

April 4, 1939.

L. S. HARRISON

2,153,185

ELAPSED TIME PRINTER

Filed Sept. 18, 1936

4 Sheets-Sheet 1

FIG. 1.

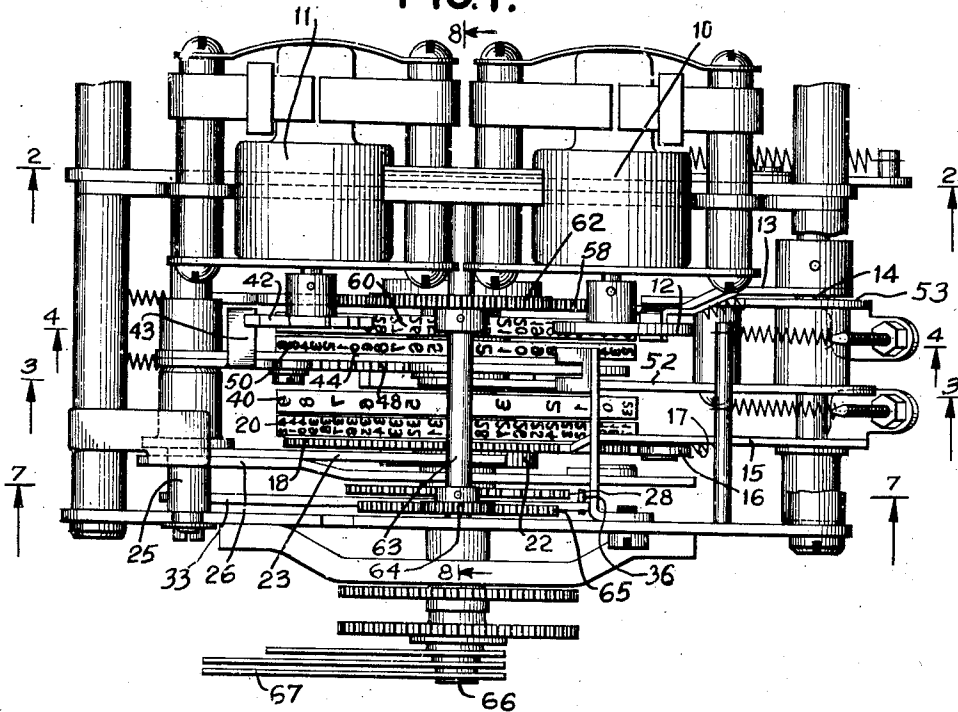
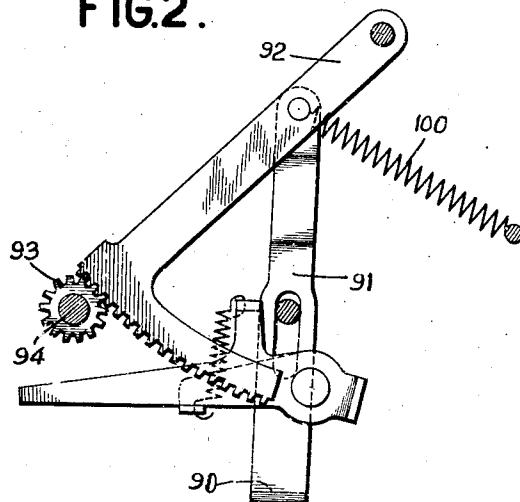


FIG. 2.



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4 Sheets-Sheet 2

FIG. 3.

