



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
10.02.2010 Bulletin 2010/06

(51) Int Cl.:
F41A 19/01 (2006.01)

(21) Application number: **07765890.4**

(86) International application number:
PCT/ES2007/070105

(22) Date of filing: **30.05.2007**

(87) International publication number:
WO 2008/145773 (04.12.2008 Gazette 2008/49)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(72) Inventor: **Delgado Acarreta, Raul**
31500 Tudela (ES)

(74) Representative: **Elzaburu Marquez, Alberto**
Elzaburu S.L.P.
Miguel Angel 21
28010 Madrid (ES)

(71) Applicant: **Delgado Acarreta, Raul**
31500 Tudela (ES)

(54) **DEVICE FOR CONTROLLING AMMUNITION CONSUMPTION IN REAL TIME**

(57) Device (12) for counting the total number of shots fired by a firearm (11) and those fired with a same loader mounted on the weapon by means of the acquisition, analysis and interpretation of physical parameters relating to its firing cycle, in such a way that the information obtained is shown in real time on a visual display unit with the activation, visual display and setting to zero

being automatic actions without intervention from the user, by means of a computer programme, with it being possible to carry out such operations manually as well. The visual display unit may show other parameters of the firearm's operation (11) such as the temperature of those points most likely to overheat so that the weapon may be used with safety and precision.

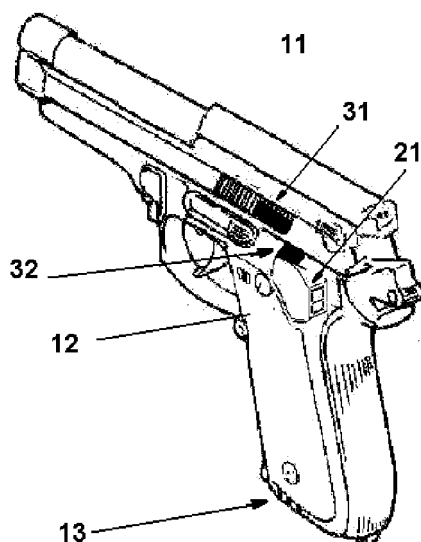


FIG. 1a

Description

OBJECT OF THE INVENTION

[0001] This invention refers, in general, to a device for counting shots fired with a firearm. More specifically, this invention refers to a device which counts the shots made with a firearm, albeit an automatic, semiautomatic or manual weapon, by means of the acquisition, analysis and interpretation of signals generated in the firearm's firing cycle. The device functions automatically, activating, disconnecting and setting at zero when the ammunition is consumed from the loader in use, therefore the firearm user does not intervene in the operation of the aforementioned device, and furthermore is provided with information on the ammunition consumption in real time as it is produced.

STATE OF THE ART

[0002] Currently the improvement of firearms, such as short arms or pistols has led to a pistol loader having a capacity to house more than a dozen cartridges, for example, 18 cartridges.

[0003] In a revolver type firearm, that is, a firearm which has drum normally able to hold 6 cartridges, it is relatively easy to mentally control the number of cartridges shot or used. In the case of a pistol which mounts a loader which can store 18 cartridges, plus one in the chamber, the task of controlling the number of shots carried out may become arduous and complicated, and the shooter may be surprised with the last unexpected shot that is, without prior warning.

[0004] In automatic firearms, with a high shooting rate, between 250 and 1200 shots per minute, the problem is further aggravated as even the slightest excess of time pressing the trigger leads to an enormous waste of ammunition. In manual activation, even though the amount of ammunition spent is much more restrained, as we will be able to keep count of the ammunition spent and the total number of shots fired with the firearm.

CHARACTERISATION OF THE INVENTION

[0005] This invention seeks to resolve or reduce one or more of the disadvantages described above by means of an automatic shot counter such as that defined in claim 1. Embodiments of the invention are established in the dependent claims.

[0006] One object of the invention is to provide a device which is able to count and show, in real time, the number of shots fired with the firearm by means of the weapon's firing cycle.

[0007] The shot counter in this invention counts the number of shots fired with the firearm which has a dynamic or static firing cycle.

