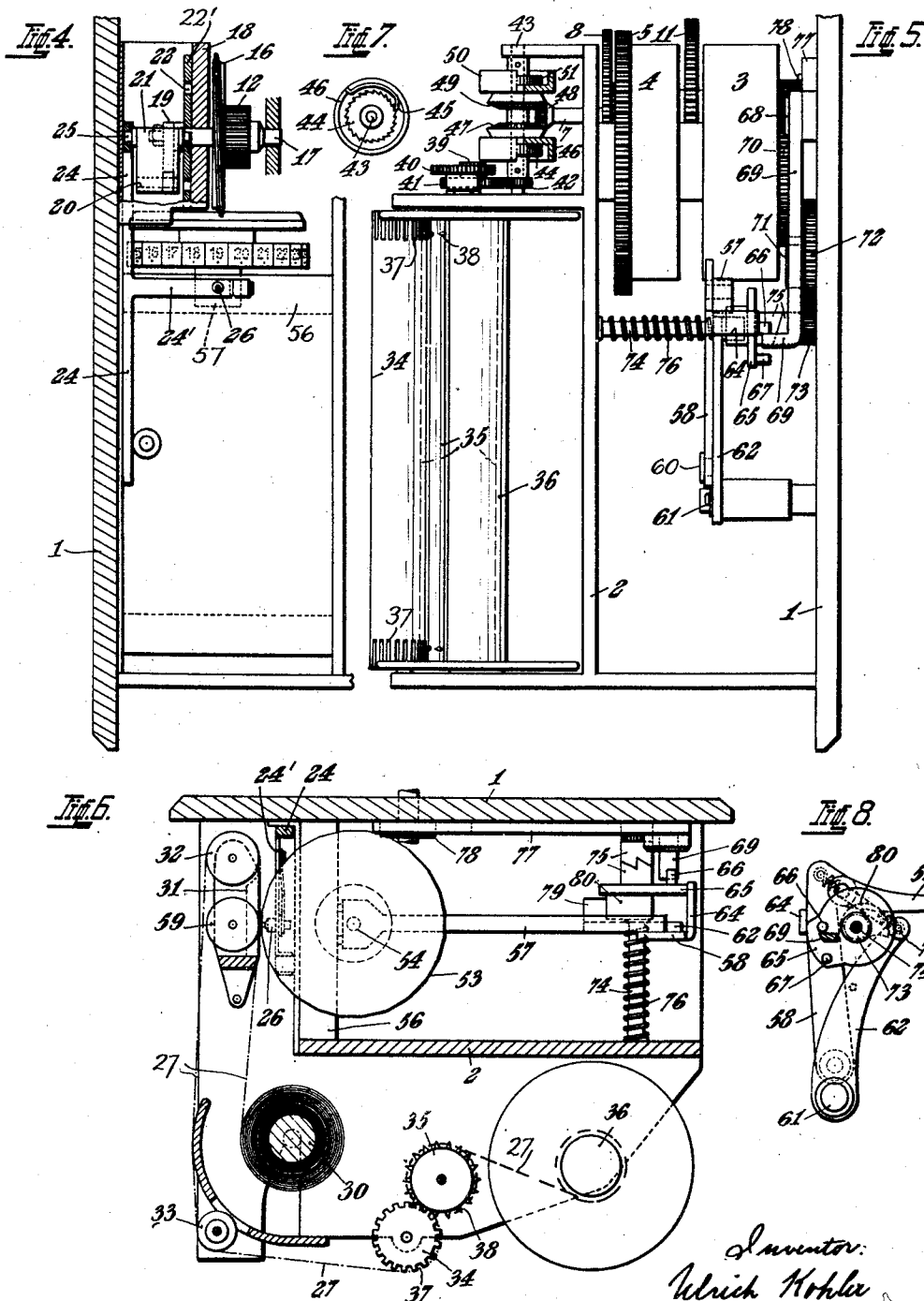
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2 Sheets-Sheet 2



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RECORDING TACHOMETER

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8 Claims. (Cl. 234—30)

This invention relates to recording tachometers of the type wherein the record paper strip is fed according to distance traversed while the vehicle carrying it is moving, and according to time, by clockwork, while the vehicle is stationary, and wherein a stylus for recording the time is moved across the strip at regular time intervals.

