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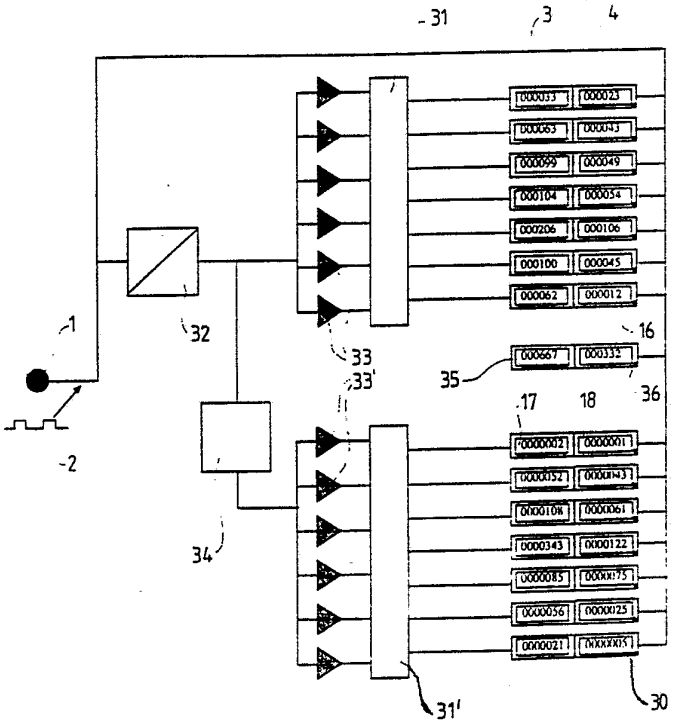
(54) Title: A METHOD FOR THE REGISTERING OF THE DRIVING PATTERN OF A MOTOR VEHICLE, AND AN APPARATUS IN THE FORM OF AN INTERVAL COUNTER FOR CARRYING OUT THE METHOD

(57) Abstract

A method and an apparatus for the registering of the driving pattern of a motor vehicle are adjusted to enable an evaluation of the total driving behavior. The speeds and the accelerations/retardations of the motor vehicle are being converted into pulse signals (2) and sorted into two different groups, one speed counter group (3-16) and one acceleration/retardation counter group (17-30), each being divided into sub-groups indicating number of kilometers driven within a first, a second, a third, etc., speed interval and a first, a second, a third, etc., acceleration/retardation interval, respectively. The sum of the kilometer statements of the sub groups of each group corresponds to the totally driven distance of the motor vehicle measured in kilometers. The apparatus comprises a pulse generator (1) adapted to be mountd to the propulsion system of the motor vehicle, e.g. wheels or gear box, and adapted to supply a pulse signal (2) simultaneously to all counters of both groups, each of which is assigned a logic circuit (31, 31′) controlled by comparators (33, 33′). The pulse generator (1) is connected to the comparators (33) of the speed counters via a pulse frequency/voltage-converter (32) connected to the comparators (33′) of the acceleration/retardation counters via a derivation circuit (33′) deriving speed into acceleration/retardation.



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A METHOD FOR THE REGISTERING OF THE DRIVING PATTERN OF A MOTOR VEHICLE, AND AN APPARATUS IN THE FORM OF AN INTERVAL COUNTER FOR CARRYING OUT THE METHOD

This invention relates to a method for the registering of the driving pattern of a motor vehicle, and an apparatus in the form of an interval counter for carrying out the method.

Recording of the driving pattern of a motor vehicle may be of interest for car owners as well as car insurance companies. The car insurance companies may fit the motor vehicles of their policy holders with the apparatus and read the same at equal intervals. On the basis of these readings, the company may e.g. set a more fair bonus arrangement, i.e. that policy holders having a "careful" driving pattern - low speeds and low accelerations - may be allotted a higher bonus. By that very fact that the policy holders know that their driving pattern is being controlled and recorded, many will be stimulated to change their driving pattern; this will again reduce driving speed, number of accidents, and consequently also the size of the disbursements from the insurance companies. Moreover, when leasing or renting motor vehicles it will be possible to control how the driving has occured. When motor vehicles are to be resold, the apparatus will give an indication of how the motor vehicle has been driven, whereby favorable/unfavorable driving pattern may influence the selling price quite substantially. Car owners may also take an interest in seeing their own driving pattern, for possibly comparing it with others.

