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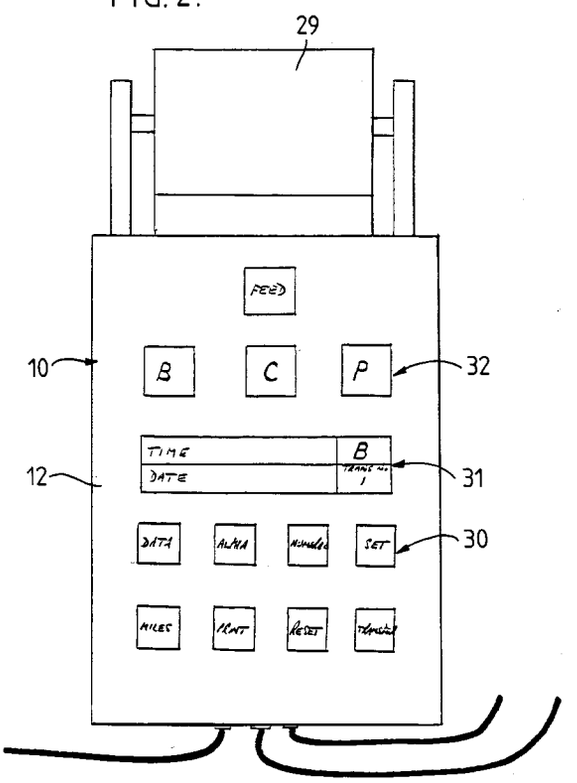
(54) Distance recording apparatus for vehicles.

(57) Vehicle distance recording apparatus (10) for recording journey distances and the category of use of the vehicle for each journey and providing a correlated record thereof, the apparatus comprising an alarm to alert the driver of the vehicle to enter into the apparatus a journey purpose code (B, C, P) at the start of each journey, a keyboard (30) to enable the driver to enter distance data and other data, a clock to generate time and data information, a distance recorder to generate distance data from signals generated by movement of the vehicle, and a printer (29) (or optionally an interface) for output on user command of distance correlated with other information for each journey.

FIG. 2.



EP 0 602 868 A2

This invention concerns distance recording apparatus for vehicles.

Prior Art

Most private vehicles are provided with an odometer, which is usually incorporated in a speedometer assembly and is driven by a rotary cable (flexible shaft) from some part, such as the gearbox, of a vehicle's transmission.

Some commercial vehicles are provided with a tachograph which effectively incorporates both an odometer and speedometer, but additionally provides a graphical record, by way of a removable tachogram, of the vehicle's velocity and distance travelled.

It is also known to fit speedometer assemblies with visible alarms responsive to vehicle controlled inputs signals, e.g. to indicate a malfunction of vehicle equipment.

The Problem

Some vehicles are employed for business and personal non-business uses; and, for personal, business or taxation reasons, the users of such vehicles may need to keep records of the respective distances travelled in the two categories of use. Producing such records from odometer readings is laborious, and gives rise to problems if the user forgets to make meticulous notes of the readings at the start and finish of every journey in combination with notes of the purpose of the journeys.

Equally problematical is the collection, interpretation and abstraction of distance information from tachograms.

Although tachograms provide permanent evidence of distances, they are bulky to store and require the vehicles to be fitted with calibrated tachographs, which are expensive and cannot be retro-fitted conveniently into many kinds of private vehicles.

The invention

The invention primarily provides distance recording apparatus incorporating a distance recorder and an alarm responsive to a vehicle controlled input, characterised in that the apparatus includes a journey purpose recorder actuable by a manually operable journey purpose input control, and an output control actuable to provide a correlated output of journey distance and purpose recorded by the recorders.

The distance recorder may be arranged to receive a digital or analogue distance signal input from a distance signal generator. Said generator may be a coupling incorporating a pulse generator connectable between a speedometer cable and a vehicles gearbox or speedometer; or may be provided by an electronic speedometer or odometer generating internal distance signals which can be tapped for the distance recorder; or may comprise a unit attachable to a vehicle to sense rotation of part of the vehicle's transmission or to sense linear movement of the vehicle along a road.