Heretofore for recording the hours of the day, either a separate stylus was brought into operation at predetermined points on the strip, or else a time-recording stylus was reciprocated in rapid succession a number of times which corresponded to the hour of the day. In both cases, however, it was difficult to read the time of day from the strip.

The present invention has for one of its objects the provision of an improved construction of tachometer of the described kind in which this difficulty is avoided, and in which the time of day can be readily read from the record strip.

According to the invention, a recording tachometer is provided of the kind described, wherein the stylus is reciprocated several times within the given time unit of say one hour, and the points of the time record which are coincident with the hours are indicated by a type wheel or disc that records the hour numerically, so that they can be read without difficulty.

Conveniently, the types of the wheel are formed by points which perforate the strip for recording the hours.

According to a feature of the invention, the type wheel is rotated by the clockwork by means of a worm and a crown wheel fixed to the type wheel, and for recording the hours on the strip, the type wheel is moved forwards and backwards in quick succession at right-angles to the strip, by a striking mechanism controlled by the clockwork.

In a preferred construction, an eccentric forming part of the clockwork controls the locking lever of an escapement the detent of which can rotate approximately one revolution, and at the same time serves as the control member of a lever which effects the to-and-fro movement of the type wheel by means of a connecting rod.

Conveniently, the escapement mechanism constitutes the locking device of the spring-barrel axle of the clockwork, for which purpose a one-way clutch is interposed between the said axle and the detent.

According to another feature of the invention, the lever controlled by the detent of the escapement mechanism is connected by a spring with

a second lever which is so influenced by a cam rotating with the detent that the spring is subjected to an increased tension for feeding the type wheel against the strip.

One embodiment of the invention is diagrammatically illustrated by way of example in the accompanying drawings, wherein:—

Figure 1 is a sectional side elevation of one form of tachometer according to the invention,

Figure 2 is a plan view thereof,

Figure 3 is a diagram,

Fig. 4 is in part a section in the vertical longitudinal plane of axis 17, and in part an elevation viewed from the left of Fig. 1, parts 27 and 31—38 being omitted for the sake of clarity,

Fig. 5 is an elevation taken from the right side of Fig. 1; and

Fig. 6 is a section on line 6—6 of Fig. 1, the spring cases 3 and 4 being omitted, and

Figures 7 and 8 are detail views described hereinafter.

Like reference characters designate like parts in all the views.

Referring to the drawings, between the front plate 1 and the vertical partition wall or plate 2 two spring barrels 3 and 4 (Figs. 2 and 5) are arranged on an axle common to both of them. The springs therein work together, i. e. they are coupled in known manner so that both can be wound up simultaneously and both will run down together. The double spiral spring housing is employed in order to provide a sufficiently long operation of the drive mechanism. The spiral spring enclosed by the barrel 3 (Fig. 2) acts at its inner end on the spring barrel shaft, which carries along or drives the wheel 10, through which the drive for the reciprocal movement of the marking wheel 53 is actuated. The toothed rim 5 of the barrel 4 meshes with a pinion 6 which is free to rotate on an axle 7 which rotates once in an hour and which hereinafter is called an hour axle, and which pinion fixedly carries a spur gear 8 which cooperates with the escapement, not shown, of the clockwork. The pinion 6 drives a spur gear 11 fast on the hour axle 7, by means of a coil spring 9 and a friction disc 10, the said gear wheel 11 meshing with two pinions 12 and 13. The paper advance roll 35 is driven from the shaft (not shown) of the speedometer by means of the ratchet wheel 80, which may be fast on the said shaft, in which wheel 80 a pawl engages resiliently, said pawl being mounted on gear 82, loose on the same shaft as wheel 80, which gear drives the gear 40 of the advance roller 35 in one direction only. The shaft of the ratchet wheel 55