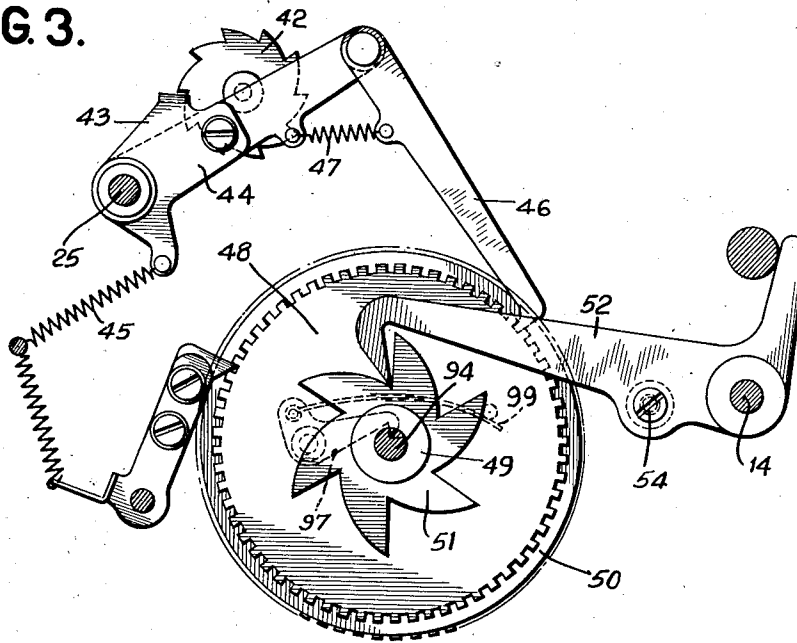
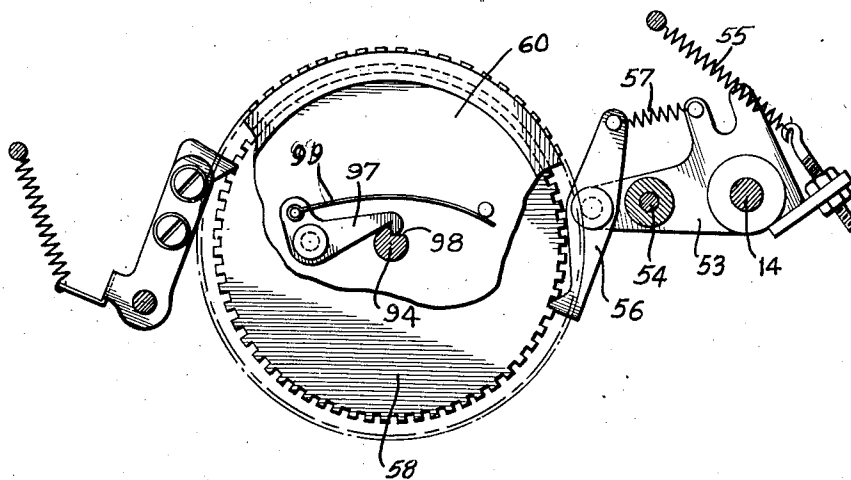


FIG. 4.



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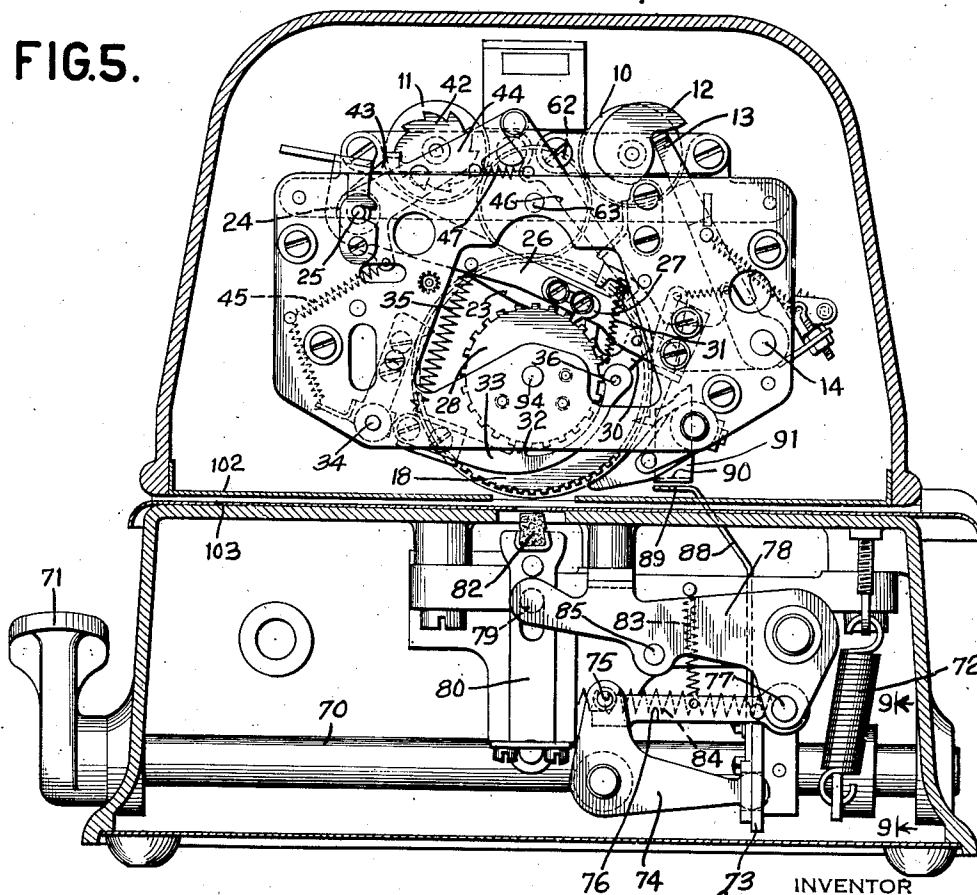
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FIG. 6.