The alarm is preferably responsive to the input of an electrical start signal which arises when a vehicle's ignition or main electrical system is switched on, or, especially in the case of vehicles having compression ignition engines, when a vehicle's starter motor is energised. The alarm may give an audible or a visible warning signal in response to said electrical signal.

The journey purpose recorder is preferably associated with the alarm to cancel the warning signal when a journey purpose is manually entered; and may be arranged to default to assume a predetermined journey purpose recording state if no manual input is entered within a predetermined period after a warning signal has issued.

The output control is preferably arranged to provide items of information which include a start distance recorded by the distance recorder upon receipt of the start signal, a finish distance recorded by the distance recorder upon input of a termination signal, and the journey purpose. The termination signal may be the switching off of the vehicle's ignition or main electrical system, i.e. the cessation of the start signal. The output device may also obtain date and time information from a clock of the apparatus, and provide further items of information including date of journey and the times of journey start and finish.

The journey purpose and distance recorders may be responsive to an additional manual input to cancel the warning signal and resume recording a subsequent journey as part of the last started journey, for avoiding the risk of producing misleading items of information if a journey is interrupted.

The distance recorder may be arranged to operate in recognised units of distance, e.g. miles or kilometres, from a pre-calibrated distance signal input.

However, it is preferred to arrange the distance recorder to operate in arbitrary units, and to incorporate into the apparatus proportioning means into which data representing distance measurements can be entered manually and which is arranged to compare entered measurement data with recorded unit data for generating a conversion factor for converting the recorded distances from said arbitrary units into recognised units of distance.

Both of the recorders and parts of the alarm and output control may be integrated in a microprocessor or equivalent electronic circuitry, optionally, together with parts of the proportioning means, in a main unit having thereon manually operable members for entering journey purpose and output demand inputs, and, optionally, measured distance data.

However, the or duplicate manually operable members may be provided on a remote unit, of rela-

tively small size, for convenient mounting in an accessible position in a vehicle.

Either or both of the units may incorporate a display for the warning signal, recorded data, time and date and/or data inputs.

The main unit is preferably provided with a printer to provide a printed output; but may be connectable to an external printer or a computer, to print or process the output.

The invention more particularly provides vehicle distance recording apparatus for recording journey distances and the category of use of the vehicle for each journey and providing a correlated record thereof, the apparatus comprising an alarm to alert the driver of the vehicle to enter into the apparatus a journey purpose code at the start of each journey, a keyboard to enable the driver to enter distance data and other data, a clock to generate time and date information, a distance recorder to generate distance data from signals generated by movement of the vehicle, and a printer (or optionally an interface) for output on user command of distance correlated with other information for each journey.

The invention will be described further, by way of example, with reference to the accompanying diagrammatic drawings, wherein:-

FIGURE 1 shows a function-block circuit diagram of apparatus of the invention;

FIGURE 2 shows the front of a main unit of the invention:

FIGURE 3 shows a log printout;

FIGURE 4 shows the front of a remote unit of the apparatus;

FIGURE 5 shows the front of a proportioning device of the apparatus; and

FIGURE 6 shows a signal generator of the apparatus.

Referring to FIGURE 1, the apparatus primarily comprises circuitry in a main unit 10 having associated therewith a printer 11 and an operating panel 12. To simplify an explanation, the circuitry is represented schematically in FIGURE 1 in the form of functional blocks shown in a block circuit diagram, whereas in reality the functions of said blocks are performed primarily in a microprocessor based system.

The functional blocks which form parts of the apparatus which can be integrated or embedded in a microprocessor include a distance recorder 20, proportioning means 21, a data receiver 22, an output control 23, a clock 24, a journey purpose recorder 25, an alarm controller 26 and a printer controller 27, and, optionally, a proportioning device 17.

An internal power supply 13 incorporating a rechargeable cell is provided in the unit 10, and a sound generator 14 is mounted on or provided in the unit 10.