80 is driven from the shaft of the speedometer in suitable manner and when the wheel 80 is being rotated, it will drive the paper feed roller 35 through the intermediary of the pawl 81 and gear 82. However, when the speedometer shaft is at rest and the roller 35 derives its motion from the shaft 7, the said roller, travelling in but one direction, carries with it the loose gear 82 and the pawl 81, so that the latter passes idly over the teeth of the ratchet wheel 80. The shaft 14 of the pinion 13 carries in front of the plate 1 a knob 15 for setting the clockwork. The ratio of the number of teeth of the pinions 11 and 12 is 3:1 so that during each revolution of the hour axle 7, i. e. every hour, the pinion 12 and a worm 16 fast with it make three revolutions.

Drive of the stylus

Within a casing 18 attached to the front plate 1 a shaft 17 carries a crank arm 19 whose pin 20 engages one end of a link 21. The other end of this link 21 carries a pin 25, one end of which is guided in a stationary cam groove 22 and the other end is movable in a horizontal slot 23 of a vertically movable rod 24 which carries a recording or marking member 26 (Fig. 4), hereinafter referred to as a stylus. Figs. 1 and 2 show that one end of pin 25 engages in the ellipsoidal groove 22 of the vertical plate 22', while the other end engages in the horizontal slot 23 of the vertically slidable support 24 of pencil 26. The details of the mechanism for tracing curves on paper strip 27 and the drive therefor have nothing to do with this invention, which relates to the mechanism for indicating the hours on the paper strip. This stylus is uniformly moved, once up and once down, in twenty minutes, this action being brought about by the described crank mechanism. The stylus thus reciprocates three times an hour. The time curve 28 shown at the left hand in Figure 3 is made by the stylus 26 on the paper strip 27 which is fed past it. The speed curve 29 is made by a recording member 29' shown in Fig. 1.

Feed of the record strip

The paper strip 27 is fed by the device described below during the movement of the vehicle carrying the tachometer, whether forwards or backwards, the strip always moving in the same direction and in an amount proportional to the distance traversed. When the vehicle is stationary, the strip is moved according to time by clockwork. The strip extends horizontally from a supply roll 30 entirely across the width of an abutment plate 31 opposite the stylus 26, around vertical guide rollers 32 and 33, and between two vertical feed rolls 34 and 35, to a take-up roll 36 (see Fig. 6, also Fig. 2). The feed roll 34 at both ends has peripheral recesses 37 (Fig. 5) and the roll 35 has driving pins or teeth 38 adapted to engage these recesses, so that the strip will be positively fed according to the distance traveled, or else exactly according to the elapsed time.

The feed roll 35 carries a gear wheel 40 (Figs. 2 and 5) which meshes with a pinion 39. The distance shaft, not shown, of the tachometer is operatively connected with the wheel 40. The pinion 39 is connected by means of a larger wheel 41 with a gear wheel 42 mounted on a vertical shaft 43 and is rigidly connected with a ratchet wheel 44. A spring 45 (Figure 7) formed at one end as a pawl, engages the ratchet wheel 44, its other end being attached to a cup-shaped

disc 46 which encloses the ratchet wheel 44. The disc 46 is firmly connected to a bevel wheel 47 which meshes with a bevel pinion 48 fast on the hour axle 7. The particular drive of the paper strip during travel and on standstill is old per se and does not form part of the invention. The time shaft 7 acts on one or the other of the wheels 46 and 50 of shaft 43 only when the vehicle is at a standstill, since during travel this shaft in each case is turned 10 more rapidly than is wheel 46 or 50 when the vehicle is at a standstill. When the clockwork is wound, time shaft 7 always turns, regardless of whether the vehicle is moving. During this travel of shaft 7 the shift pawl 45 between the wheel 46 and the wheel 44 (Fig. 7) simply slides over and off the teeth of the more rapidly rotating wheel 44, while when the vehicle is at a standstill it carries the wheel along and thus drives the paper strip according to time. Such a drive is described and shown in German Pat. 388,828, to Reszny.