CAR TRANSPORTATION CO. JULY 10, 1935			
CAR NO.	OPERATOR NO.	CLOCK TIME	ELAPSED TIME
2341	12	9 32	32.2
1542	29	9 57	25.1

FIG. 5.



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FIG. 7.

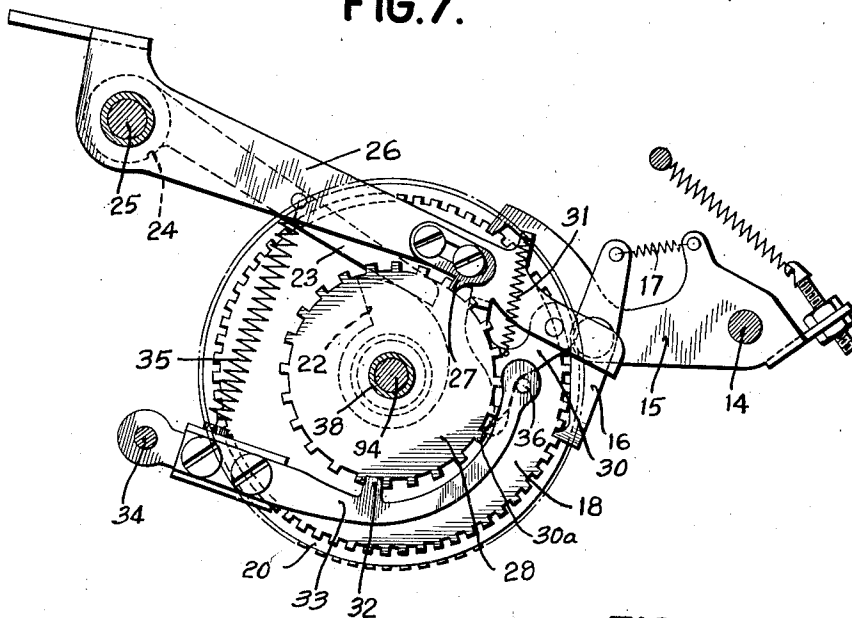


FIG. 8.

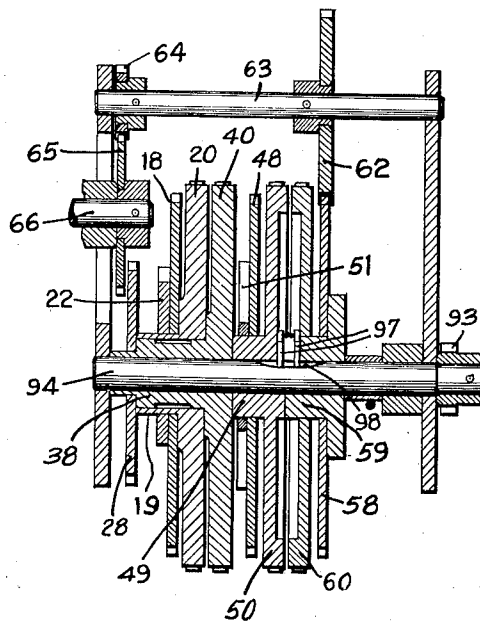
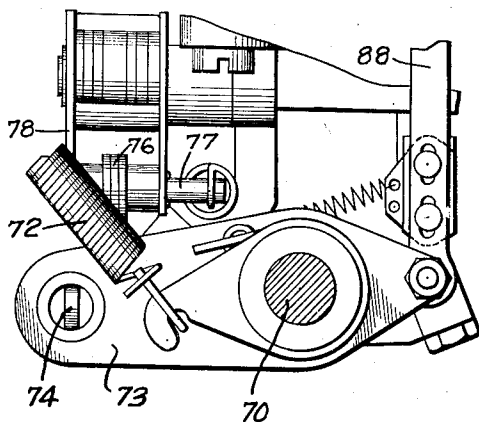


FIG. 9.



