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(54) ELECTRONIC COUNTER

(57) The invention relates to an electronic counter (11) for shots from a firearm that includes an impulse sensor (12) that is electrically connected to a signal processor (13) which is in turn electrically connected to data storage (14).

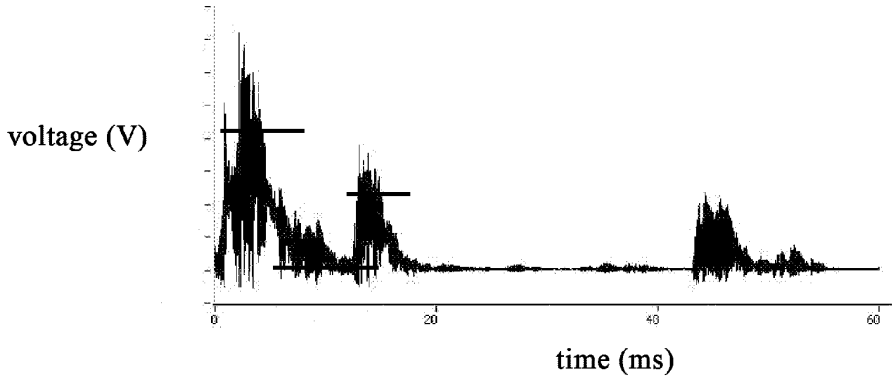

FIG. 1

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Description

OBJECT OF THE INVENTION

[0001] The present invention relates to an electronic counting device for counting the number of shots fired by an automatic or semi-automatic firearm.

STATE OF THE ART

[0002] American patent US7143644 discloses a shot-counting device assembled into a firearm that detects an impulse in said firearm upon firing a shot.

[0003] The electronic counter comprises an impulse sensor, a signal processor and a memory. The impulse sensor transmits the electric signals derived from a shot to the processor.

[0004] The processor receives a first signal and opens a reception time window. During said time window it receives a second time signal, records that a shot has been fired and stores said information in the memory.

[0005] A drawback of the aforementioned electronic counter stems from the fact that a time window is opened whenever a signal is received from the impulse sensor with the object of a subsequent signal for recording a shot.

[0006] If the signal received by the processor from the impulse sensor does not come from a shot, electricity is consumed to open a time window to await a subsequent signal. This unnecessary consumption reduces the service life of an electric battery that feeds power to the electronic shot counter.

SUMMARY

[0007] The present invention aims to resolve one or more of the aforementioned drawbacks by means of a shot-counting device assembled into a firearm, as claimed in the claims.

[0008] An object of an embodiment of the electronic shot-counting device is to partially count the number of shots fired using the cartridges stored in a cartridge storage unit, as well as the total number of shots fired by the firearm to determine the maintenance periods of the firearm and the remaining service life of the firearm itself and of each of the elements which, once assembled, compose the firearm.

[0009] Another object of the embodiment is to perform the aforementioned functions with minimum energy consumption in order to lengthen the service life of the source of electricity that supplies electricity to the electronic shot-counting device.

[0010] The electronic shot-counting device is adapted to distinguish between impulses associated with a shot fired by the firearm and other types of impulses resulting from the inappropriate use of the firearm. This type of analysis is carried out within a minimum period of time and with minimum electricity consumption.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] A more detailed explanation of the invention is provided in the following description, which is based on the figures attached hereto:

Figure 1 shows, along a voltage-time coordinate axis, a signal generated by an impulse sensor at one of its outlets corresponding to a shot fired by an automatic or semi-automatic firearm; and

Figure 2 shows a block diagram of the electronic counting device.

EMBODIMENT

[0012] In relation to figure (2), an electronic shot-counting device (11) comprises an impulse sensor (12) of the piezoelectric type, accelerometer, etc. electrically connected to a processor (13) of microprocessor-type signals (13) which, in turn, is electrically connected to a data memory-type removable data storage medium (14).

[0013] The electronic counter (11) is assembled into a firearm of the automatic or semi-automatic type, in such a manner that the impulse sensor (12) is disposed near the trip string of the firearm to directly receive the impulse peaks produced in the firearm when a shot is fired therewith.

[0014] In relation to figures 1 and 2, on firing a shot with the firearm, the impulse sensor (12) of the electronic counting device (11) supplies, at one of its outlets, a train of impulse peaks or impulse signals relative to a shot fired by the firearm. The impulse signal is received at an inlet of the signal microprocessor (13).

[0015] It must be observed that a plurality of standard impulse signals respectively associated to each type of cartridge that can be fired by the firearm are stored in the storage memory.

