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(54) **FIREARM COMPRISING A MAGAZINE DETECTION GROUP**

FEUERWAFFE MIT EINER MAGAZINERKENNUNGSGRUPPE

ARME À FEU COMPRENANT UN GROUPE DE DÉTECTION DE MAGASIN

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Description

[0001] The present invention relates to a firearm comprising a detection group suitable to detect the presence of a magazine in the firearm and the number of bullets therein.

[0002] In the prior art firearms comprising electronic devices of various kinds are known of, for example suitable for locating the weapon, or detecting a shot fired event, or counting the number of shots fired, or the like.

[0003] Said electronic devices are also suitable to assess, manage and transmit the information detected so as to give the shooter or an operations centre such information, for example to give an alarm signal or to track how the firearm is used.

[0004] Further information concerning the state of use of the firearm relates to the status of the magazine, i.e. whether it is inserted in the firearm or not and relative to the number of bullets housed in it.

[0005] In other words, the firearm in question must necessarily provide, within itself, for one or more electronic or mechanical or electro-mechanical devices, which without affecting the geometry and functioning kinematics of the firearm, are also suitable to accomplish the aforesaid detection. An example of a firearm comprising said type of device is disclosed in US 5 303 495 A.

[0006] The purpose of the present invention is to make a firearm suitable to also detect the above information relative to the magazine status.

[0007] Such purpose is achieved by a firearm according to claim 1.

[0008] Further advantages and embodiments of the firearm of the present invention, will be evident from the dependent claims composing the set of appended claims.

[0009] Moreover, the characteristics and advantages of the firearm will be evident from the description given below, made by way of a non-limiting example, with reference to the attached drawings, wherein:

- figure 1 is a perspective view of a firearm, in particular of a gun, comprising a detection group according to a preferred embodiment;
- figure 2 is a side view of the firearm shown in figure 1 comprising the firearm device, comprised in the detection group;
- figure 2' is a side view of the firearm device comprised in the detection group, as in figure 1;
- figures 3a and 3b show a perspective and a side view of a carrier fitted with the magazine device comprised in the detection group;
- figure 4 shows a diagram of a gun fitted with the primary sensors comprised in the firearm device.

[0010] With reference to the appended drawings, reference numeral 1 globally denotes a firearm in its entirety.

[0011] Preferably, said firearm 1 comprises a magazine 10 housed in a specially shaped magazine housing 100.

[0012] Preferably, the magazine housing 100 extends along a magazine axis X-X. Similarly the magazine 10 also extends in height for example between a bullet input/output end suitable to be placed in a position proximal to the firing chamber of the weapon and a bottom end.

[0013] According to a preferred embodiment, the magazine 10 is fitted with a carrier 11 suitable to keep at least one bullet housed in the magazine 10 near its input/output end; in other words, with the magazine 10 inserted in the firearm 1, the carrier 11 keeps a bullet in a position such as to be engaged by the firing mechanism to be promptly brought into the firing chamber.

[0014] In a preferred embodiment, the carrier 11 is suitable to adopt a full magazine position, in which the magazine 10 contains all the bullets inside it and the carrier 11 is thus lowered and proximal to the bottom end, and an empty magazine configuration, in which the magazine 10 is emptied of all the bullets inside it and the carrier 11 is thus raised and proximal to the bullet input/output end.

[0015] Preferably, the carrier 11 operates with a spring element in turn housed inside the magazine 10.

[0016] It is to be noted that in a preferred embodiment said firearm 1 is a gun. Preferably, the magazine housing 100 is made in the grip of the gun.

[0017] In a further preferred embodiment said firearm 1 is an assault rifle.

[0018] The firearm 1 comprises a detection group suitable to detect the presence of the magazine 10 in the magazine housing 100 and suitable to detect the presence of a predefined number of bullets inside it.

[0019] As described in detail below, the detection group is suitable to be housed in the firearm without revolutionising its structure or influencing its kinematics.

[0020] The detection group comprises a firearm device 51 and a magazine device 52 suitable to be operatively connected to each other.

[0021] Specifically, the firearm device 51 is suitable to be housed in the firearm 1, in particular it is placed near the walls of the magazine housing 100.

[0022] In yet other words, the firearm device 1 fits into firearm, for example in the grip of the gun.