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UNITED STATES PATENT OFFICE

2,153,185

ELAPSED TIME PRINTER

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Application September 18, 1936, Serial No. 101,371

9 Claims. (Cl. 234—43)

This case relates to elapsed time recorders.

The object of the invention is to provide a single time train and recording elements operated thereby to automatically provide an elapsed time record.

The object, further, is to provide a single set of time recording elements rendered effective to furnish elapsed time records by reason of being automatically reset between successive recording operations.

The object, still further, is to provide means for resetting the elapsed time recording elements as an incident to the recording operation.

The latter object embraces provisions for resetting the elapsed time elements as an automatic accompaniment to the recording operation, but after the record has been made.

Another object is to provide means for recording the actual clock time without interference from the resetting operation of the elapsed time recording means.

Other objects will appear from the following parts of the specification and from the drawings, in which:

Fig. 1 is a plan view of the type head of the recorder with the casing removed,

Figs. 2, 3, and 4 are sections, respectively, on lines 2—2, 3—3, and 4—4 of Fig. 1.

Fig. 5 is a vertical, front sectional view through the recorder,

Fig. 6 shows a ticket on which the elapsed time and clock time are printed by the recorder and on which the car and operator numbers are written in,

Fig. 7 is a section on lines 7—7 of Fig. 1,

Fig. 8 is a section on lines 8—8 of Fig. 1 and

Fig. 9 is a detail section along lines 9—9 of Fig. 5.

Besides recording elapsed time, it is desired to record the actual clock time. To avoid interference between the two recording means, when the elapsed time recording means is reset, it is desirable to provide separate time trains and driving motors for the two recording means. The

driving motors are of the ordinary synchronous type used to drive a secondary clock movement.

Referring to Figs. 1 and 5, motors 10 and 11 respectively drive the actual clock time and the elapsed time trains. The actual clock time train will be described first.

On the shaft of motor 10 is a single point spiral cam 12 engaged by a follower lever 13 secured to a shaft 14. Cam 12 makes one revolution per minute and lever 13 drops off the high point of the cam once each minute, causing counter-

clockwise movement of shaft 14. Also fixed to shaft 14 is a lever 15 (Figs. 1 and 7) pivotally mounting a pawl 16 urged by a spring 17 towards a toothed wheel 18. As shaft 14 and lever 15 rock counterclockwise, pawl 16 engages a tooth of wheel 18 to rotate the latter one tooth distance or one step. Wheel 18 has sixty teeth, each representing a minute. Thus, wheel 18 makes one revolution per hour.

Hub 19 (see Fig. 8) of wheel 18 rigidly carries a type wheel 20 which has type "0" to "59" for printing the minutes of clock time. Also fixed to hub 19 of wheel 18 is a single point spiral cam 22 (see Figs. 1 and 7) engaged by a follower lever 23, the hub 24 of which is rotatably mounted on a rod 25. Rigidly carried by hub 24 is an arm 26 having a dog 27 (Figs. 5 and 7) for engaging a toothed wheel 28. Pivotaly carried by the outer end of arm 26 is a pawl 30 having a tooth 30a (Fig. 7) and urged to engage wheel 28 by a spring 31 between the pawl and its carrying arm. Wheel 28 is normally locked by a tooth 32 on an arm 33 pivoted at 34 and connected by a spring 35 to arm 26. When follower lever 23 drops off the point of cam 22, pawl 30 descends, its tooth 30a cams against the left side of a pin 36 provided on the free end of lock arm 33 and rocks the latter arm clockwise to release its tooth 32 from wheel 28. At the same time, pawl tooth 30a engages a tooth of wheel 28 and moves the latter through one tooth distance, at the end of which the wheel is engaged by dog 27, carried by arm 26, to prevent overthrow of the wheel. Wheel 28 has twenty-four teeth, and since it is moved by pawl 30 once for each revolution of sixty minute wheel 18, each tooth of wheel 28 represents one hour. Thus, wheel 18 as it makes a single revolution during one hour transfers a step of movement to hour wheel 28.

Wheel 28 is rigidly carried by the hub 38 of a type wheel 40 (see Figs. 1 and 8) which has type 0 to 24 for recording the clock time in hours alongside the record in minutes made by minute type wheel 20.

The elapsed time train will now be described.