[0016] Given that the storage memory is removable, the standard impulse signals are loaded therein, for example, by inserting the removable memory in a USB-type connector of a laptop-type client device. Once the standard impulse signals have been stored in the memory, it is inserted in the corresponding connector of the electronic counter (11) of the firearm.

[0017] Therefore, before a shot is fired by a marksman he/she must indicate the cartridge being fired from among those stored in the memory.

[0018] The type of cartridge loaded in the firearm to be shot is selected through a wireless interface unit connected to an inlet/outlet data unit of the electronic counter (11), which is connected to the signal microprocessor (13).

[0019] Once the type of cartridge to be fired has been selected, the microprocessor (13) preloads data associated with the standard impulse signal of the selected cartridge.

[0020] The standard impulse signal includes an impulse peak train comprising at least two successive im-

pulse peaks with characteristic parameters associated with each of the impulse peaks of the impulse signal.

[0021] An impulse peak relative to the shot itself, the following impulse peak relative to a sliding movement in the direction of a sliding element of the firearm associated with the movement of the fired cartridge case, for example, a slide, a drum, etc. and, finally, a subsequent impulse peak relative to the introduction of a cartridge ready to be fired in the chamber of the firearm. It has been observed that, in the event that there is no cartridge ready to be fired in the chamber of the firearm. It should be noted that this last peak is not observed if there is no cartridge in the chamber.

[0022] Therefore, each type of impulse peak has a rise and fall surge, a maximum peak value, distance between successive peaks, etc., which are parameters that characterise the impulse signal as a whole.

[0023] Consequently, in accordance with the characteristic parameters derived from the standard impulse signal preloaded in the microprocessor (13) , it determines the instants at which samples must be taken of the rise and fall surge of a first impulse peak received at the microprocessor inlet (13) , which can be associated with an impulse signal relative to a shot fired by the firearm.

[0024] Once the samples have been obtained, the microprocessor (13) analyses whether the voltage values of the samples obtained are greater than a predetermined threshold voltage value; if the comparison is positive, i.e. the voltage values exceed the threshold value, the microprocessor (13) will receive a subsequent impulse peak.

[0025] In short, in the steps described above, the microprocessor (13) has calculated that in a impulse peak time, i.e. the peak area, the samples taken at the impulse peak received will exceed the threshold voltage value corresponding to an impulse peak associated with a stored standard impulse signal, the threshold value being greater than the maximum value of the next impulse peak of the standard impulse signal.

[0026] If the area calculated previously by the microprocessor (13) is smaller than the area derived from the stored standard impulse signal, the microprocessor (13) will determine that the impulse peak received does not correspond to an impulse peak associated with an impulse signal relative to a fired shot. As a result of the foregoing, the signal microprocessor (13) switches to a minimum energy consumption or standby state (sleep mode).

[0027] However, if the area calculated previously by the microprocessor (13) is greater than or equal to the area derived from the stored standard impulse signal, it will take a predetermined number of samples in a trough area subsequent to the impulse peak received.

[0028] Likewise, the signal microprocessor (13) , in accordance with the standard impulse signal preloaded therein, determines the instants at which it must take the predetermined number of samples of a trough period between successive impulse peaks associated with an impulse signal relative to a shot.

[0029] Once the samples have been taken, the microprocessor (13) analyses whether the voltage values of the samples obtained are lower than a predetermined threshold voltage value; if the comparison is positive, i.e. the voltage values are less than or equal to the threshold value, the microprocessor (13) will take a predetermined number of samples relative to an impulse peak separated from the first impulse peak received, which is previous to the aforementioned trough area.

[0030] However, if the samples obtained previously by the microprocessor (13) exceed the threshold of the trough area derived from the stored standard impulse signal, the microprocessor (13) will determine the that a trough area between impulse peaks associated with an impulse signal relative to a fired shot has not been received, as a result of the foregoing, the signal microprocessor (13) will switch to a minimum energy consumption or standby state (sleep mode) .

[0031] Therefore, in accordance with the characteristic parameters derived from the standard impulse signal preloaded in the microprocessor (13) , it will determine the instants at which it must take samples at an impulse peak subsequent to the trough area following the impulse peak received at the microprocessor (13) inlet.

[0032] Similarly, once the samples have been taken, the microprocessor (13) analyses whether the voltage values of the samples obtained exceed a second predetermined threshold voltage value; if the comparison is positive, i.e. the voltage values are greater than the threshold value, the microprocessor (13) will receive a subsequent impulse signal trough area.

[0033] In accordance with the standard impulse signal preloaded in the signal microprocessor (13), it will determine the instants at which it must take a predetermined number of samples relative to a trough subsequent to a second impulse peak received at the microprocessor (13) inlet.