[0008] A dynamic firing cycle is that which is fired by an automatic or semiautomatic firearm, which includes

at least the mechanical actions of shooting, hammering and loading in such a way that it is prepared for the next shot and which implies movement of specific mechanical elements. Each dynamic cycle corresponds to a partial count and the sum of all the partial counts, that is, the shots fired, corresponds to a total count of the number of shots fired by the firearm throughout its operative life.

[0009] In turn, the static firing cycle is defined as that made by a firearm which comprises, at least, the mechanical action of shooting, and in which the operations of introducing the cartridge into the chamber and extraction of the spent cartridge are made manually. Each static cycle corresponds to a partial count and the sum of all the partial counts, that is, the shots fired, corresponds to a total count of the number of shots fired by the firearm throughout its operative life

[0010] The result of these counts is shown, in real time, in a visual display unit which may or may not be incorporated in the firearm, thus forming part of the shooter's equipment, or of a data collection centre of a multiplicity of shooters. As a result, the shooter is able to know the number of cartridges available at any given movement, permitting him to more effectively control consumption of the ammunition and avoiding the dangerous surprise of running out of ammunition at a highly emotional tense moment.

[0011] Furthermore, the total counter of the shots fired by the firearm enable perfect maintenance of those parts which undergo most wear during use, thus preventing irreparable damage to the firearm.

[0012] In firearms which make dynamic firing cycles, the count thereof is made in one of the following two ways In the first, on the basis of times and speeds of displacement of a linear or rotational movement of an element which is displaced in reaction to the shot, thus forming part of the firearm's closing system.

[0013] In the second, on the basis of the characteristics of the disturbances generated in at least one element of the firearm when the shot occurs. Parameters which characterise a disturbance may be for example, amplitude, duration etc. of the disturbance.

[0014] It should be noted that in both cases it is possible to differentiate the action of shooting of any manual action made by the user thereof. It also enables identification of the last available cartridge which permits the automatic setting at zero of the partial counter.

[0015] In a firearm which makes static firing cycles, the count thereof is made on the basis of the characteristics of the disturbances generated in at least one element of the firearm when the shot is produced. Parameters which characterise a disturbance may be for example, amplitude, duration etc. of the disturbance.

[0016] In this case it is also possible to differentiate the action of shooting from any other manual action carried out by the shooter.

[0017] The dynamic cycle may be complete or incomplete. A dynamic cycle should be considered to be complete when it ends with a new cartridge fed into the cham-

ber and, therefore, ready to be fired. The dynamic cycle is incomplete when the firearm is unloaded as there are no more cartridges in the loader or as it has jammed, that is, the firearm cannot fire again until a new loader has been inserted.

[0018] Another object of the invention is its ability to ensure visibility in real time of the partial and total count in a visual display unit, situated in the firearm itself or in a device situated at a distance from the firearm which is firing the shot and in any situation when using the firearm.

[0019] Another object of the invention is to make a lightweight counter with reduced dimensions which does not interfere with the use of the firearm and which is simple to mount both in long and short arms, of the type already in existence or new manufacture.

[0020] A further object of the invention is that the counter has considerable operational autonomy, including several thousand shots, as a result of its reduced electrical energy consumption. This autonomy is achieved by means of electronic circuits which remain in repose until a shot is fired. At that moment the counter is automatically activated, presents the information relating to the partial count, that is, that which corresponds to the loader which is being used, during a pre-established time period and finally it returns to the resting position until the next shot.

[0021] Another object of the shot counter is that the shooter does not intervene or interfere in its operation. When a shot is fired, the counter is activated, it memorises the information, shows it during a pre-established time period on the visual display unit so that it does not distract the shooter's attention any longer than necessary and prevents its position from being visible in the dark and returns to its resting state until the next shot. If the user wishes to consult the number of shots fired, a button is activated for this purpose, causing the stored information to be shown on the visual display unit for a number of seconds.

[0022] Another object of the invention is to provide useful information in order to assess the ageing and wear of the main components of the firearm by means of analysis of the firing cycles made with the arm throughout its lifetime.