The shaft of motor 11 of the elapsed time train rigidly carries a ten point cam 42 (see Figs. 1, 3, and 5) which makes one revolution per minute. Engaged with cam 42 is a follower 43 the hub of which is rotatably carried by rod 25. Also rotatably carried by rod 25 and secured to follower 43 is an arm 44. Arm 44 and the connected follower 43 are urged clockwise (Fig. 3) by a spring 45 connected to arm 44. Pivotaly carried by arm 44 is a pawl 46 held by a spring 47 towards a

toothed wheel 48. Since cam 42 makes one revolution per minute and has ten points, cam follower 43 will drop off a high point ten times each minute and pawl 46 will advance wheel 48 a tooth distance each tenth of a minute. Wheel 48 has sixty teeth, each representing one-tenth of a minute.

Wheel 48 is rigidly secured to the hub 49 (see Figs. 3 and 8) of a type wheel 50 which has sixty type corresponding to the teeth of wheel 48 for recording tenths of minutes. The type of wheel 50 are arranged in six recurring series, each series having ten type for recording 0 to 9 tenths of a minute.

Rigidly carried by hub 49 of wheel 50 is a six point cam 51 (Figs. 3 and 8) coacting with a follower 52. Each lobe of cam 51 occupies an arc coextensive with a group of .0 to .9 type of wheel 50. Thus, when type wheel 50 passes from the .9 type position of any of its six series of type to the following .0 type position, follower 52 drops off the point of a cam lobe. Accordingly follower 52 will rock clockwise once each minute.

Follower 52 is rotatably carried by shaft 14. Also rotatably about shaft 14 is a lever 53 (see Fig. 4) connected to follower 52 at 54 for common movement with the follower. A spring 55 connected to lever 53 urges the latter and follower 52 counterclockwise (Figs. 3 and 4). The free end of lever 53 pivotally carries a feed pawl 56 urged by a spring 57 to engage its nose with the teeth of a wheel 58 (see Figs. 1, 4, and 8). When follower 52 drops off a point of cam 51, lever 53 rocks counterclockwise (Fig. 4) and pawl 56 moves wheel 58 through one tooth distance. Since follower 52 drops off a cam point once each minute, wheel 58 will be moved at minute intervals. Wheel 58 has sixty teeth and, therefore, makes one revolution per hour.

Wheel 58 is rigidly carried by the hub 59 of a type wheel 60 which has sixty type spaced correspondingly to the teeth of wheel 58 and adapted to record "0" to "59" minutes of elapsed time.

Type wheel 50 records tenths of minutes and type wheel 60 records minutes of elapsed time, no provision being made to record more than an hour of elapsed time. During a minute interval, type wheel 60 remains stationary with one of its type at printing position. During the same minute interval, type wheel 50 moves ten steps and an entire series of type .0 to .9 passes printing position. Thus a recording operation will effect printing of the elapsed time from wheels 50 and 60 of a certain minute of time "0" to "59" depending on the minute position of wheel 60 plus either ".0" to ".9" of a minute depending on the tenth of a minute position of wheel 50.

Toothed wheel 58 which moves at minute intervals and makes one revolution per hour meshes with a gear 62 (Figs. 1, 5, and 8) fast to a shaft 63 which also rigidly mounts a pinion 64. Pinion 64 meshes with a gear 65 on a shaft 66 which rigidly carries an indicator hand 67 (Fig. 1). The ratio of the gearing between wheel 58 and shaft 63 is one-to-one so that hand 67 moves at minute intervals and makes one revolution per hour. Indicator hand 67 cooperates with an indicating dial (not shown) to indicate the minutes of elapsed time.

The means for taking an impression from type wheels 20, 40, 50, and 60 and the means for causing successive impressions to be made on successive lines of the record card C (Fig. 6) are such as disclosed in Patent No. 1,299,197.

Briefly, referring to Fig. 5, a shaft 70 carries, outside the machine casing, an operating handle 71 which is depressed against resistance of a spring 72 connected to the shaft. Fastened to shaft 70 is double arm plate 73 (Figs. 5 and 9) one arm of which is swiveled to a bell crank 74. The upper end of crank 74 has a stud 75 seated in a recess formed at the free end of an arm 76 pivotally carried by a rod 77 secured to a lever 78. The left end of lever 78 (Fig. 5) has a pin 79 riding in a vertical slot of a slidable frame 80 the upper end of which mounts a rubber platen 82.