The operating panel 12 is provided with a data-entry keyboard 30, including multi-function keys and control keys, a display 31 and a journey purpose keyboard 32; and, optionally a connection 33 for a remote panel 34 on which the display 31 and keyboard 32 are duplicated.

The distance recorder 20 has input terminals 35 for analogue and digital distance signals from a vehicle provided distance signal generator, and has a further input terminal 35A for signals from a distance signal generator 36, optionally via the proportioning device 17 of the apparatus.

The recorder 20 is arranged to record distances in arbitrary units, which units may be recognised units of linear measure if the vehicle equipment provides appropriate signals or if the optional proportioning device 17 is calibrated, e.g. on installation, so that pulses or signals from the generator 36 are converted to represent recognised units.

The alarm 26 has an input terminal 38 connectable to a vehicle's ignition or other main operating electrical circuit which has to be switched on when the vehicle is in use (and thus provides a journey start signal), and is usually switched off to stop the vehicle's engine (and thus provides a journey stop signal). A feed from the terminal is used for recharging the internal power supply 13.

The blocks are arranged to receive inputs, as follows:-

(a) vehicle and user identification data can be input manually via the keyboard 30 into the data receiver 22,

(b) distance data can be input manually via the keyboard 30 into the proportioning means 21,

(c) journey purpose codes can be input manually via the keyboard 32 into the journey purpose recorder 25,

(d) output commands and printer commands can be input manually via the keyboard 30 into the output control 23.

The blocks are arranged (as partially represented by the interconnections therebetween in FIGURE 1) to interrelate and function so that under conditions in which the terminal 38 is de-energised, the previously recorded and input data is held in memory, and time and date information is displayed in the display 31. The internal power supply 13 may be arranged to shut down the display if the stored power falls below a predetermined level.

Upon energisation of the terminal 38 (receipt of the start signal) the alarm 26 causes the generator 14 to emit an audible warning until halted by the recorder 25 in response to entry of a purpose code either manually or automatically by default to a predetermined code on lapse of a predetermined time; and the recorder 20 will record a start time and date.

During travel the recorder 20 counts and stores the units of distance travelled and records a final count, when the terminal 38 is next de-energised (receipt of the stop signal), together with a stop time and date.

Upon entry of a print command into the output control 23, the control 23 causes the printer, via printer controller 27 to print-out the vehicle and user identification, the distance or distances travelled, the start and stop times and dates, and journey purpose identifications.

If the units arise from signal inputs of pre-calibrated measurements of distance, the output will be in recognised units of linear measure.

If on the other hand the units are arbitrary, then a print-out converted to recognised units of linear measure can be obtained by:-

(a) Prior to the start of a journey or series thereof, entering distance data manually, which data may be taken from a reading of the vehicle's odometer, into the proportioning device 21.

(b) At the end of that journey or the series, again entering data taken from a further reading of the odometer.

(c) Entering a miles or kilometres command into the control 23.

(d) Commanding a printout.

The control 23 causes the units recorded to be compared with the odometer distance data so that the device 21 calculates a correction factor to convert said units into, e.g. miles or kilometres, as commanded, for the printout. Said conversion factor and the selected units of measure are stored, for automatic conversion of subsequent journey distance data.

The apparatus has a memory 28 arranged to record periodical, e.g. daily, weekly or monthly, totals of stored information for printing out or to provide data to a terminal or port 16 for connection to a computer, e.g. in an office accounts or vehicle fleet management department.

In this embodiment the apparatus includes the memory 28 also records summaries details and totals of data and information taken from the periodical print-outs of information for producing a long term e.g. annual report.

Additionally, each journey is identified by a transaction number, which number is increased by a count of one each time the journey recorder 25 is actuated by energisation of the terminal 38.

Clearly, all the memory, recording and data storage functions of the blocks can be readily performed in the memory or memories of a microprocessor.

The apparatus preferably has additional functions, including that of enabling parts of an interrupted journey to be recorded as a single journey, in which the journey transaction number is not altered when the appropriate key is pressed on the keyboard 32.