[0023] Instead, the magazine device 52 is housed in the magazine 10 of the firearm 1, specifically, it is housed in the carrier 11 of the magazine 10. In other words, the magazine device 52 is suitable to have an axial disposition in the magazine 10 induced by the position of the carrier 11.

[0024] The firearm device 51 comprises a plurality of primary sensors 510 positioned along the magazine device X-X. While the magazine device 52 comprises at least one secondary sensor 520, suitable to be operatively connected with each primary sensor 510.

[0025] Each primary sensor 510 comprises a mechan-

ical switch.

[0026] In a preferred embodiment, the mechanical switch is a magnetic switch.

[0027] In other words, the mechanical switch comprises an active portion adapted to be stressed to close the switch.

[0028] Preferably, said active portion is in a ferromagnetic material.

[0029] According to a preferred embodiment, the secondary sensor 520 comprises a ferromagnetic element, preferably a permanent magnet, i.e. which has a magnetic field.

[0030] In other words, the mechanical switch, in particular the active portion, is suitable to close upon the action of the secondary sensor 520.

[0031] The closure of the mechanical switch entails a change of resistance and the position of the closed mechanical switch position, which is a function of the position of the carrier 11, and thus of the number of bullets housed in the magazine housing 100 loader, is thus establishable.

[0032] According to a preferred embodiment, the secondary sensor 520 is embedded inside the carrier 11.

[0033] According to the invention, the carrier 11 is in a non-magnetic material.

[0034] According to a preferred embodiment, therefore, thanks to the position along the magazine axis X-X of a plurality of primary sensors 510, as the height along the magazine axis X-X of the carrier 11 varies, the secondary sensor 520 performs an action on the primary sensor 510 proximal to it. In other words, depending on the axial position of the carrier 11 in the magazine 10, the primary sensor 510 undergoes an action, for example such as to perform the closure of the respective switch.

[0035] According to a preferred embodiment, the primary sensors 510 are in a number equal to the number of possible positions of the carrier 11.

[0036] In a preferred embodiment, the primary sensors 510 are in a number equal to the maximum number of bullets which are housable in the magazine 10.

[0037] In a preferred embodiment, the primary sensors 510 are in a number equal to the maximum number of bullets which are housable in the magazine housing 100.

[0038] According to a preferred embodiment, the firearm device 51 comprises a support element 550 suitable to support and house the plurality of primary sensors 510 in such a way as to connect them electrically to each other.

[0039] Preferably, the support element 550 extends in length and is suitable to be placed in the firearm facing the magazine, extending along the magazine axis X-X.

[0040] Preferably, the support element 550 is in non-magnetic material.

[0041] In a preferred embodiment, the magazine housing 100 comprises a detector seat which extends along the magazine axis X-X suitable for housing the firearm device 51. Preferably, the support element 550 and the primary sensors (510) housed on it, are housed in said

detector seat.

[0042] Preferably, the support element 550 is suitable to be inserted in the firearm 1 in the direction of the magazine axis X-X.

[0043] Preferably, the support element 550 is an electronic terminal board on which the primary sensor elements 510 and the electronic circuitry which puts them in mutual communication are housed.

[0044] According to a preferred embodiment, the detection group comprises a data processing unit suitable to manage the information derived from the primary sensors 510.

[0045] Preferably, the detection group by means of the data processing unit is suitable to manage the information, for example transmitting it to another electronic device inside or outside the firearm 1. In further embodiments the detection group by means of the data processing unit is suitable to store the information in a special memory.

[0046] Preferably, the detection group is suitable to transmit the information detected to a mobile phone or smartphone.

[0047] Innovatively the firearm according to the present invention resolves the problems typical of the prior art, being suitable to detect the aforesaid information relative to the status of the magazine.

[0048] Advantageously, in fact, the firearm according to the invention is suitable to detect in the first place the presence or absence of the magazine in the magazine housing and secondly the number of bullets housed in it. Advantageously, the firearm according to the present invention is suitable to detect the presence of bullets housed in said magazine.

[0049] In addition, advantageously, the firearm according to the invention, achieves the purpose set forth comprising a detection group which does not affect the firearm itself. It is not in fact necessary to revolutionize the shape or design of the firearm. Advantageously the operations on the firearm to comprise and house the detection group are minimal and substantially non-invasive.

[0050] An additional advantage is therefore that the firearm according to the invention, despite comprising a detection group shows no change in shooting kinematics, the detection group not being invasive of the firing mechanism of the firearm.