[0023] Another object of the invention is to use the visual display unit and the electronic circuits of the shot counter to show other information inherent to the operation of the firearm such as, for example, the barrel temperature. In this way we will be able to avoid excessive temperature values during intensive use, in short periods of time, as these could affect the firearm's precision or endanger the shooter and/or the firearm.

BRIEF DESCRIPTION OF THE FIGURES

[0024] A more detailed explanation of the invention is given in the following description based on the attached figures in which:

[0025] Figures 1a and 1b show projected views of a

firearm with a counter device in accordance with this invention.

[0026] Figures 2a, 2b, and 2c show profile views of the shot counter in accordance with the invention and

5 **[0027]** Figure 3 shows a block diagram of the shot counter device in accordance with the invention.

DESCRIPTION OF THE INVENTION

10 **[0028]** Below, figures 1a, 1b, 2a, 2b and 2c show illustrations of shot counter devices 12 for firearms 11, for example, pistols and rifles which include a viewing panel 21 placed preferably round the firearm's aiming system, so that the screen in itself is oriented towards the shooter's sight, and therefore, within the field of vision of the sighting system.

15 **[0029]** Figure 3 shows a block diagram of the shot counter 12 which includes a first means of perception or sensor 32 which is adapted to perceive certain physical characteristics relating to the action of the shot made with the firearm 11.

20 **[0030]** In the case of a firearm with a dynamic firing cycle, the function of counting the number of shots fired is based on the times or speeds of displacement of an element associated with the firearm's closing system for example. In this case, the sensor 32 includes one or more sensors which may be magnetic, or of the electromagnetic radiation type, irrespective of whether or not they are visible to the human eye, or a combination of these.

25 In order for the sensor 32 to be able to perceive the shot, the aforementioned sensor perceives a solid medium 31 which participates from movement of the alternative sliding, backwards and forwards once more, from at least one element of the closing system of the firearm 11.

30 **[0031]** When the sensor 32 is of the magnetic type, the aforementioned solid means 31 is, at least, a magnet situated on the slide or closing system of the firearm, with the possibility of the actual slide being the aforementioned means 31, in which case an auxiliary magnet will be placed close to the sensor 32. When the sensor 32 is of the type with electromagnetic radiations, the solid medium 31 is, at least, a reflective layer or surface situated on the slide or firearm closing system, with the aforementioned means 31 being the slide itself.

35 **[0032]** In addition, the firearm which carries out a firing cycle may obtain information in order to count the shots carried out on the basis of the characteristics of the dynamic disturbances suffered by the firearm when it fires a shot. Therefore, the sensor 32, includes one or more vibration sensors such as for example of the piezoelectric type.

40 **[0033]** In the case of a firearm which carries out static firing cycles, the function of counting the number of shots fired is based on the characteristics of the dynamic disturbances to which the firearm 11 is subject in a similar manner to the previously mentioned case. As a result, the sensor 32, includes one or more vibration sensors such as for example of the piezoelectric type as well.

[0034] when a shot is fired brusque and strong dynamic disturbances of the firearm occur. Furthermore, in the firearm 11 with dynamic firing cycle, there is a strong acceleration of the slide or closing system, in the opposite direction of the shot, in general, due to conservation of the movement amount.

[0035] When the slide reaches the end of its run or the closing system causes a backward thrust and driven by the recovery spring it changes the direction of its movement returning forwards again until the firing cycle is completed. Both phenomena are very different from those produced by an accidental blow or by handling of the firearm 11 by the shooter.

[0036] The first means of perception or sensor 32 will directly receive, or through the solid medium 31, the characteristics of the firearm shot 11. The sensor 32 generates at one of its exits an electrical signal which is sent, through electrical connections to a programmable logical control means 33 which, in turn is connected to the visual display unit 21.

[0037] The electrical signal generated is analysed and compared with the signal model corresponding to a shot. In the event that they are equal or substantially similar, the microprocessor 33 varies in a unit both in terms of the number of total shots fired with a firearm 11, total count, such as the number of shots fired with the loader 13 mounted by the firearm 11, partial count.