The object of the present invention is to provide a method and an apparatus for the registering of the driving patterns of motor vehicles and thereby enable an evaluation of the total driving behavior.

This object is achieved through the features as set forth in the following claims.

In contrast with prior art apparatus for the purpose concerned, which only measure speed above a certain limit, i.e. record speed excesses and take note of these, the method and apparatus according to the invention are based on the registering of speed and acceleration/retardation and and on the sorting of these in different groups.

The apparatus uses the speed of the motor vehicle, i.e. driven distance per unit of time, to generate data describing the driving pattern of the motor vehicle. The apparatus is connected to the propulsion system of the motor vehicle, i.e. wheels or gear box, via a pulse generator adapted to generate a signal proportional to the speed of the motor vehicle. This signal is processed further in the apparatus so that individual kilometer counters are incremented; there being one counter for each speed interval, e.g. 0-10 km/h; 10-20 km/h and so forth. The sum of all counters will constitute the totally driven distance.

On the basis of the speed signal, the apparatus also generates a signal representing the acceleration/retardation (the time derivative of the speed) of the motor vehicle. This signal will be positive when accelerating and negative when decelerating. The acceleration/retardation-signal controls the kilometer counters counting the number of kilometers driven by the motor vehicle in the different areas of acceleration/retardation. Thus, the apparatus comprises two sets of counters, one set of which is

controlled by the speed signal of the motor vehicle, the other set being controlled by the acceleration/retardation-signal of the motor vehicle. Both sets of counters count the number of kilometers driven. By reading the apparatus, one may form oneself an idea of the driving pattern of the motor vehicle, the apparatus stating exact number of kilometers in the different speed zones and acceleration/retardation zones.

The interval counter according to the invention is far more versatile and advanced than prior art technique; this should also appear from the following description of an embodiment of the invention.

Said embodiment is diagrammatically illustrated in the accompanying drawing figure showing a circuit design of an interval counter for motor vehicles.

The interval counter shown comprises a pulse generator 1 which, in a manner not closer shown, is fitted for mounting on a propulsion system of a motor vehicle, i.e. wheels or gear box. The pulse generator 1 having a pulse frequency proportional to the speed of the vehicle, is adapted to give a certain number of pulses per kilometers driven.

Reference numeral 2 denotes a square wave puls from the pulse generator 1. The pulse signal 2 is simultaneously supplied to all of a row of counters.

The counters comprise fourteen speed counters 3, 4 ....16 in two sets, one set of which can be reset to zero, as well as fourteen acceleration/retardation counters 17, 18 ....30 in two sets, one set of which can be reset to zero, and being arranged in two separate groups each of which is assigned a logic circuit 31 and 31', respectively. When supplying the pulse signal 2, only one speed counter, say 3, and one

acceleration/retardation counter, say 17, activated at a time. The respective logic circuit 31, 31' controls which counter that is counting.

The pulse signal 2 enters simulatenously a pulse frequency/ voltage converter 32 adapted to convert from pulse frequency to voltage. From the voltage converter 32, a voltage signal proportional to the speed of the motor vehicle is generated. This voltage signal is supplied to a set of comparators 33 assigned the logic circuit 31 for the speed counters 3, 4 .... 16. The comparators 33 are each set on a separate speed level. The signal from these comparators 33 controls the logic circuit 31 which selects which of the speed counters that is to be active.

The voltage signal from the converter 32 is also supplied to a derivation circuit 34. From this circuit 34, a voltage signal proportional to the acceleration/retardation of the motor vehicle is achieved. This voltage signal is supplied to a set of comparators 33' assigned the logic circuit 31' for the acceleration/retardation counters 17, 18 ....30. The signal from these comparators 33' controls the logic circuit 31' which selects which of the acceleration/retardation counters that is to be active.

The apparatus/interval counter shown is likewise equipped with a total counter 35 acting as an ordinary kilometer counter. The sum of the speed counters 3, 4 .... 16 will show the very same distance driven as the total counter 35.