[0051] Yet a further advantage lies in that the detection group comprises a plurality of components composed of magnetic elements which, however, are designed to be suitable to operate with each other without magnetizing the other components comprised in the weapon.

[0052] Advantageously, the detection group is simple and reliable to make, guaranteeing over time a correct detection of the presence of the magazine and of the bullets stored therein. In other words, advantageously, the use of mechanical components ensures a reliable and effective detection even with high peak stresses suffered by the firearm, for example due to the firing event.

[0053] In addition, advantageously, even the manage-

ment of the detection group is simple to implement, not presenting details and complex systems or electronic circuitry, the management, implementation and reliability of which is always in discussion, all the more so in a hostile environment such as that of a firearm, which typically suffers critical and impulsive stresses. Advantageously, the firearm according to the present invention is suitable to allow over time the aforesaid detection even after sustaining impulsive stresses such as those of a gunshot. Advantageously, the switches are indeed suitable to withstand up to 5000g.

[0054] According to yet a further advantageous aspect, the non-invasiveness of the detection group of the present invention makes it suitable to be comprised in firearms of small dimensions, such as a gun. Advantageously, the aforesaid advantages are thus also achievable on a gun comprising a detection group.

[0055] Advantageously, the detection group is suitable to consume very little energy in its implementation, activating in fact only upon a change of resistance, i.e. only if the shot fired event occurs and the number of bullets housed in the magazine housing changes. If said event does not occur, the detection group has all the switches open and therefore does not consume energy.

[0056] In a further embodiment, the carrier (11) is of the type comprising a dummy bullet, and the magazine device (52) is housed in said dummy bullet.

[0057] It is clear that a person skilled in the art may make modifications to the firearm described above so as to satisfy contingent requirements while remaining within the sphere of protection of the following claims.

Claims

1. Firearm (1) comprising a magazine (10), fitted with a carrier (11) in a non-magnetic material, housed in a specially shaped magazine housing (100) which extends along a magazine axis (X-X), wherein the firearm (1) comprises a detection group suitable to detect the presence of the magazine (10) in the magazine housing (100) and the presence of a predefined number of bullets inside it, comprising:

i) a firearm device (51), housed in the firearm (1), preferably near the walls of the magazine housing (100), comprising a plurality of primary sensors (510) arranged along the magazine axis (X-X), wherein each primary sensor (510) comprises a mechanical switch;

ii) a magazine device (52), housed in the carrier (11) of the magazine (10), comprising at least a secondary sensor (520), comprising a ferromagnetic element yielding a magnetic field, wherein the carrier (11) is of the type comprising a dummy bullet and the secondary sensor (520) is housed in said dummy bullet or wherein the secondary sensor (520) is embedded inside the car-

rier (11);

in which at the change in height along the magazine axis (X-X) of the carrier (11) the secondary sensor (520) by means of its magnetic field performs an action on the primary sensor (510) proximal to it to perform the closing of the respective mechanical switch.

2. Firearm (1) according to claim 1, wherein the mechanical switch is a magnetic switch comprising an active portion, preferably of ferromagnetic material, suitable to close upon the action of the secondary sensor (520).

3. Firearm (1) according to any of the previous claims, wherein the ferromagnetic element comprised in the secondary sensor (520) is a permanent magnet.

4. Firearm (1) according to any one of the previous claims, wherein the primary sensors (510) are in a number equal to the number of positions that the carrier (11) is suitable to assume between a configuration of magazine full, in which the magazine (10) contains all the bullets inside it, and a configuration of magazine empty, in which the magazine (10) is emptied of all the bullets inside it.

5. Firearm (1) according to any of the preceding claims, wherein the primary sensors (510) are in a number such as to count the number of bullets housed inside the magazine housing (100).

6. Firearm (1) according to any of the preceding claims, wherein the firearm device (1) comprises a support element (550) suitable to support and house the plurality of primary sensors (510) in such a way as to connect them electrically to each other.

7. Firearm (1) according to any of the previous claims, wherein the magazine housing (100) comprises a detector seat (115) which extends along the magazine axis (X-X) suitable for housing the firearm device (51).

8. Firearm (1) according to any of the preceding claims, wherein the detection group comprises a data processing unit suitable to manage the information deriving from the primary sensors (510), for example, to transmit it to another electronic device inside or outside the firearm (1).