In order that when setting the clock by turning the axle 7 backwards by hand, the paper strip 27 will be fed in the same direction as when the hour axle 7 rotates in the normal direction, the bevel pinion 48 on the hour axle 7 meshes with a bevel wheel 49 disposed above it and firmly secured to a disc 50 which, like the disc 46, controls a ratchet wheel 51 by a spring pawl, not shown. This disc 50 imparts a movement to the ratchet wheel 51 which is, in the opposite direction of rotation to that of the ratchet wheel 44, the said ratchet wheel 51 being fast on the shaft 43. By turning the knob 15 and the hour axle 7 in the one or other direction, the shaft 43 together with the rolls 35 and 34 will always be moved forwards either by the lower coupling 44, 45, 46 or by the upper coupling 50, 51.

Recording hours at the time curve

In peripheral contact with the worm 16 (Fig. 1) is arranged a horizontal crown wheel 52 which meshes therewith and is firmly secured to a type wheel 53 below it. The lower, downwardly extending end of the axle 54 of the type wheel rests in a horizontal connecting rod 57. As shown in Figure 1 the left-hand end of this rod is guided by a pin 55 movable in a transverse member 56, while its right hand end is pivoted to a lever 58 (see also Fig. 5). On the periphery of the wheel 53 are provided numbers ranging from 1 to 24 corresponding to the twenty-four hours of a day, and the wheel rotates once in twenty-four hours. The numbers which constitute types, are formed by very fine points arranged in groups, each in the form of a numeral, so that the numbers can be perforated in the strip when the type wheel 53 is pressed by the rod 57 against the strip. A roller 59, covered with hard felt or the like, arranged on its axle beside the upper end of the roller 32 serves as an abutment for the paper strip at that side of the latter which is opposite the type wheel.

The lever 58 is shown as rotatable on a pivot 60 of a tensioning lever 62, which in turn, is fulcrumed at 61. Suitable means such as a spring 63 pulls this lever 58 to the left in Fig. 1, towards the lever 62. Now, when the roller 79, disposed on that end of the lever 62 which is attached to the spring 63, is caused to slide down from the apex of the cam 80, on which it bears, due to the rotation of the said cam, then the lever 58 would come, under the biasing action of the spring 63, to bear against the cam 80, thus braking the

cam and also the rotation of the shaft 14 (Fig. 8) on which the cam 80 is mounted. To prevent such contact between the lever 58 and the cam 80, a pin 62' (Fig. 1) is provided on the lever 62 in such manner that the lever 58 will come to bear thereagainst and will be stopped thereby, before it has come into contact with the cam 80.

The lever 58 is shown as having a lateral lug 64 disposed thereon, which lug extends within the path of a cam 65 serving as a detent for a periodically acting escapement, the purpose of which cam 65 will be explained hereinafter.

Two lateral pins 66 and 67 on the cam 65 are staggered relatively to one another both radially and in the direction of rotation of the cam, and extend into the range of the bent lower end of a lever 69 fulcrumed at 68 (Fig. 1); this lever 69 normally prevents the rotation of the cam 65 by a train of gears 70, 71, 72, 73 driven by the spring-barrel axle (Fig. 2), through a dog clutch 75 which is arranged on the axle 74 of the cam 65 and is operative in only one direction. A coil spring 76 encircling the axle 74 tends to hold the dog clutch 75 engaged, one of the parts of which is formed by a hub of the cam 65, and the other by a hub of the gear wheel 73. The cam 65 together with the lever 69 forms the escapement for the spring-barrel axle. The dog clutch 75 permits the main springs to be wound up by turning the spring-barrel axle without turning the cam 65 backwards.

The escapement 65, 69 is controlled by a fork 77 (Fig. 1) which is rigidly connected with the lever 69 and embraces an eccentric 78 fast on the hour axle 7. The hub of the cam 65 carries a cam 80 that lies within range of an anti-friction roller 79 of the lever 62, by which cam 80 the tension of the spring 63 is increased for approximately one revolution (time of escapement) shortly before the release of the cam 65; that is to say the force of the lever 58 acting on the connecting rod 57 and the type wheel 53 is increased.