As mentioned, one set of counters in each group may be reset to zero. Also the total counter 35 is assigned such a counter 36. The resetable counters are being counted up in parallel to the other counters and will show the same figure. The only difference is that the users of the apparatus have the opportunity of resetting these counters

whenever this might be desirable. These counters will function in the same manner as a trip counter on a motor vehicle.

For the speed counters, an actual division would be in speed groups of 10 km/h, i.e. that a first counter counts the number of kilometers driven in the speed interval of 0-10 km/h, a second counter counting number of kilometers driven in the speed interval 10-20 km/h, and so forth. In order to restrict the number of counters, the apparatus may possibly be so adapted that all kilometers driven above an upper speed limit, e.g. 180 km/h, are counted by one counter.

For the acceleration/retardation counters, an actual division may be into accelerations/retardations from -10 $m/sec.^2$ to +10 $m/sec.^2$, using an interval width of 1 $m/sec.^2$

The physical implementation of the apparatus might comprise more counters than shown in the figure. However, only one display may be used and one multiplexer fetching one figure at a time. The method fo the invention may also be carried out using a microprocessor.

Claims

1. A method for the registering of the driving pattern of a motor vehicle, i.e. the number of kilometers driven within a first, a second, a third, etc., speed interval, and the number of kilometers driven within a first, a second, a third, etc., acceleration/retardation interval, characterized in that the speeds and accelerations/retardations of the motor vehicle are converted into pulse signals and sorted into different groups, each of which being divided into sub groups stating the number of kilometers driven within a first, a second, a third, etc., speed interval and a first, a second, a third, etc., acceleration/retardation interval, respectively, the sum of each group's sub groups' kilometer statements corresponding to the totally driven distance of the motor vehicle measured in kilometers.

2. An apparatus for carrying out the method as defined in claim 1, characterized in that it comprises two groups of counters (3-16, 17-30), one speed counter group (3-16) and one acceleration/retardation counter group (17-30), each assigned their separate logic circuit (31, 31') controlled by comparators (33, 33'), the comparators (33) of the speed counter group each being set at a separate speed level (e.g. 0-10 km/h, 10-20 km/h, etc.), the comparators (33') of the acceleration/retardation counter group each being set at a separate acceleration/retardation level (e.g. -1m/sec. , +1m/sec. , etc.), a pulse generator (1) having a pulse frequence proportional to the speed of the motor vehicle being adapted for mounting to the propulsion system of the motor vehicle, preferably wheels or gear box, and adapted to give a pulse signal (2) simultaneously to all counters of both groups, said pulse generator (1) being connected to the comparators (33) of the speed counters via a pulse frequence/voltage-converter (32)

connected to the comparators (33') of the acceleration/ retardation counters via a derivation circuit (34) deriving speed into acceleration/retardation.

3. Apparatus in accordance with claim 2, c h a r a c t e r i z e d i n that each counter of said two groups in series is connected to a similar counter resetable to zero.

4. Apparatus in accordance with claim 2 or 3, c h a r a c t e r i z e d i n that it is equipped with a total counter (35), to which, preferably, a resetable total counter (36) is connected in series, said total counters acting as ordinary kilometer counters.