[0034] Once the samples have been taken, the microprocessor (13) analyses whether the voltage values of the samples obtained are lower than a predetermined threshold voltage value; if the comparison is positive, i.e. the voltage values are less than or equal to the threshold value, the microprocessor (13) will receive a predetermined number of samples relative to an impulse peak separated from the second impulse peak received, which is prior to the aforementioned trough area.

[0035] However, if the area calculated previously by the microprocessor (13) is smaller than the area of the trough area derived from the stored standard impulse signal, the microprocessor (13) determines that a trough area between impulse peaks associated with an impulse signal relative to a fired shot has not been received; as a result of the foregoing, the signal microprocessor (13) switches to a minimum energy consumption or standby state (sleep mode) .

[0036] Therefore, in accordance with the characteristic

parameters derived from the standard impulse signal preloaded in the microprocessor (13) , it determines at what instants it must take samples at the impulse peak subsequent to the trough area that followed the last impulse peak received at the microprocessor (13) inlet.

[0037] Similarly, once the samples have been taken, the microprocessor (13) analyses whether the voltage values of the samples obtained exceed a predetermined threshold voltage value; if the comparison is positive, i.e. the voltage values are greater than the threshold value, the microprocessor (13) records an additional shot in the count kept in the storage memory.

[0038] It must be observed that the microprocessor (13) increases by one unit the count of the number of shots fired by the firearm, even if the microprocessor (13) does not receive the impulse peak relative to the introduction of a cartridge ready to be fired in the firearm chamber, provided that the microprocessor (13) has verified that two impulse peaks separated by a trough area and a second trough area subsequent to the impulse peak relative to the sliding movement of the firearm slide have been received.

[0039] The microprocessor (13) generates a warning signal relative to an empty cartridge storage unit at one of its outlets, which shows the marksman the number of shots fired by the cartridge barrel (14) currently assembled into the firearm, the total number of shots fired by the firearm, the warning signal relative to an empty cartridge barrel (14), etc.

Claims

1. An electronic counting device for counting the number of shots fired by a firearm, **characterised in that** the electronic counting device (11) comprises an impulse sensor (12) electrically connected to a signal processor (13) which, in turn, is electrically connected to a data storage medium (14).

2. A device, according to claim 1, **characterised in that** the electronic counting device (11) is adapted for being assembled into the firearm and wherein the impulse sensor (12) is in proximity of the trip string of the firearm to supply impulse peaks at one of its outlet terminals.

3. A device, according to claim 1, **characterised in that** the data storage medium (14) is adapted to store impulse peaks associated with standard impulse peaks relative to shots fired by the firearm using different types of cartridges.

4. A device, according to claim 3, **characterised in that** the data storage medium (14) is of the removable memory type.

5. A device, according to claim 3, **characterised in that** a wireless interface unit is connected to a data input/output unit (15) connected to the signal microprocessor (13) of the electronic counting device (11) in order to select the type of cartridge loaded in the firearm.

6. A method for counting shots fired by a firearm, **characterised in that** the method comprises the following steps:

   - selection of a type of cartridge stored in a data storage medium (14);
   - procurement of a plurality of samples at predetermined instants of an impulse peak received at an inlet terminal of a signal microprocessor (13), in accordance with characteristic parameters derived from a standard impulse signal associated with the type of cartridge selected;
   - comparison of the voltage value of the samples obtained with a predetermined threshold voltage value based on an impulse peak relative to the shot itself comprised in the standard impulse signal selected; in the event that the samples obtained are greater than or equal to the predetermined voltage threshold and are maintained during a determined time interval by the standard impulse signal; and
   - procurement of a predetermined number of samples at a trough area subsequent to the impulse peak received.

7. A method, according to claim 6, **characterised in that** the method comprises the following steps:

   - comparison of the voltage value of the samples obtained with a predetermined threshold voltage value based on a trough area subsequent to the impulse peak relative to the shot itself comprised in the standard impulse signal selected; in the event that the samples obtained are less than or equal to the predetermined voltage threshold and are maintained during a determined time interval by the standard impulse signal; and
   - procurement of a predetermined number of samples at an impulse peak relative to a sliding movement in the direction of a sliding element of the firearm associated with the movement of the fired cartridge case.

8. A method, according to claim 7, **characterised in that** the method comprises the following steps:

   - comparison of the voltage value of the samples obtained with a predetermined threshold voltage value based on an impulse peak relative to a sliding movement comprised in the standard impulse signal selected; in the event that the samples obtained are greater than or equal to the

predetermined voltage threshold and are maintained during a determined time interval by the standard impulse signal; and
- increase by one unit of the shot count made by the electronic counting device (11).