[0038] Previously the model electrical signal corresponding to the type of firing cycle characteristic of the firearm 11, dynamic or static, would have been stored in the microprocessor memory 33. This information is a characteristic parameter of each firearm 11 and of the type of ammunition used thereby, so that it is possible to distinguish between a complete and an incomplete cycle as well as handling of the slide by the shooter and the jamming of the weapon or when the casing is trapped by the closing system.

[0039] The programmable logic control means 33 based on a programming means such as a microprocessor, may be connected to an data entry means 34 which includes one or various switches or buttons which permit the selection and visual display in real time on the counter screen 21 the information required by the shooter at any time, such as the total count or partial count etc.

[0040] The partial counter automatically sets to zero when the microprocessor 33 identifies an incomplete dynamic firing cycle, or in another embodiment, when it identifies that the shooter has acted manually on the slide or closing system of the firearm 11.

[0041] It may also be set at zero with a button included for this purpose or when the loader is changed for another by means of a mechanical microswitch or a magnetic type sensor, not shown in the drawings, placed on the firearm 11 and a magnet inserted in the loader 13.

[0042] The counter 12 may be configured as an accessory which is coupled to the body of the firearm 11, to any of the firearm components 11 or to any of its accessories; as a system which is housed or embedded in

the firearm casing in any of the firearm 11 components, or in any of its accessories etc; so that the screen 21 may be visualised at any time by the shooter when firing a shot, that is, the screen 21 is facing towards the shooter.

[0043] The microprocessor information 33 may be transmitted through electrical connections, or through any means of transmission of information via an air interface to a receiver and data processing system and/or another visual display unit not shown in the drawings which form part of the shooter's equipment, or distanced therefrom.

[0044] The counter 12 comprises a supply unit in the form of a battery or cell 35, not shown, which supplies electrical energy to all counter circuits 12. The battery 35 is small in size and of the long term type. Rechargeable batteries may also be used.

[0045] In order to extend the battery life 35, the counter 12 is automatically activated when a shot is fired. Initially it is in repose, with the visual display unit turned off. When the firearm fires, the sensor 32 generates a signal activating the counter 12. Following a predetermined period of non use of the fire arm, the counter returns to its resting position, maintaining the value of the counters both total and partial.

[0046] The counter 12 may also be automatically activated by an impact sensor, a magnetic switch or a piezoelectric sensor which picks up the mechanical vibrations of the firearm 11 when it fires.

[0047] The counter 12 may also include buttons for carrying out further functions such as: exclusively switching off the screen without affecting the counter as it continues incrementing as new shots are fired or selecting a certain number on the visual display unit 21 so that the counter 12 discounts a unit every time that a new shot is fired.

[0048] The visual display unit may be of the liquid crystal type LCD, electroluminescent, plasma, coherent light or similar, due to the fact that these technologies consume very little power.

[0049] The screen information 21 will be shown with different degrees of light intensity in accordance with ambient light available at any given time in order to facilitate viewing at all times. In this way it will be notably reduced when the intensity of ambient light is low or dark and it will increase when the opposite is the case.

[0050] In respect of figures 1a, 1b, 2a, 2b and 2c, the screen 21 will comprise at least two digits which may be together or separate. It may also be formed by 1½ digits, namely, by a complete digit and another formed solely by two vertical segments aligned in such a way that as they take up a small amount of space it will be easier to integrate them in small firearms. In this case, for the count of more than 20 shots for example, the points at the foot of each digit will be used in order to codify the information.

[0051] In order to have evidence of the temperature in the barrel of the firearm at least one temperature probe may be placed, not shown in the figures, at an appropriate point of the barrel. This probe generates an electrical

signal based on its temperature which is sent, through electrical connections, to the programmable logic control means 33.

[0052] Although the value of the temperature may appear on the visual display unit when activated by the button, in the preferred embodiment it is shown indirectly through the mode which visualises the partial counter. For example, with its intermittent flashing with two different frequencies corresponding to the two temperature scales, one lower for warning and one higher for danger, which have been previously established in the programmable logic control means 33.

[0053] In order to avoid placing long electrical connections along the firearm 11, the temperature probe may be placed at another part of the firearm so that measuring the temperature at that point infers the same, given that the temperature at both points is related given since weapon in question is the same article.