The operation of this device is as follows:

The springs 3 and 4 (Figs. 2 and 5), joined together on a common shaft, and wound by suitable means (not shown) rotate continuously. A toothed rim 5 on the spring barrel 4 meshes with a pinion 6 mounted freely on the shaft 7, which is rotated once each hour, by virtue of the regulatory action of a spur gear 8 fast to the pinion 6, and which cooperates with an escapement (not shown), for controlling the clockwork mechanism. Through the intermediary of the coiled spring 9 and the friction disc 10, the gear wheel 11 meshes with the two pinions 12 and 13. The shaft 14 of the pinion 13 carries the knurled knob 15 which protrudes exteriorly of the casing for setting the clockwork and for manual adjustment. The pinion 12 is fast to the worm 16, and the ratio of the teeth of the gear wheel 11 to those of the pinion 12 is 3:1, so that for each revolution of the hour shaft 7, the pinion 12 revolves three times, i. e. it makes a complete revolution every twenty minutes.

As shown in Fig. 4, the worm 16 meshes with the crown wheel 52, which in turn is fast to the type wheel 53, carrying numbers 1-24 inclusive, the gear ratio being such that the said type wheel revolves once every twenty-four hours. Thus, every hour one of the 24 numbers on the type wheel is brought, in rotation, into operable position.

Since the crank 19 is fast to the shaft 17 on which the pinion 12 and worm 16 are mounted,

it is moved completely over the oval guide 22 (Fig. 1) every twenty minutes, and since the pin 25 engages the slotted head 23 of the vertically movable rod 24, the stylus 26 is reciprocated three times per hour, thereby tracing the time record 28, shown in Fig. 3.

The means for reciprocating the type wheel, together with the crown gear 52, will be explained hereinafter.

Next, it becomes necessary to explain the means for moving the time chart continuously in a single direction. As will be recalled, and as is evident from Figs. 2 and 6, the time chart is moved by means of the driving cylinder 35, cooperating with the driven cylinder 34 in such manner that the record strip 27 is unwound from the supply roll 30 and is then moved across guide rollers 31, 32, and 33, to the rolls 34 and 35, and thence to the take-up roll 36. Suitable gearing, not shown, serves to drive the take-up roll 36 from the drive roll 35.

As shown in Figs. 2 and 5, the bevel pinion 48 is fast to the hour shaft 7, and meshes continuously with the bevel wheels 47 and 49, mounted on the vertical shaft 43. Associated with the bevel wheels 47 and 49, respectively, are cup-shaped discs 46 and 50, respectively controlling ratchet wheels 44 and 51 by means of corresponding pawl springs such as are shown at 45 in Fig. 7. The bevel pinion 48 acts on one or the other of the bevel wheels 46 and 49 only when the vehicle is at a standstill, and the paper strip is being driven by the clockwork. During travel, this shaft 43 is turned by the gear 40 from the motor drive shaft more rapidly than the wheels 46 or 49 are driven when the vehicle is at a standstill. As stated in the foregoing, the time shaft 7 turns continuously, and during the movement of the vehicle, the pawl 45 simply slides over and off the teeth of the more rapidly rotating wheel 44, while when the vehicle is at a standstill, the pawl carries the wheel along and thus drives the paper strip according to time. The action is of the differential type.

Now, it will be seen that it is essential that the paper strip be moved constantly in a single direction, regardless of whether the clockwork adjusting member 15 is turned in either a clockwise or a counter-clockwise direction, and it is to this end that the differential gearing is employed. Thus, by turning the knob 15 and hence the hour axle 7 in either direction, the shaft 43 together with the rolls 35 and 34 will always be moved in the proper direction, either by the lower coupling 44, 45, and 46 or by the upper coupling 49, 50, and 51.