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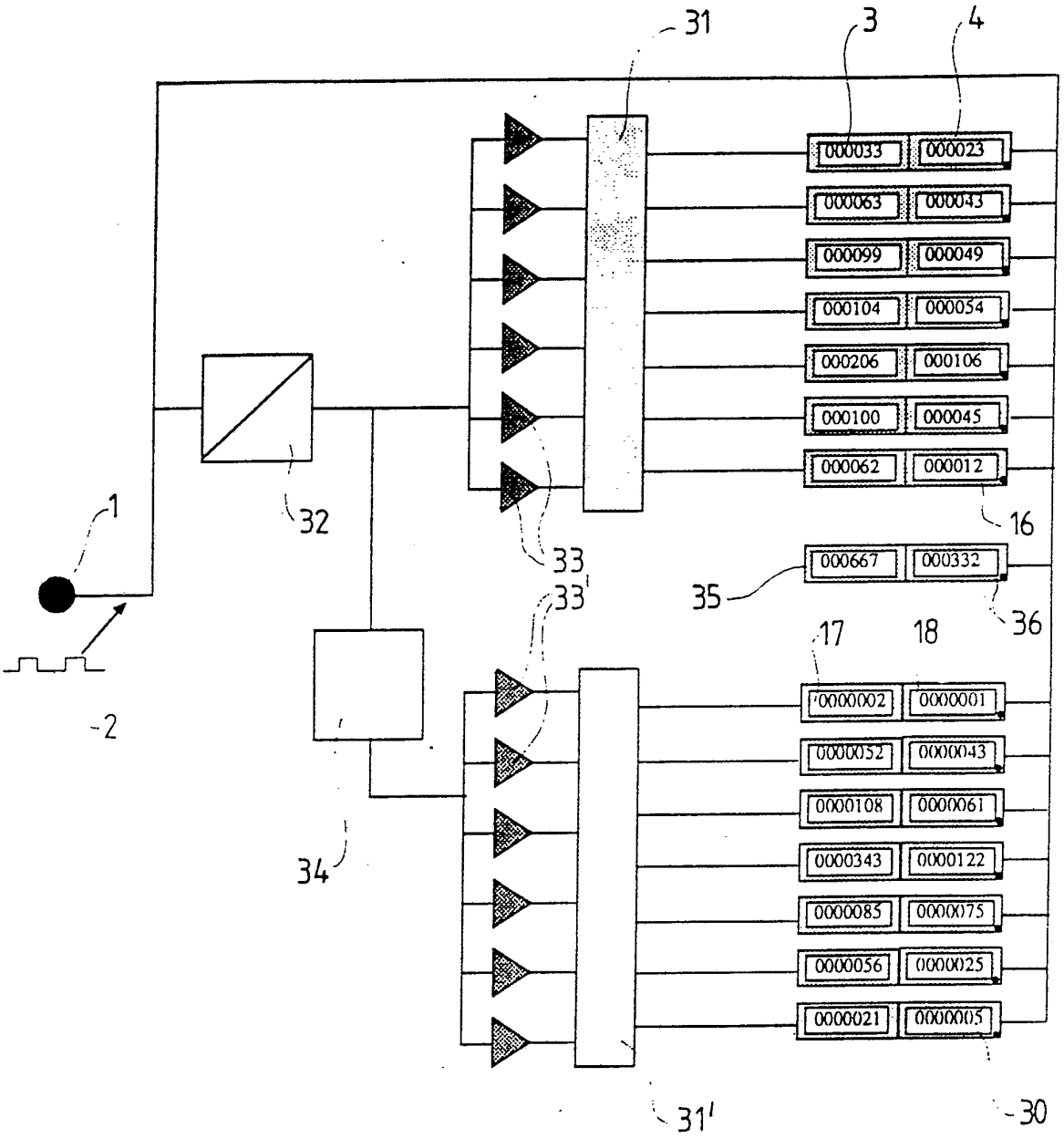
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INTERNATIONAL SEARCH REPORT

International Application No PCT/NO 89/00081

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC4: G 07 C 5/10

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC4	G 07 C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

SE,DK,FI,NO as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	US, A, 4644368 (MUTZ) 17 February 1987, see column 7, line 59 - column 8, line 19; figure 4 --	1,2
A	EP, A2, 0189204 (CATERPILLAR MITSUBISHI LTD) 30 July 1986, see page 13, line 5 - line 11 --	1,2
A	EP, A2, 0129949 (HIDDEN-1 (PROPRIETARY) LIMITED) 2 January 1985, see page 13, line 3 - line 25 --	1,2
A	WO, A1, 87/04253 (TACOM LTDA) 16 July 1987, see page 6, line 26 - page 7, line 6 --	1,2

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* Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
1989-11-24	1989 -11- 30
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	HANS BANDELIN

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/NO 89/00081

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4644368	17/02/87	DE-A- 3505068	19/06/86
		EP-A- 0191413	20/08/86
		JP-A- 61190687	25/08/86
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