9. Firearm (1) according to any of the previous claims, wherein said firearm (1) is a handgun.

10. Firearm (1) according to any of the previous claims from 1 to 8, wherein said firearm (1) is an assault rifle.

Patentansprüche

1. Feuerwaffe (1), umfassend ein Magazin (10), welches auf einen Träger (11) aus einem nicht-magnetischen Material angepasst ist, welcher in einem speziell geformten Magazinegehäuse (100) aufgenommen ist, welches sich entlang einer Magazinachse (X-X) erstreckt, wobei die Feuerwaffe (1) eine Detektionsgruppe umfasst, welche dazu geeignet ist, das Vorliegen des Magazins (10) in dem Magazinegehäuse (100) und das Vorliegen einer vorbestimmten Anzahl von Kugeln innerhalb von ihm zu detektieren, umfassend:

i) eine Feuerwaffen-Vorrichtung (51), welche in der Feuerwaffe (1) bevorzugt in der Nähe der Wände des Magazinegehäuses (100) aufgenommen ist, umfassend eine Mehrzahl von primären Sensoren (510), welche entlang der Magazinachse (X-X) angeordnet sind, wobei jeder primäre Sensor (510) einen mechanischen Schalter umfasst;

ii) eine Magazin-Vorrichtung (52), welche in dem Träger (11) des Magazins (10) aufgenommen ist, umfassend wenigstens einen sekundären Sensor (520), umfassend ein ferromagnetisches Element, welches ein magnetisches Feld erzeugt, wobei der Träger (11) von dem Typ ist, welcher eine Dummy-Kugel umfasst, und der sekundäre Sensor (520) in der Dummy-Kugel aufgenommen ist oder wobei der sekundäre Sensor (520) innerhalb des Trägers (11) eingebettet ist;

wobei bei der Änderung der Höhe entlang der Magazinachse (X-X) des Trägers (11) der sekundäre Sensor (520) mittels seines magnetischen Felds eine Wirkung auf den primären Sensor (510) nahe zu ihm ausübt, um das Schließen des entsprechenden mechanischen Schalters durchzuführen.

2. Feuerwaffe (1) nach Anspruch 1, wobei der mechanische Schalter ein magnetischer Schalter ist, umfassend einen aktiven Abschnitt, vorzugsweise aus ferromagnetischem Material, dazu geeignet, sich auf die Wirkung des sekundären Sensors (520) hin zu schließen.
3. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei das ferromagnetische Element, welches in dem sekundären Sensor (520) umfasst ist, ein Permanentmagnet ist.
4. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei die primären Sensoren (510) in einer Anzahl gleich der Anzahl von Positionen vorliegen, welche der Träger (11) geeignet ist, zwischen einer Konfiguration eines vollen Magazins, in welcher das

Magazin (10) alle der Kugeln innerhalb davon enthält, und einer Konfiguration eines leeren Magazins anzunehmen, in welcher das Magazin (10) von allen der Kugeln innerhalb davon entleert ist.

5. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei die primären Sensoren (510) in einer solchen Anzahl vorliegen, dass die Anzahl von Kugeln abgezählt wird, welche innerhalb des Magazinegehäuses (100) aufgenommen sind.
6. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei die Feuerwaffen-Vorrichtung (1) ein Trageelement (550) umfasst, welches dazu geeignet ist, die Mehrzahl von primären Sensoren (510) in einer Weise zu tragen, dass sie elektrisch miteinander verbunden werden.
7. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei das Magazinegehäuse (100) einen Detektorsitz (115) umfasst, welcher sich entlang der Magazinachse (X-X) erstreckt, dazu geeignet, die Feuerwaffen-Vorrichtung (51) aufzunehmen.
8. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei die Detektionsgruppe eine Datenverarbeitungs-Einheit umfasst, welche dazu geeignet ist, die Informationen zu verwalten, welche von den primären Sensoren (510) abgeleitet werden, beispielsweise um sie zu einer weiteren elektronischen Vorrichtung innerhalb oder außerhalb der Feuerwaffe (1) zu übertragen.
9. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche, wobei die Feuerwaffe (1) eine Handfeuerwaffe ist.
10. Feuerwaffe (1) nach einem der vorhergehenden Ansprüche von 1 bis 8, wobei die Feuerwaffe (1) ein Sturmgewehr ist.