A spring 83 is connected to arm 76 to maintain the latter engaged with stud 75 of bell crank 74. Another spring 84 is connected to rod 77 of lever 78 to urge the lever clockwise (Fig. 5).

When handle 71 is depressed, plate 73 rocks bell crank 74 clockwise (Fig. 5), and stud 75 of the bell crank forces arm 76 to the right. As arm 76 moves to the right, it rocks lever 78 counterclockwise, causing spring 84 to stretch. Lever 78 rocks counterclockwise until a pin 86 thereon strikes the upper edge of arm 76 and depresses the arm below stud 75 of bell crank 74. This releases the arm from the restraint of bell crank 74 and likewise releases lever 78 for clockwise rocking by spring 84. As lever 78 rocks clockwise, its stud 79 acts on frame 80 to force platen 82 upwardly, and the platen effects printing by type wheels 20, 40, 50, and 60 on the record card through an inking ribbon (not shown).

The printing operation is thus effected during the downstroke of handle 71.

Referring to Figs. 5 and 9, a link 88 is connected to double arm plate 73 of shaft 70, at the opposite end from the connection of the plate to bell crank 74. Link 88, as disclosed in Patent No. 1,299,197 is connected to the ribbon feeding mechanism (not shown herein). For present purposes, link 88 is also provided at its upper end with a horizontally bent lug 89 underlying a similar lug 90 (see Figs. 2 and 5) of a slidable link 91. The upper end of link 91 is pivoted to a rack sector 92 which meshes with a pinion 93 fast to its shaft 94. Shaft 94 freely passes through hubs 38, 49, and 59 of type wheels 40, 50, and 60.

Type wheels 50 and 60 pivotally carry resetting pawls 97 (see Figs. 3, 4, and 8) adapted to coact with notched portion 98 of shaft 94. Springs 99, each acting on one of the resetting pawls 97, urge the pawl noses into engagement with the periphery of shaft 94. During time-driven movements of wheels 50 and 60, the latter rotate clockwise (Figs. 3 and 4) and the teeth of pawls 97 coast freely over the notched portion of shaft 94. In the resetting operation, shaft 94 is given a single revolution clockwise, during which the radial wall of notch 98 meets the teeth of pawls 97 and forces the latter and their carrying wheels 50 and 60 to rotate with shaft 94 until the latter completes its revolution. At the end of this revolution of shaft 94, the latter will have moved type wheels 50 and 60 to their starting or zero positions.

Shaft 94 is given a single resetting revolution during the return stroke of operating handle 71 of the impression effecting means, after the record has been printed. During the down stroke of handle 71, the record was printed, as explained previously. When handle 71 is moved through its down stroke, its shaft 70 rocks in a direction to elevate link 88 (Figs. 5 and 9). As link 88 moves

upwardly, its lug 89 meets lug 90 of link 91 (Fig. 2) and forces the latter upwardly, rocking the sector 92 clockwise to effect a revolution in a counterclockwise direction of pinion 93 and reset shaft 94. During this action of sector 92, a spring 100 connected thereto is stretched. The notch 98 of reset shaft 94 during counterclockwise rotation ratchets past the teeth of reset pawls 97, without effect on type wheels 50 and 60.

Thus, the down stroke of handle 71 results in effecting a printing operation and in stretching spring 100 which is to supply the power for resetting the type wheels 50 and 60.

Upon the upward, return, stroke of handle 71, plate 73 rocks clockwise (Fig. 9), causing link 88 to descend. This permits link 91 to follow as spring 100 relaxes. As link 91 returns downwardly to its initial position, rack sector 92 rocks counterclockwise causing pin 93 and reset shaft 94 to make a single revolution in a clockwise direction. During this revolution of shaft 94, its notch 98 engages the nose of each resetting pawl 97 to move type wheels 50 and 60 ahead to their zero positions.

The return stroke of the operating handle and connected parts may be suitably dampened to prevent too abrupt return operation of rack sector 92 and the parts operated thereby.

In above manner, the elapsed time recording elements 50 and 60 are automatically reset as an incident to recording operation but after the record has been printed. The clock time type wheels 20 and 40 remain undisturbed. Following the return of the elapsed time type wheels 50 and 60 to starting position, their timed operation resumes to furnish the elapsed time till the next recording operation.