Next, it will be described the means for reciprocating the type wheel, and in this connection, attention is to be directed primarily to Fig. 1, but also, to a lesser extent, to Figs. 2, 5, 6, and 8. As shown in Fig. 1, the eccentric 78 is fast to the hour shaft 7 and rotates therewith once each hour. A forked arm 77 embraces the said eccentric and is pivoted at 68, being fast to the lever 69, which, as best shown in Figs. 1 and 8, terminates in a bent, bevelled portion at its free end. In the manner described hitherto the type wheel 53 is fast to the rod 57 (Fig. 1) shown as pivotally secured to the lever 58, which is rotatable on the pivot 60 on the tensioning lever 62. A spring 63 interconnects these two levers, and ordinarily pulls the lever 58 against the pin 62' of the lever 62.

Fast to the shaft of the spring barrels 3 and 4 is the gear wheel 70, meshing with the pinion 71 fast to the gear wheel 72, in turn meshing with 75

the pinion 73 on the shaft 74, in the manner of a train of step up gearing. Secured to the shaft 74 is the cam 65, having pins 66 and 67 as described previously. Now, the tendency of the pinion 73 is to rotate this cam 65 continuously, but the engagement of the free end of the lever 69 with the pins 66 and 67 prevents this. The eccentric 78 rocks the lever 69 once every hour, and during the first portion of the movement of this lever 69, i. e. immediately after the type wheel 53 has made an imprint on the time strip 27, the lever 69 engages at its free end the pin 67 and holds the cam 65 against rotation. In the next subsequent course of the revolution of the eccentric 78, the lever 69 is caused to release the pin 67, so that under the actuation of the clockwork mechanism through the said train of gearing, the cam 65 is quickly flipped through approximately 30 degrees until the lever 69 engages the pin 66. During turning of the cam 65, the cam 80, fast to the same shaft 74 on which the cam 65 is mounted, is also turned, and by reason of the contact of its humped portion with the roller 79 on the lever 62 this lever is forced outwardly, i. e. to the left in Fig. 1. At the same time the lateral lug 64 on the lever 58 engages the hump of the cam 65 and is pushed to the right in Fig. 1, thereby tensioning the spring 63.

In the next phase of the rotation of the eccentric 78, the lever 69 is caused to slip off the pin 66, so that the train of gearing quickly flips the cams 65 and 80 through approximately 330° whereby the lug 64 is released from the hump of the cam 65. This permits the tensioned spring 63 to contact forcefully, pivoting the lever 58 about its pivot point 60, and striking with its type wheel 53 against the abutment 59. Immediately thereafter the roller 79 slides off the hump portion of the cam 80 thereby lessening the tension on the spring 63, and thus reversing the load on the cam 65 as it withdraws the type wheel 53 from its impressing position. By the engagement of the crown wheel 52 with the worm 16 in the manner previously described the type wheel 53 has previously been rotated $\frac{1}{24}$ th of a revolution, so that the proper hour designation is brought into position.

The dog clutch 75, previously described, and the spring 76 are simply to facilitate rewinding of the clockwork mechanism in any suitable manner, inasmuch as these clutch elements ensure uni-directional movement of the cams and hence of the shaft 74 and thus of the cams 65 and 80.

The next thing for consideration is the chart of Fig. 2. The stylus 26 traces the time record 28; and considering the top portion thereof, from numerals 3 and 4, representing the lapse of one hour, the stylus will have been reciprocated three complete cycles. The length of the charge covered by the path of this tracing is dependent, not on the clockwork mechanism, but on the speed at which the vehicle travels, the drive now being by the vehicle-driven pawl 40. This is evident from the speed curve 29, traced by the stylus 29'. Now, at 28' is shown the time record which is traced when the vehicle is at a standstill, i. e., when the paper strip is fed by a clock-mechanism. Correspondingly, the tracing 29 shows a similar interval of inactivity.