Revendications

1. Arme à feu (1) comprenant un chargeur (10), muni d'un support (11) en matériau non magnétique, logé dans un logement du chargeur spécialement mis en forme (100) qui s'étend le long d'un axe du chargeur (X-X), dans laquelle l'arme à feu (1) comprend un groupe de détection apte à détecter la présence du chargeur (10) dans le logement du chargeur (100) et la présence d'un nombre prédéfini de balles à l'intérieur de celui-ci, comprenant :

i) un dispositif d'arme à feu (51), logé dans l'arme à feu (1), de préférence à proximité des parois du logement du chargeur (100), comprenant une pluralité de capteurs primaires (510) agen-

cés le long de l'axe du chargeur (X-X), dans laquelle chaque capteur primaire (510) comprend un commutateur mécanique ;

ii) un dispositif du chargeur (52), logé dans le support (11) du chargeur (10), comprenant au moins un capteur secondaire (520), comprenant un élément ferromagnétique produisant un champ magnétique, dans laquelle le support (11) est du type comprenant une balle factice et le capteur secondaire (520) est logé dans ladite balle factice ou dans laquelle le capteur secondaire (520) est intégré à l'intérieur du support (11) ;

dans laquelle, au changement de hauteur du support (11) le long de l'axe du chargeur (X-X), le capteur secondaire (520), au moyen de son champ magnétique, effectue une action sur le capteur primaire (510) situé à proximité de celui-ci pour effectuer la fermeture du commutateur mécanique correspondant.

2. Arme à feu (1) selon la revendication 1, dans laquelle le commutateur mécanique est un commutateur magnétique comprenant une partie active, de préférence en matériau ferromagnétique, apte à se fermer sous l'action du capteur secondaire (520). 25
3. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle l'élément ferromagnétique compris dans le capteur secondaire (520) est un aimant permanent. 30
4. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle les capteurs primaires (510) sont en nombre égal au nombre de positions que le support (11) est capable d'occuper entre une configuration du chargeur plein, dans laquelle le chargeur (10) contient toutes les balles en son intérieur, et une configuration du chargeur vide, dans laquelle le chargeur (10) est vidé de toutes les balles en son intérieur. 35 40
5. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle les capteurs primaires (510) sont présents en un nombre permettant de compter le nombre de balles logées à l'intérieur du logement du chargeur (100). 45
6. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle le dispositif d'arme à feu (1) comprend un élément de support (550) apte à porter et loger la pluralité de capteurs primaires (510) de manière à les connecter électriquement les uns aux autres. 50 55
7. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle le logement du

chargeur (100) comprend un siège de détecteur (115) qui s'étend le long de l'axe du chargeur (X-X), apte à loger le dispositif d'arme à feu (51).

- 5 8. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle le groupe de détection comprend une unité de traitement de données apte à gérer les informations provenant des capteurs primaires (510), par exemple, pour les transmettre à un autre dispositif électronique à l'intérieur ou à l'extérieur de l'arme à feu (1).
- 10 9. Arme à feu (1) selon l'une quelconque des revendications précédentes, dans laquelle ladite arme à feu (1) est une arme de poing.
- 15 10. Arme à feu (1) selon l'une quelconque des revendications 1 à 8 précédentes, dans laquelle ladite arme à feu (1) est un fusil d'assaut.
- 20