An example of the panel 12 on the unit 10 is shown in FIGURE 2, via the keyboard 30 of which various items of information can be entered, as data for storage, for example:-

1. Company Name
2. Employees Name or Number
3. Vehicle Registration or Fleet number
4. Time
5. Date
6. Imperial/Metric
7. Distance

Data is entered by pressing either "alpha" or "numeric" keys which operate by rotation, and the letter or digit is recorded by pressing the "set" key.

Commencement mileage/kilometres and periodic mileage/kilometres are entered by pressing "mileage/kilometres" key, and then entering the distance data.

During entry of such data the display shows the item and the data being entered e.g. "Company" and "A.B.SALES".

Alternative modes of input can be applied and the method referred to is by an example only.

The keyboard 30 also includes keys for commands to be entered, including:-

1. A "Print" key, to command the output control 23 to give a printout 18 via the printer of stored information and data in the form of a log as exemplified in FIGURE 3.
2. A "Transfer" key to command the output control 23 to feed the stored information and data to the terminal or port 16.

[A printout or transfer of the annual report information from the summarising memory 28 can be obtained by pressing and holding down the respective print or transfer key for a predetermined period, e.g. 4 seconds, after a printout or transfer of the normal log.]

3. A "Reset" key, to command the apparatus to reset the recorded distances and number of journeys recorded, to zero, after a printing a log, or an annual report.

A "feed" key is provided on the panel, for causing the printer to feed when a new roll 29 of paper is being loaded into the printer.

Referring to FIGURES 2 and 4, the display 31 normally displays the time and date, the journey purpose code and the journey transition number; and the keyboard 32 has three keys "B" for business journeys, "P" for private journeys and "C" for continuations of a previous journey.

Referring to FIGURE 5, the proportioning device 17 may be mounted in a vehicle remote from the unit 10, and is set upon installation and at periodic intervals (e.g. of 2 or 3 years) by repeatedly running the vehicle for a known distance, e.g. on a rolling road, and adjusting a setting control 37 until a distance shown in an "output reading" display 39 matches the known distance, and then, optionally, locking or sealing the control 37 in its final setting. The proportioning device 17 can be left *in situ*, even if the unit 10 is removed or exchanged.

If the device 17 is employed, there may be no

need to enter opening and closing distances via the keyboard 30 (which distances, e.g. mileages are denoted by "O" and "C" respectively in the log shown in FIGURE 3) and the "units" will be in miles, so that there will be no or a zero % variation.

An example of distance signal generator 36, is shown in FIGURE 6, and comprises a body 40 having male and female threaded connecting portions to receive respectively one end fitting 41 of a speedometer cable 42 and a cable connector fitting 43 of a gearbox or speedometer; a shaft 44 having fittings to receive one end of the cable 42 and a cable device or driven member 45 of the gearbox or speedometer; a rotor 46 having a magnet 47; and a pick-up coil 48 having output terminals 49 to transmit one electrical pulse for rotor revolution to the unit 10.

The invention is not confined to details of the foregoing examples, and includes and provides apparatus having any novel feature, part or functional arrangement disclosed herein or in the accompanying drawings; novel combinations thereof; and mechanical, electronic and functional equivalents thereof. For example, the or either of the keyboards may have a set of alpha and/or numeric keys. The circuitry and memory functions thereof may permit the input and recording of other data and/or narrative information, for subsequent printout, e.g. the journey recorder may couple the purpose code with (or even replace the purpose code by) a journey identification such as the name or list number of a customer, business, office or branch to be visited, or other identification of journey purpose, e.g. a destination, which data or information is correlated in the output with the relevant distance and/or time information.

Claims

1. Distance recording apparatus incorporating a distance recorder (20) and an alarm (26) responsive to a vehicle controlled input, characterised in that the apparatus can be fitted in a vehicle, and includes a journey purpose recorder (25) actuable by a manually operable journey purpose input control (30), and an output control (23) actuable to provide a correlated output of journey distance and purpose recorded by the recorders (20,25), wherein the alarm (26) is responsive to input from a vehicle of an electrical start signal into the apparatus to generate an audible or visible warning signal for a driver of the vehicle, and wherein the journey purpose recorder (25) is associated with the alarm (26) to cancel the warning signal when a journey purpose is manually entered into the control (32).