If the vehicle is placed out of commission for a period of time exceeding the time limit of the clock, then the driving mechanism must be wound up and the clock must be set for the commencement of a new trip. When setting the clock, as mentioned above, the paper strip is fed, the stylus

26 is moved up and down and the hours are marked by the type wheel 53. It may happen that the clock is moved backwards instead of forwards. This can be seen from the curve 28 in Figure 3. When the vehicle is stationary, the curve drawn by pencil 26 consists of a uniform zigzag line of small extent for a comparatively long period of time; see curve 28 in the middle of Fig. 3. When the vehicle is in motion, i. e. when the strip advances according to the speed, the zigzag line is more or less drawn out or extended; see curve 28 at the top and bottom of Fig. 3. Since pencil 26 (Figs. 1, 4, and 6) is constantly moved upwardly and downwardly uniformly, once up and once down in 20 minutes, this time line includes six directional changes per hour at intervals of ten minutes. Thus the third node 28'' upwardly beyond 3 in curve 28 represents 3×10 or 30 minutes past 3; i. e. 3:30. Curve 28 is therefore a time line which makes it possible to read the speed of the vehicle at any minute on the speed curve 29. The paper strip is provided only with longitudinally extending lines, which cannot be seen on the drawings, for indicating the speeds shown on line 29. Time curve 28, in Fig. 3, shows that the vehicle stopped shortly before 6 o'clock in the evening (18). The speedometer clock stopped at 5 o'clock in the morning of the next day. Of course, the paper strip also stopped moving. The next time the vehicle was started at 3 o'clock in the morning. It was first necessary to turn the clock of the speedometer which stopped at five o'clock, back to three o'clock. That is, the clock was set back two hours, and this is indicated by the fact that numerals 4 and 3 follow numeral 5 in the constricted zigzag line, and after starting of the vehicle the numeral 4 follows the numeral 3, there being an elongated zigzag line to indicate that the paper strip is now being driven by the vehicle. Had the driver moved the clock forward, the numerals 5, 6, 7 to 24 and then 1 to 3 would appear in the form of a constricted zigzag line on the paper strip. However, by turning back the clock from 5 to 3, the driver saves work, time and extent of paper strip. Suitable legends on the chart of Fig. 3 indicate the meanings of the jogs in the speed curve.

I claim:

1. In a recording tachometer for a vehicle having a feed mechanism for feeding a continuous record strip, means for actuating said feed mechanism according to distance while the vehicle is moving, and a clockwork mechanism for actuating said feed mechanism according to time when the vehicle is stationary; a stylus mounted to move across the record member, means for reciprocating the stylus a plurality of times during unit time, a wheel having type numerals representing hours, means for rotating said wheel by a clock-driven axle, and means for bringing said wheel into and out of marking relation with the record member at the end of each time unit.

2. In a recording tachometer for a vehicle having a feed mechanism for feeding a continuous record strip, means for actuating said feed mechanism according to distance while the vehicle is moving, and a spring-driven axle for actuating said feed mechanism according to time when the vehicle is stationary; a stylus mounted to move across the record member, means driven by said time axle for reciprocating the stylus repeatedly during a unit time, a wheel having type numerals representing hours, means driven by said time axle for rotating said wheel, and means for moving said wheel against the record member and

marking the latter at the end of each time unit.

3. In a recording tachometer for a vehicle having a feed mechanism for feeding a continuous record strip, means for actuating said feed mechanism according to distance while the vehicle is moving, and a spring-driven axle for actuating said feed-mechanism according to time when the vehicle is stationary; a stylus mounted to move transversely of said strip, means driven by said time axle for reciprocating the stylus repeatedly during a unit time, a type wheel having peripheral type numerals, a crown wheel fixed to said type wheel, a worm wheel driven by said time axle and meshing with said crown wheel, and striking mechanism controlled by said time axle and arranged to move the type wheel forwards against the strip and backwards away therefrom in quick succession in a direction substantially normal to the strip.

4. In a recording tachometer for a vehicle having a feed mechanism for feeding a continuous record strip, means for actuating said feed mechanism according to distance while the vehicle is moving, and a spring-driven axle for actuating said feed-mechanism according to time when the vehicle is stationary; a stylus mounted to move transversely of said strip, means driven by the time axle for reciprocating the stylus repeatedly during a unit time, a type wheel having peripheral type numerals, means driven by said time axle for rotating said type wheel, and reciprocatory mechanism for reciprocating said type wheel towards and away from the strip, said reciprocatory mechanism comprising an eccentric driven by said time axle, a connecting rod having one end rotatably connected to the type wheel at its axis of rotation, a spring-controlled lever connected to the other end of said connecting rod, an escapement device comprising a detent rotatable through approximately 360° and controlling said lever, and a locking lever controlled by said eccentric and controlling said escapement device.