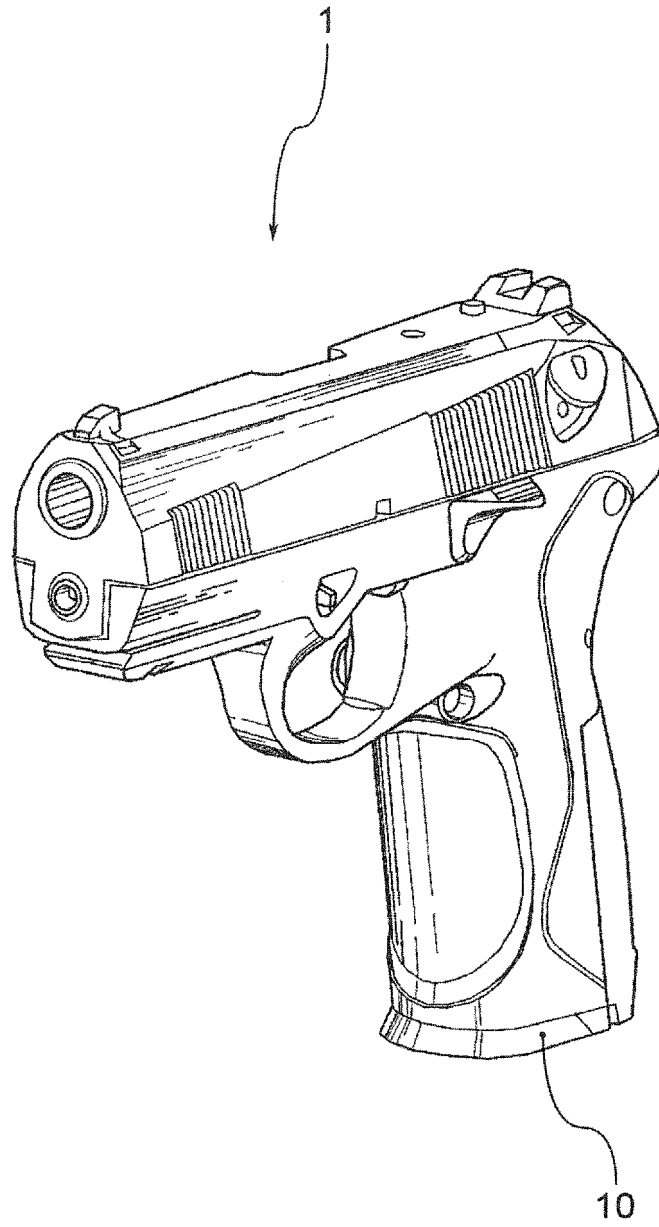
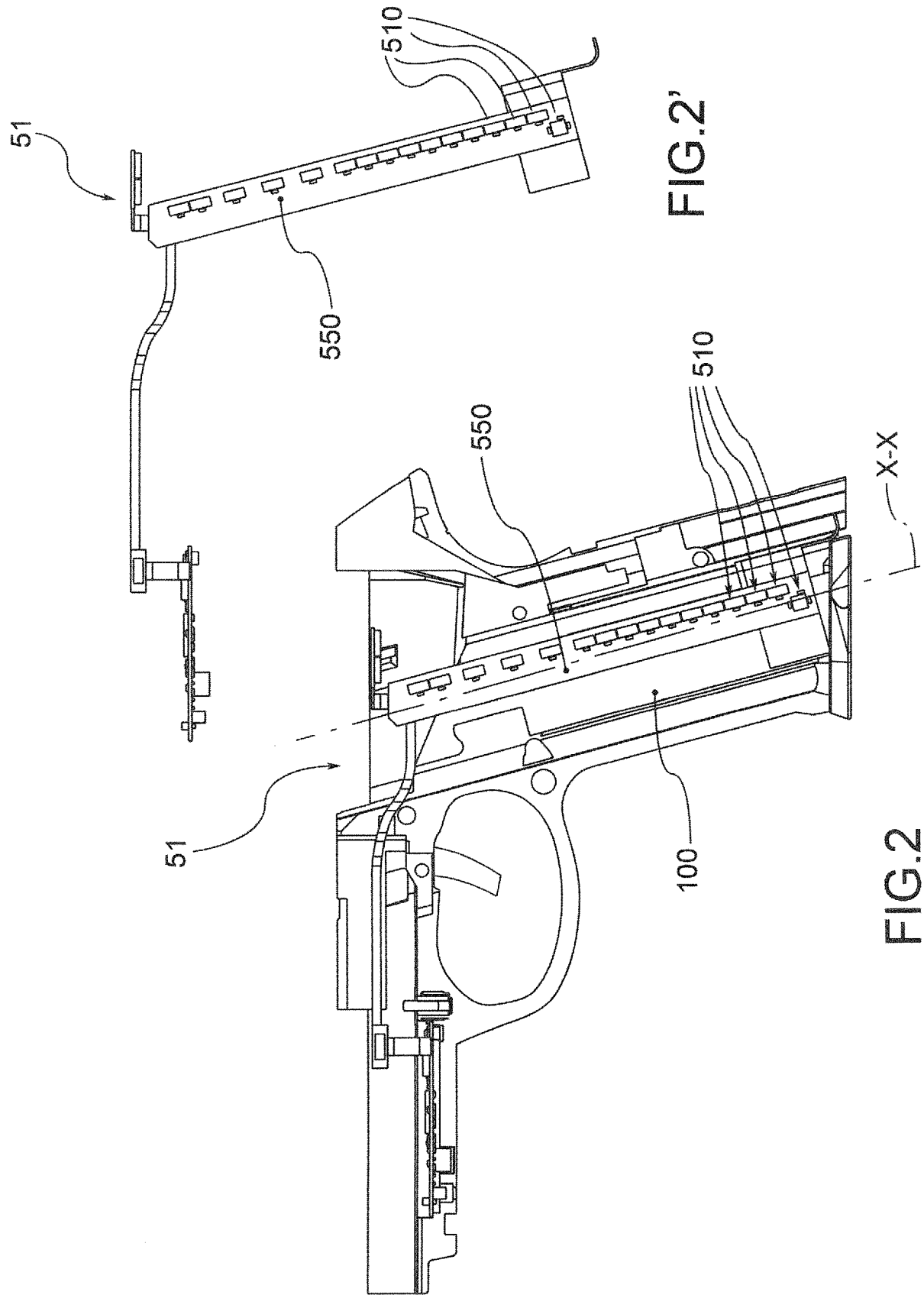