2. Apparatus as claimed in Claim 1 including a printer (11) to give a printed record of the correlated output for the driver.

3. Apparatus as claimed in Claim 1 or 2 wherein the journey recorder (25) is arranged to assume a predetermined journey purpose recording state if no manual input is entered within a predetermined period after a warning signal has issued.

4. Apparatus as claimed in Claim 1, 2, or 3 wherein the output control (23) is arranged to provide items of information which includes a start distance recorded by the distance recorder upon receipt of the start signal, a finish distance recorded by the distance recorder upon input of a termination signal, and the journey purpose.

5. Apparatus as claimed in Claim 4 wherein the output control (23) also obtains date and time information from a clock (24) of the apparatus, and provides further items of information including date of journey and the times of journey start and finish.

6. Apparatus as claimed in any preceding claim wherein the journey purpose and distance recorders (20,25) are responsive to an additional manual input (32) to cancel the warning signal and resume recording a subsequent journey as part of the last started journey.

7. Apparatus as claimed in any preceding claim wherein the distance recorder (20) is arranged to operate in recognised units of distance.

8. Apparatus as claimed in any one of Claims 1 to 6 wherein the distance recorder (20) operates in arbitrary units, and wherein the apparatus incorporates proportioning means (21) into which data representing distance measurements can be entered manually and which is arranged to compare entered measurement data with recorded unit data for generating a conversion factor for converting the recorded distances from said arbitrary units into recognised units of distance.

9. Apparatus as claimed in any preceding claim wherein both of the recorders (20,25) and parts of the alarm (26) output control (23) and other parts (21,22,24,27,29) are integrated in a microprocessor.

10. Apparatus as claimed in Claim 9 wherein the microprocessor is disposed in a main unit (10) having thereon manually operable members (30,32) for entering journey purpose and output demand inputs, and, optionally, measured distance data.

11. Apparatus as claimed in Claim 11 wherein the

unit incorporates a display (31) for the recorded data, time, date and data input manually.

12. Apparatus as claimed in Claim 10 or 13 wherein duplicate manually operable members (32) are provided on a remote unit (34), of relatively small size, for convenient mounting in an accessible position in a vehicle.

13. Vehicle distance recording apparatus for recording journey distances and the category of use of the vehicle for each journey and providing a correlated record thereof, the apparatus comprising an alarm (26) to prompt the driver of the vehicle to enter into the apparatus a journey purpose code at the start of each journey, a keyboard (30) to enable the driver to enter distance data and other data, a clock (21) to generate time and date information, a distance recorder (20) to generate distance data from signals generated by movement of the vehicle, and a printer (11) or an interface (27) for output on user command of distance correlated with other information for each journey.

FIG.1.