[0054] The embodiments and examples established in this report are presented as the best explanation of this invention and its practical application, and thus permitting experts in the art to put this invention into practice and use. Nevertheless, experts in the art will recognise that the description and the foregoing examples have been presented for the purpose of illustrating and merely as an example. The description as explained herein is not considered to be exhaustive or to restrict the invention to the precise form in which it is described. Modifications and variations are possible in the light of the above teaching without abandoning the spirit and scope of the following claims.

Claims

1. **Ammunition consumption control device**, in real time for a firearm (11) which makes the mechanical action of firing; **characterised in that** the counting device (12) comprises a sensor (32) which is adapted to perceive the movement of a means (31) solid to a mobile mechanical element of the firearm which moves as a result of the shot and/or which is adapted to perceive mechanical disturbances generated during the shot; the aforementioned sensor (32) is adapted to generate an electric signal which is sent to a programmable logic control means (33) so that a count in a counter unit stored in said programmable logic control means (33) varies according to the number of shots fired by the firearm (11) in turn, the programmable logic control means (33) sends said count generated to a visual display unit (21).
2. **Device** in accordance with claim 1; **characterised in that** the counting device (12) in a unit the count varies according to the number of shots fired with the firearm (11) based on the realisation of the dynamic firing cycle compared to the time and/or speed standards of the mobile mechanical element char-

acteristic of the firearm (11) previously stored in the programmable logic control means (33).

3. **Device** in accordance with claim 1; **characterised in that** in the counting device (12) in a unit the count varies according to the number of shots fired with the firearm (11) based on the realisation of the dynamic firing cycle compared to the standard value of characteristic mechanical disturbance of the firearm (11), with said value having been previously stored in the programmable logic control means (33).
4. **Device** in accordance with claims 2 and 3; **characterised in that** the count made corresponds to the total number of shots fired by the firearm (11) to the number of shots fired with a loader (13) mounted by the firearm (11) or the number of cartridges available in the loader (13).
5. **Device** in accordance with claim 4; **characterised in that** the counting device (12) is automatically activated through the perception or sensor medium (32) by an impact or piezoelectric sensor, or magnetic switch when the firearm is used; following a predetermined period the counter (12) returns to its resting position maintaining the value of the counters, both total and partial.
6. **Device** in accordance with claim; **characterised in that** the count corresponding to the partial counter may automatically set to zero when the counting device (12) identifies the shot of the last available cartridge which identifies an incomplete dynamic firing cycle.
7. **Device** in accordance with claim 5; **characterised in that** the counting device (12) is equipped with a mechanical sensor and the loader (13) with a magnet, in order to effect the automatic setting to zero of the partial counter when the loader is replaced.
8. **Device** in accordance with claim 5; **characterised in that** the counting device (12) is equipped with a microswitch for automatically setting the partial counter to zero when the loader is substituted.
9. **Device** in accordance with claim 5, **characterised in that** the sensor (32) comprises one or more sensors which may be of the magnetic type, or electromagnetic, visible or not to the human eye, by a combination thereof situated on the firearm (11) or by one or more vibration sensors for example, of the piezoelectric type.
10. **Device** in accordance with claim 9, **characterised in that** the solid means (31) is the actual slide or at least a layer or a reflective surface situated on the slide or closing system of the firearm when the sen-

sor (32) is of the electromagnetic radiation type.