9. A method, according to claim 8, **characterised in that** the method comprises the following step:

- transmission of the shot count to a display device that can be assembled into the firearm.

10. A firearm that stores cartridges for being fired, according to any of claims 1 to 5, **characterised in that** the firearm comprises an electronic shot-counting device (11).

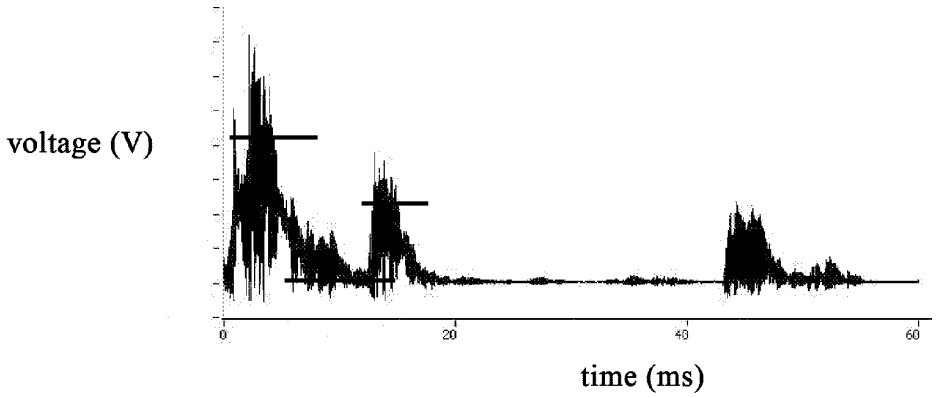

FIG. 1

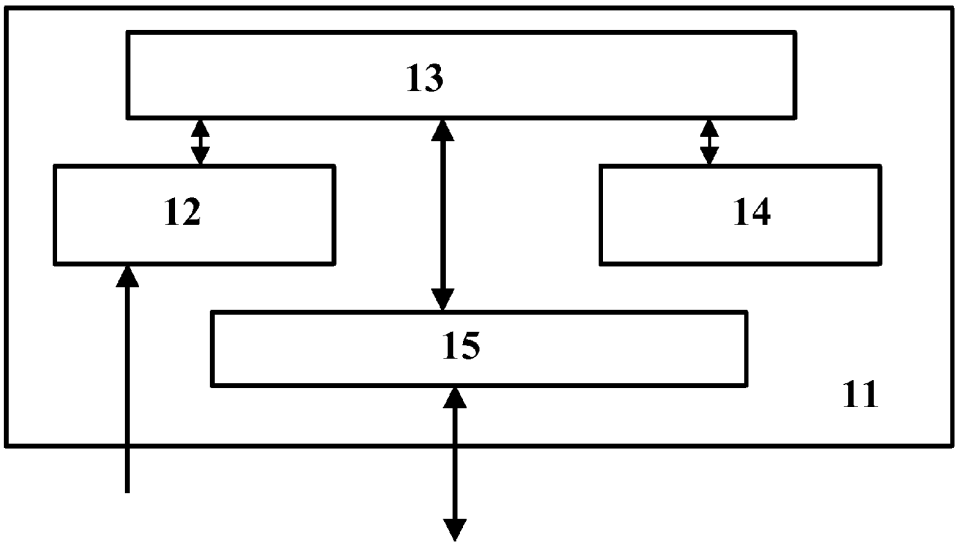

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2010/070741

A. CLASSIFICATION OF SUBJECT MATTER

F41A9/01 (2006.01)
F41A9/62 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F41A

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 2009156944 A1 (BERETTA ARMI SPA ET AL.) 30/12/2009, paragraphs[52 - 65]; paragraphs[74 - 76]; paragraphs [84 - 85].	1-10
X	US 5918304 A (GARTZ KARL) 29/06/1999, abstract; column 1, lines 50 - 59; column 2, lines 45 - 58; claim 6, figures.	1-10
X	US 2009277065 A1 (CLARK ROBERT BERNARD IREDALE ET AL.) 12/11/2009, abstract; paragraphs[40 -45]; figure 1, figures 4 - 6.	1-5,10

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"O" document referring to an oral disclosure use, exhibition, or other means.
"P" document published prior to the international filing date but later than the priority date claimed
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search	Date of mailing of the international search report
26/07/2011	**(02/08/2011)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer C. Piñero Aguirre Telephone No. 91 3493405

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2010/070741

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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REFERENCES CITED IN THE DESCRIPTION

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