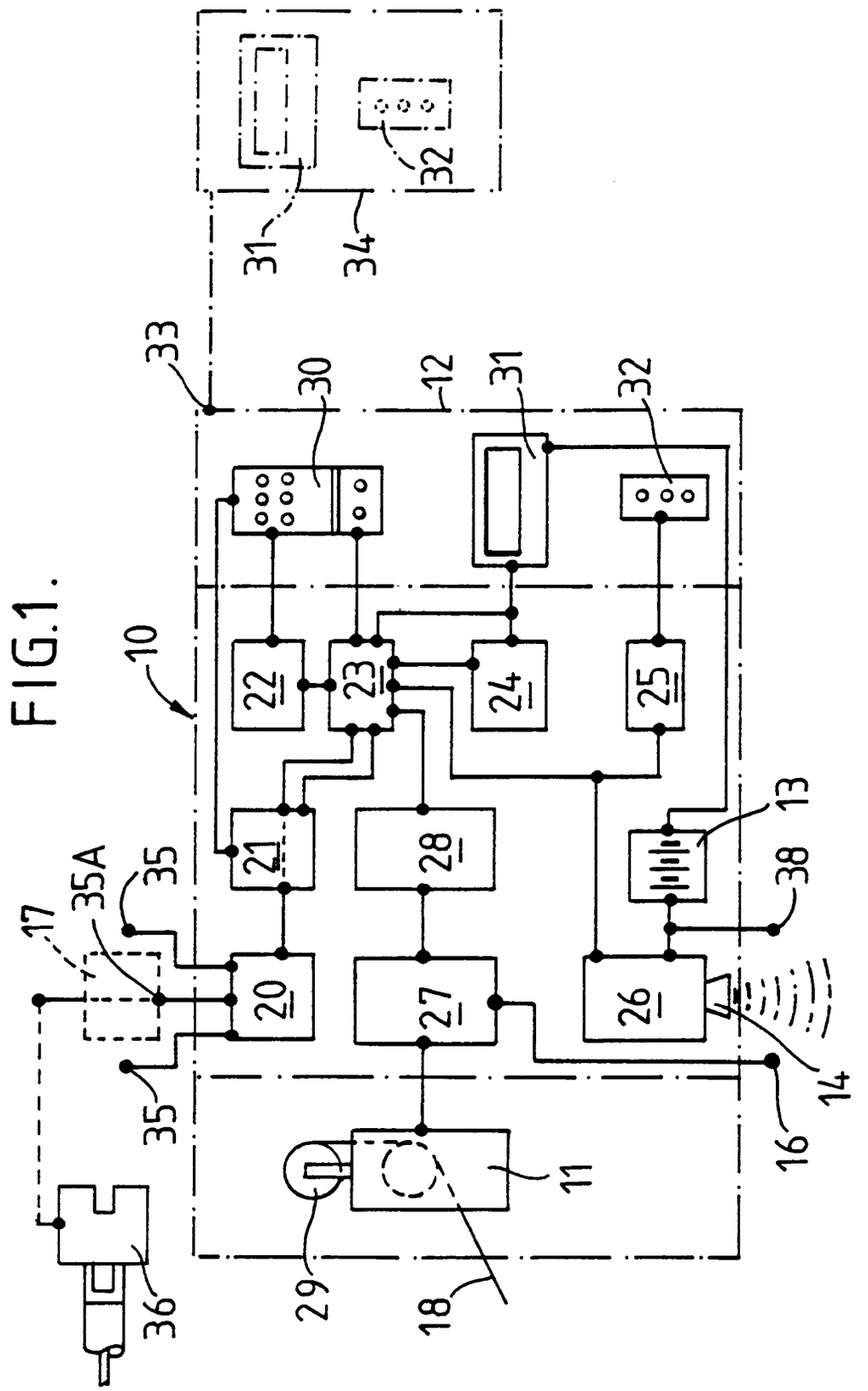

31
34
32
33
30
12
31
32
10
22
23
24
25
21
28
13
38
35A
35
17
20
27
26
14
16
35
11
29
18
36

FIG. 2.