11. **Device** in accordance with claim 9; **characterised in that** the solid means (31) is the actual slide or at least a magnet situated on the slide or closing system of the firearm (11) when the sensor (32) is of the magnetic type. 5
12. **Device** in accordance with claim 11; **characterised in that** an auxiliary magnet is placed next to the sensor (32) when the solid means (31) is the actual slide. 10
13. **Device** in accordance with claim 1; **characterised in that** the counting device (12) in a unit varies the count according to the number of shots fired with the firearm (11) based on the realisation of the static firing cycle compared to the standard value of characteristic mechanical disturbance of the firearm (11), with said value having been previously stored in the programmable logic control means(33). 15
14. **Device** in accordance with claim 13; **characterised in that** the sensor 32 includes one or more vibration sensors, for example, of the piezoelectric type. 20
15. **Device** in accordance with claim 5 or 13; **characterised in that** it includes a data entry means (34) which is adapted to select at least one item of information stored in the programmable logic medium (33) so that the type of information selected is shown in real time, visually on the visual display unit(21) 25
16. **Device** in accordance with claim 15; **characterised in that** the data entry means (34) consist of one or various buttons. 30
17. **Device** in accordance with claim 16; **characterised in that** the counting device (12) is affixed to the firearm (11) in such a way that the visual display unit (21) is facing towards the shooter. 35
18. **Device** in accordance with claim 16; **characterised in that** an element of the firearm (11) is adapted to receive the counting device (12) in such a way that the visual display unit (21) is facing towards the shooter. 40
19. **Device** in accordance with claim 16; **characterised in that** the counting device (12) is adapted to be integrated in an accessory which is coupled to the firearm (11) in such a way that the visual display unit (21) is facing towards the shooter. 45
20. **Device** in accordance with any of claims 17 to 19; **characterised in that** the visual display unit(21) is a liquid crystal, electroluminescent, plasma, coherent light screen or similar and is situated in the environment of the sighting system of the firearm (11). 50
21. **Device** in accordance with claim 20; **characterised in that** the information stored in the programmable logic medium (33) may be transmitted through electrical connections, or through a transmission means which uses an air interface in order to transmit information, to a reception and data processing system and /or may be shown on another visual display unit different from the screen (21). 55
22. **Device** in accordance with claim 21; **characterised in that** the counting device (12) is equipped with different buttons for setting the partial counter to zero, switching the visual display unit on or off or pre-establishing a certain number on the visual display unit (21) in such a way that the counter (12) discounts a unit each time that the new shot is fired.
23. **Device** in accordance with claim 20; **characterised in that** the information displayed on the visual display unit may be shown with different light intensities in order to adapt to the intensity of the ambient lighting.
24. **Device** in accordance with claim 20; **characterised in that** the visual display unit may additionally show information relating to the temperature of the barrel of the firearm.
25. **Device** in accordance with claim 24; **characterised in that** the temperature of the barrel of the firearm may be shown with a temperature value.
26. **Device** in accordance with claim 24; **characterised in that** the temperature of the barrel of the firearm may be shown indirectly by means of the manner in which the value of the partial counter is shown.
27. **Firearm** which incorporates a device for counting in accordance with any of the previous claims.