5. In a recording tachometer for a vehicle having a feed mechanism for feeding a continuous record strip, means for actuating said feed mechanism according to distance while the vehicle is moving, and a clockwork mechanism for actuating said feed mechanism according to time when the vehicle is stationary; said feed mechanism comprising a time axle, a stylus mounted to move transversely of said strip, means driven by the time axle for reciprocating the stylus repeatedly during a unit time, a type wheel having peripheral type numerals, means driven by the time axle for rotating said type wheel, a spring-driven axle, a barrel rotatable on the latter axle and geared to the time axle, a spring connected at one end to the spring-driven axle and at its other end to the barrel, and reciprocatory mechanism for reciprocating said type wheel towards and away from the strip, said reciprocatory mechanism comprising a spring-controlled lever for reciprocating the type wheel, an escapement device controlled by said time axle and comprising a detent rotatable through approximately 360° and controlling said spring-controlled lever, and a one-way clutch comprising two clutch members, one of which is operatively connected to said detent and the other of which is operatively connected to said spring-driven axle.

6. In a recording tachometer for a vehicle hav-

ing a feed mechanism for feeding a continuous record strip means for actuating said feed mechanism according to distance while the vehicle is moving, and a spring-driven axle for actuating said feed-mechanism according to time when the vehicle is stationary; a stylus mounted to move transversely of said strip, means driven by the time axle for reciprocating the stylus repeatedly during a unit time, a type wheel having peripheral type numerals, means driven by said time axle for rotating said type wheel, and reciprocatory mechanism for reciprocating said type wheel towards and away from the strip, said reciprocatory mechanism comprising an eccentric driven by said time axle, a connecting rod having one end rotatably connected to the type wheel at its axis, a lever connected to the other end of said connecting rod, an escapement device comprising a detent rotatable through approximately 360° and controlling said lever, a locking lever controlled by said eccentric and controlling said escapement device, a second lever on which the first-mentioned lever is fulcrumed, a tension spring connecting said levers together, and a cam rotatable with said detent and disposed to subject said tension spring to increased tension for moving the type wheel against the strip.

7. In a recording tachometer, in combination, a clockwork mechanism, a paper strip, means connected with said clockwork mechanism for moving said paper strip, a wheel having time figures on its periphery, a stylus movable transversely of said strip for tracing a time record on said strip during passage of the latter, means energized by said clockwork mechanism for reciprocating said stylus across said strip, and means also driven by said clockwork mechanism for moving said wheel into and out of contact with said strip, and for rotating said wheel step by step about its axis after each contact of the wheel with the said strip.

8. In a recording tachometer for a vehicle having a feed mechanism for feeding a paper record strip, means for actuating said feed mechanism according to distance while the vehicle is moving, and a clockwork mechanism for actuating said feed mechanism according to time when the vehicle is stationary; a numeral printing device, a recording pencil, means for reciprocating said pencil several times an hour across said strip in order to produce a time line thereon, said numeral printing device consisting of a perforating type wheel for indicating the hours of the day along the time line of the strip in the form of perforated numerals, a worm and a meshing crown wheel driven by said clockwork mechanism for rotating said type wheel, a cam axle, a dog clutch connecting said axle with said clockwork mechanism, said dog clutch being operable in but one direction of rotation, a checking device permitting a momentary substantially complete revolution of the cam check, and a lever controlled by said checking device, said lever being connected with the support of the type wheel, a second lever interconnecting said levers, and a cam on said cam shaft rotatable with the check member for actuating said second lever, said second lever being adapted to tension said spring for pressing the type wheel against the paper strip in rapid reciprocal movement.

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