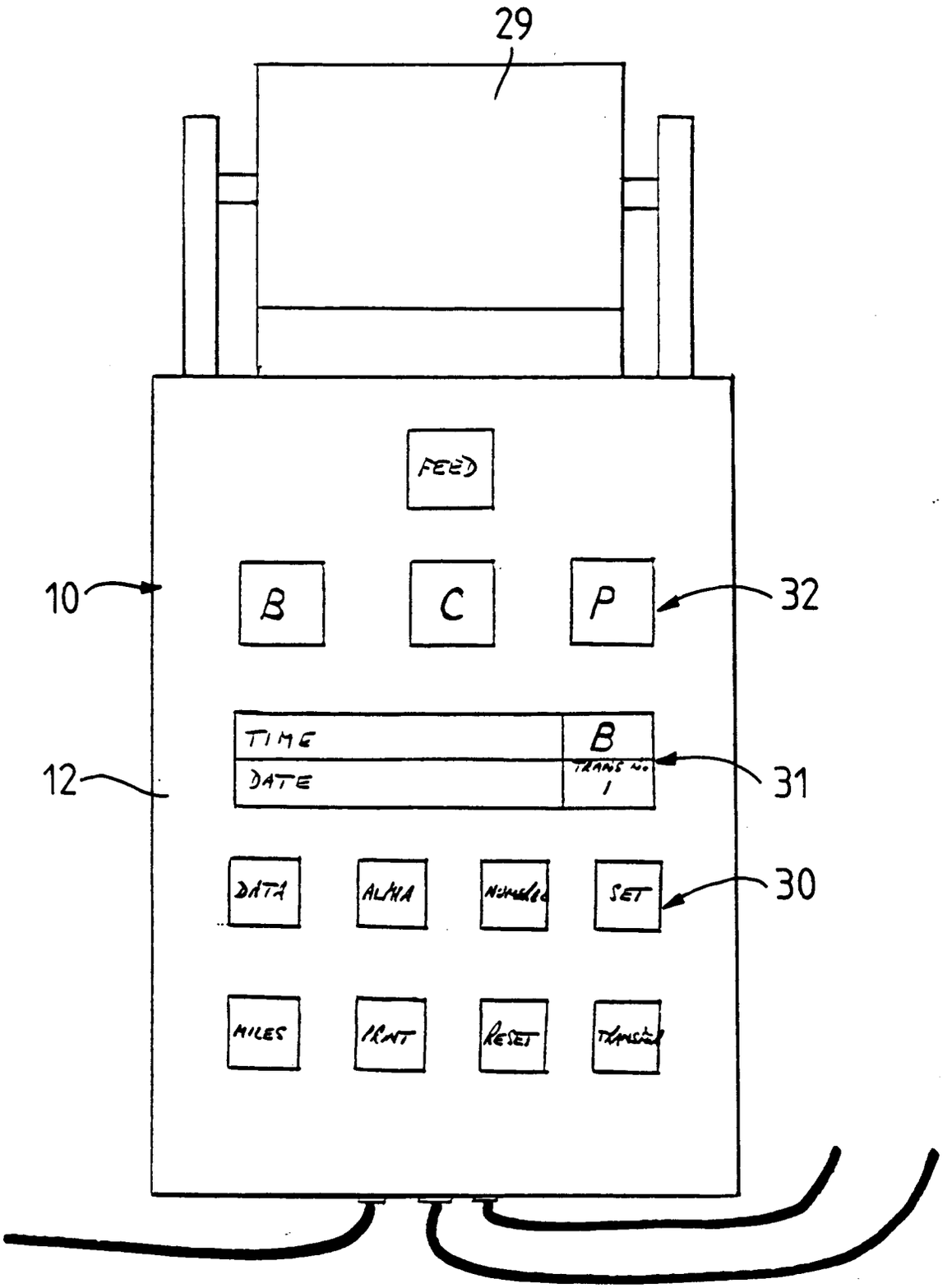
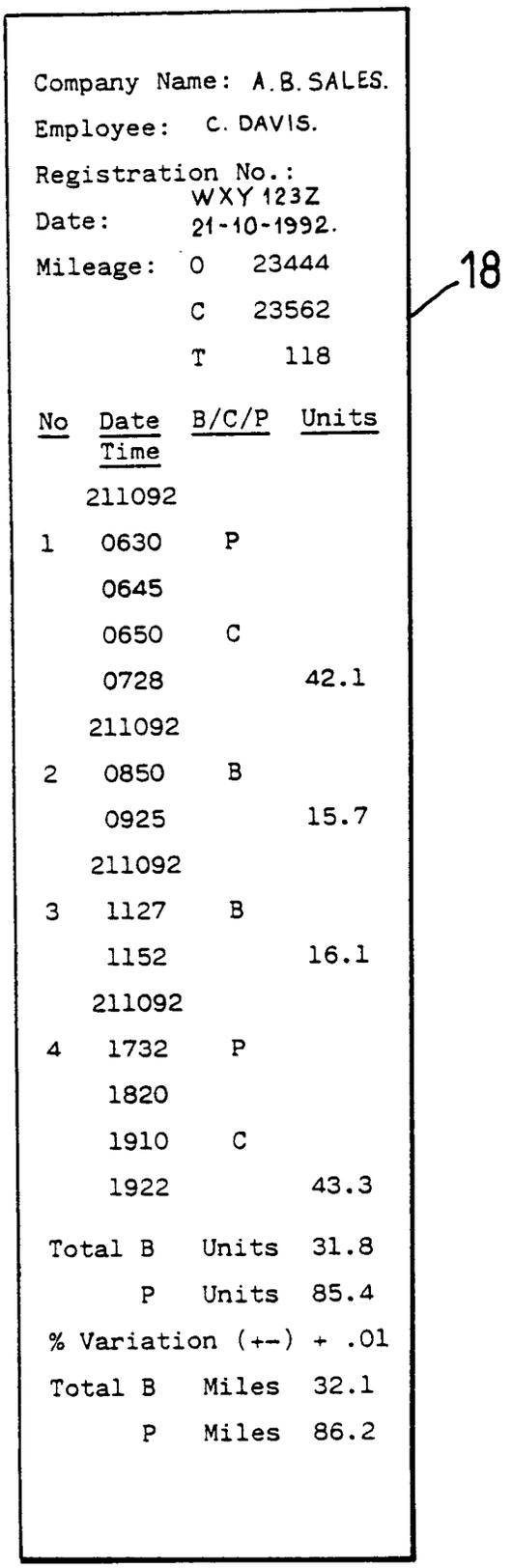