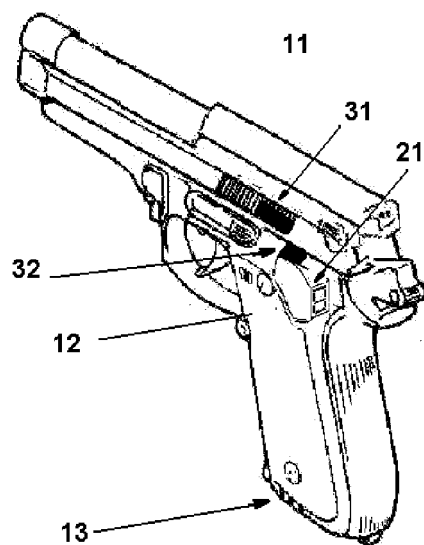


FIG. 1a

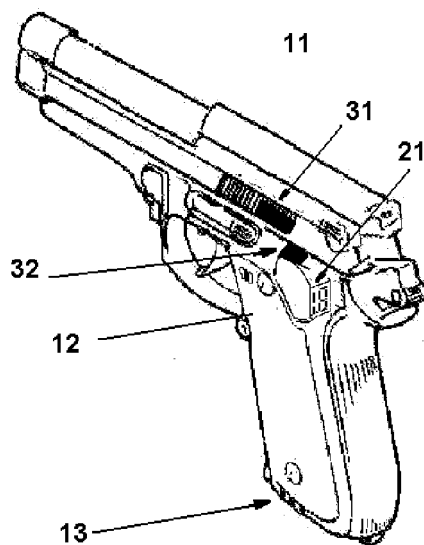


FIG 1 b

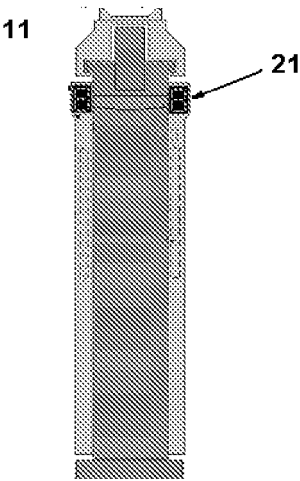


FIG. 2 a

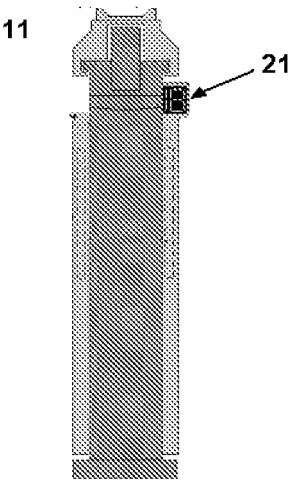


FIG. 2 b

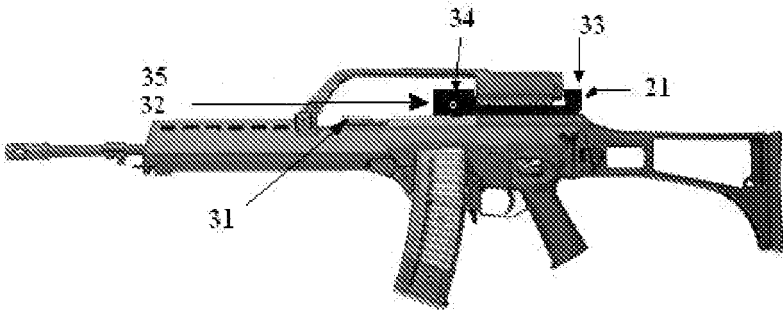


FIG. 2c

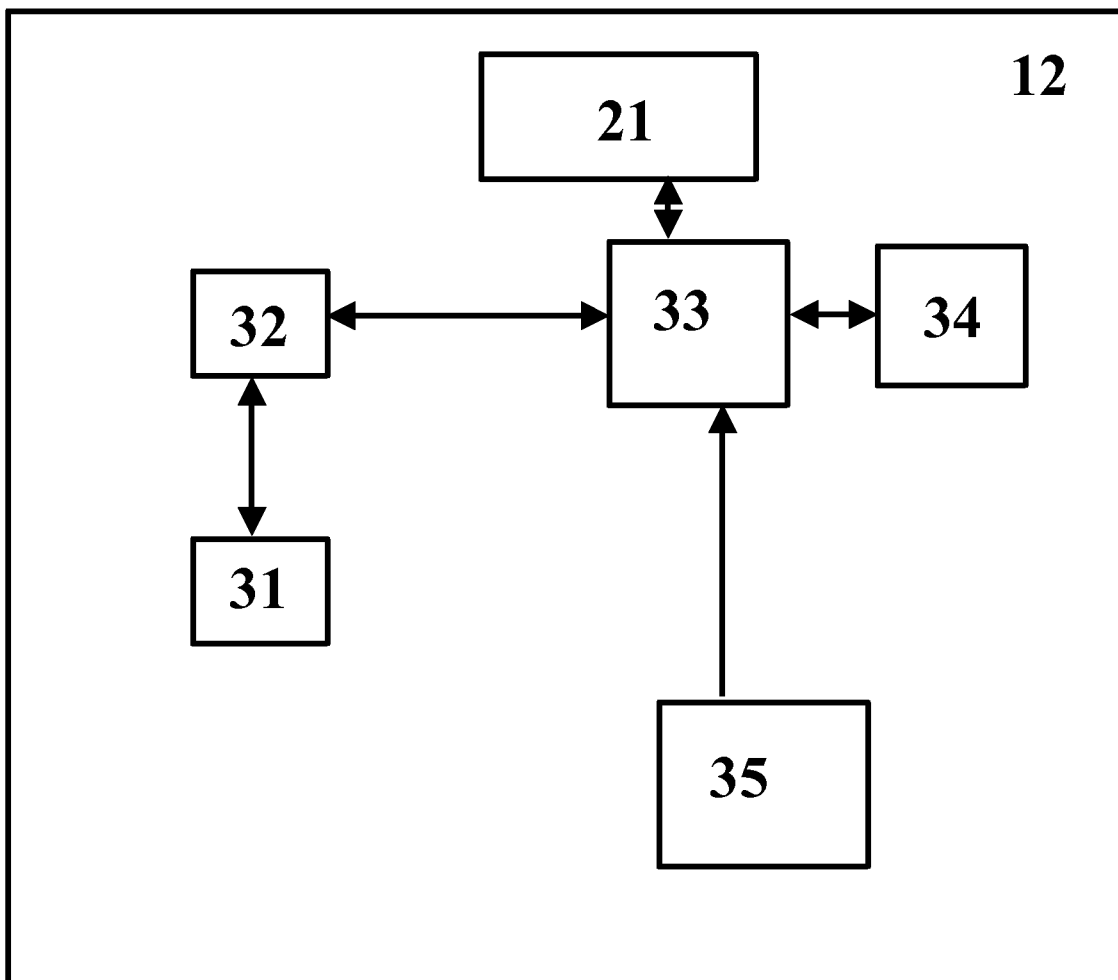


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 2007/070105

A. CLASSIFICATION OF SUBJECT MATTER

F41A 19/01 (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)

CIBEPAT,EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4541191 A (MORRIS et al.) 17.09.1985, column 2, lines 18-59; figures.	1-4,13-27
X	ES 2213132 T3 (GLOCK GASTON) 16.08.2004, column 1, lines 33-41;column 2, line 54 - column 3, line 19; column 4, lines 19-55; claimes 3-6,19; figures.	1-27
A	EP 0554905 A1 (HECKLER & KOCH GMBH) 11.08.1993, the whole document.	1
A	WO 2006042876 A1 (DELGADO ACARRETA RAUL) 27.04.2006, the whole document.	1-27
A	US 2005114084 A1 (JOHNSON et al.) 26.05.2005, the whole document.	1,24-26

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	
"E" earlier document but published on or after the international filing date	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"O" document referring to an oral disclosure use, exhibition, or other means	"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