Summary

An application of the invention is in recording the head-way between busses, cars, or the like, passing a recording station along their route. As a car arrives at the station, the inspector or timer writes in the car and operator numbers on a line of the record card C (Fig. 6) and then inserts the card between guides 102 and 103 (Fig. 5). He then depresses handle 71, causing the recording on the aforesaid line of the record card of the actual clock time in hours and minutes by type wheels 20 and 40 and of the elapsed time in minutes and tenths of minutes by type wheels 50 and 60. Upon the return stroke of the impression-effecting means, reset shaft 94 rotates clockwise (Figs. 2, 3, and 4) to reset the elapsed time type wheels 50 and 60 to their zero positions. As the type wheels 50 and 60 are reset, the parts connected thereto for common movement, including toothed wheels 48 and 58 and indicator hand 67 are similarly reset to zero positions.

While the invention has been disclosed in the preferred form, it is to be understood that variations, changes, and departures from the disclosed form or from its details may be made without departing from the invention. It is therefore intended to be limited only as indicated by the following claims.

I claim:—

1. An elapsed time recorder comprising type elements, a time train for driving said elements amounts, corresponding to elapsed times, from a starting position, a platen opposite the type elements, reciprocating means operating during the forward stroke for causing the platen to strike the type elements to print elapsed time and operating during the return stroke to cause return of

the platen after the printing operation, and devices controlled by the reciprocating means during the return stroke for automatically restoring the type elements, after the printing operation, to the starting position.

2. An elapsed time recorder comprising type elements, a time drive for driving the elements amounts, corresponding to elapsed times, from a starting position, a platen facing the type elements, manually operated means for causing reciprocation of the platen to effect printing cooperation between the platen and type elements during the forward stroke of the platen to print the elapsed time, and automatically driven devices controlled by the manually operated means for automatically operating during the return strokes of the platen to restore the type elements to the starting position.

3. An elapsed time recorder comprising type elements, a time drive for moving the elements amounts, corresponding to elapsed times, from a starting position, an oscillatable shaft, means controlled by the shaft during one stroke of the latter to coact with the type elements to print the elapsed time, and automatically driven devices controlled by the shaft during the return stroke of the latter automatically to restore the type elements, after the printing operation, to starting position.

4. An elapsed time recorder comprising type elements, a time drive for moving the elements amounts, corresponding to elapsed times, from a starting position, a reciprocable printing manual, impression-effecting means controlled by the printing manual to strike the type elements during the forward stroke to print the elapsed time, automatic restoring means for restoring the type elements to the starting position, and means operated by the manual during the forward stroke thereof for conditioning the restoring means automatically to restore the type elements to starting position after the printing operation.

5. An elapsed time recorder comprising type elements, a time drive for moving the elements amounts, corresponding to elapsed times, from a starting position, a manual device, impression-effecting means controlled by the device for cooperating with the type elements to print the elapsed time, restoring means for restoring the type elements to starting position, a spring for automatically actuating the restoring means to restore the type elements, and means controlled by the manual device for energizing said spring during the printing operation and for releasing said spring after the printing operation to expend its energy in automatically actuating the restoring means to restore the type elements.

6. An elapsed time recorder comprising time-controlled type elements advanced from a starting position in accordance with elapsed time, impression-taking means coacting with the type elements to print elapsed time, manual means for causing operation of the impression-taking means, and automatic restoring means controlled by the manual means for automatically restoring the type elements to the starting position after the printing operation.

7. An elapsed time printing device, comprising printing means, time-controlled means for moving the printing means through an elapsed time cycle, means operable at any point of the cycle for effecting printing of the elapsed time since the beginning of the cycle by the printing means, and means automatically effective after the print-

ing operation for starting a new elapsed time cycle of the printing means.

8. An elapsed time printing device comprising time printing means, time-controlled means for moving the printing means through an elapsed time cycle, apparatus operable at any point of the cycle for effecting operation of the printing means to print the elapsed time from the beginning of the cycle, and devices automatically operable under control of the aforesaid apparatus and after the printing operation for starting a new elapsed time cycle of the printing means.

9. An elapsed time recorder comprising a set of clock time type wheels and a set of elapsed

time type wheels mounted for rotation about a common axis, a platen for cooperating with both sets of wheels to print a record of the clock time and elapsed time along a single line, automatically operating resetting means to reset automatically only the elapsed time wheels without disturbing the position of the set of clock time wheels, an operating handle, means controlled thereby for operating the platen to print said record, and means also controlled by the operating handle for causing the resetting means, after the record has been printed, to reset automatically only the elapsed time type wheels.

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