29
FEED
10
B
C
P
32
TIME
DATE
B
TRANS No.
1
12
31
DATA
ALPHA
SET
30
MILES
PRINT
RESET

FIG. 3.



Company Name: A.B. SALES.

Employee: C. DAVIS.

Registration No.: WXY 123Z

Date: 21-10-1992.

Mileage: O 23444

C 23562

T 118

18

No	Date Time	B/C/P	Units
	211092		
1	0630	P	
	0645		
	0650	C	
	0728		42.1
	211092		
2	0850	B	
	0925		15.7
	211092		
3	1127	B	
	1152		16.1
	211092		
4	1732	P	
	1820		
	1910	C	
	1922		43.3

Total B Units 31.8

P Units 85.4

% Variation (+-) + .01

Total B Miles 32.1

P Miles 86.2

FIG.4.

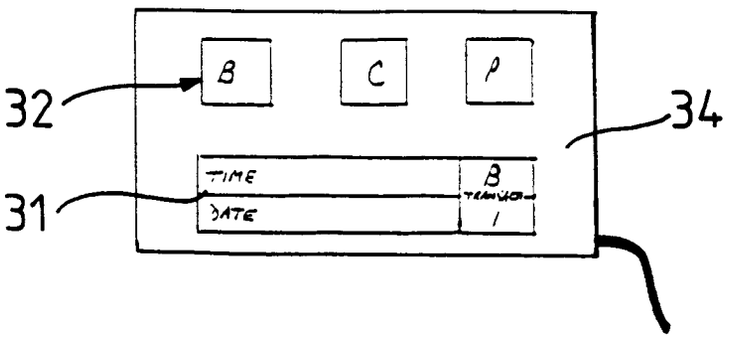


FIG.5.

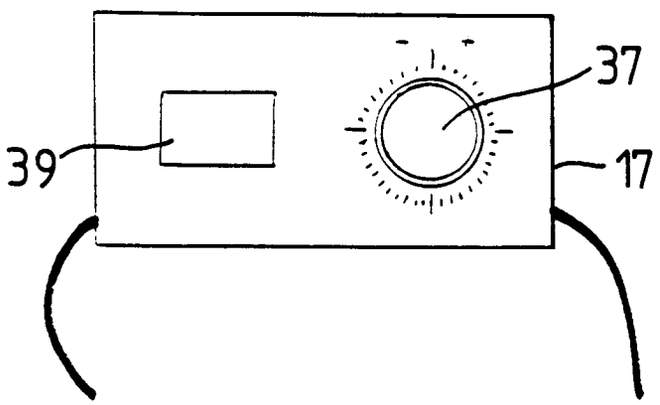


FIG. 6.