"P" document published prior to the international filing date but later than the priority date claimed	
	"&" document member of the same patent family

Date of the actual completion of the international search

17.January.2007 (17.01.2007)

Date of mailing of the international search report

(25/02/2008)

Name and mailing address of the ISA/
O.E.P.M.Paseo de la Castellana, 75 28071 Madrid, España.
Facsimile No. 34 91 3495304

Authorized officer

Fco. José Moreno Gómez

Telephone No. +34 91 349 84 58

Form PCT/ISA/210 (second sheet) (April 2007)

EP 2 151 658 A1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ ES 2007/070105

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
ES 2213132 T	16.08.2004	US 2003061753 A US 6643968 B EP 1300648 AB EP 20020018597 DE 10148677 A AT 256277 T DE 50200135 D	03.04.2003 11.11.2003 09.04.2003 19.08.2002 24.04.2003 15.12.2003 22.01.2004
EP 0554905 AB	11.08.1993	EP 19930101858 DE 4203585 AC US 5402678 A AT 152509 T DE 59306301 D ES 2102538 T GR 3023479 T	05.02.1993 12.08.1993 04.04.1995 15.05.1997 05.06.1997 01.08.1997 29.08.1997
US 4541191 A	17.09.1985	NONE	-----
WO 2006042876 A	27.04.2006	NONE	-----
US 2005114084 A	26.05.2005	US 7143644 B CA 2547081 A WO 2005052493 A US 2005155420 A US 7100437 B EP 1692453 A EP 20040816995	05.12.2006 09.06.2005 09.06.2005 21.07.2005 05.09.2006 23.08.2006 24.11.2004

Form PCT/ISA/210 (patent family annex) (April 2007)