FIG.1



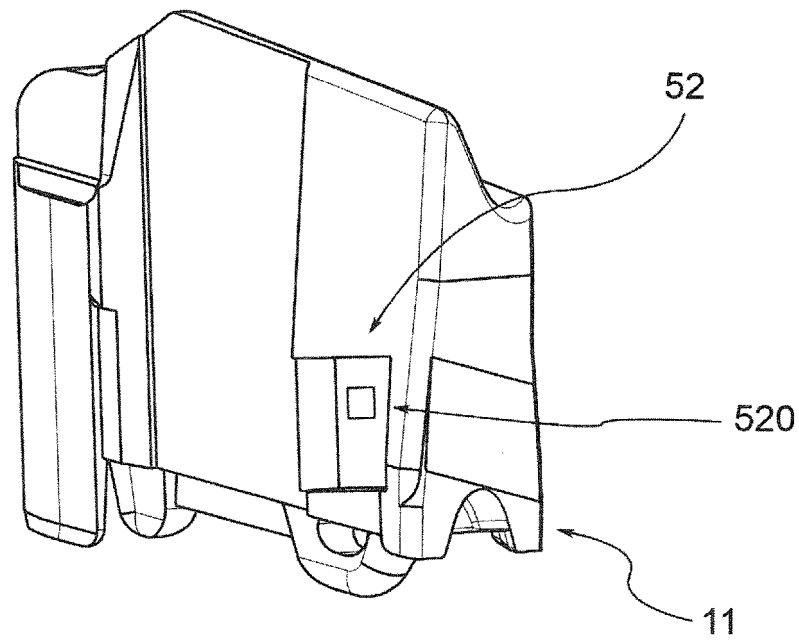


FIG. 3a

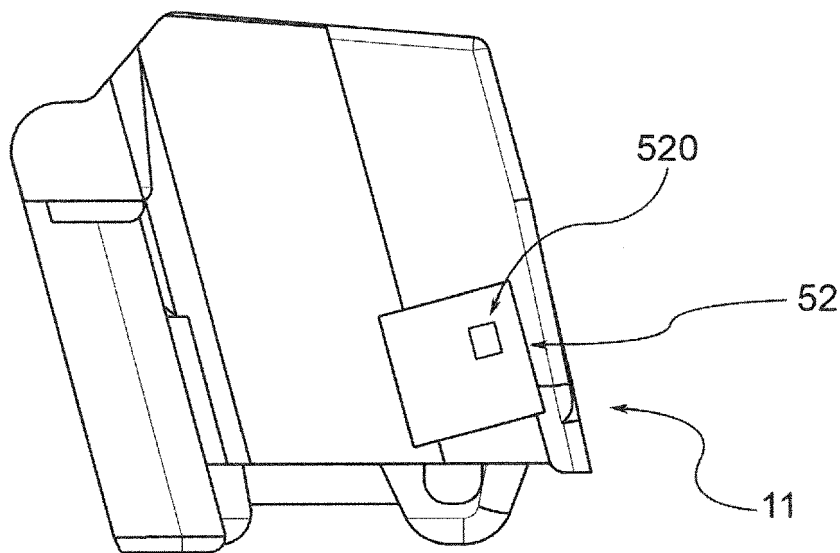


FIG. 3b

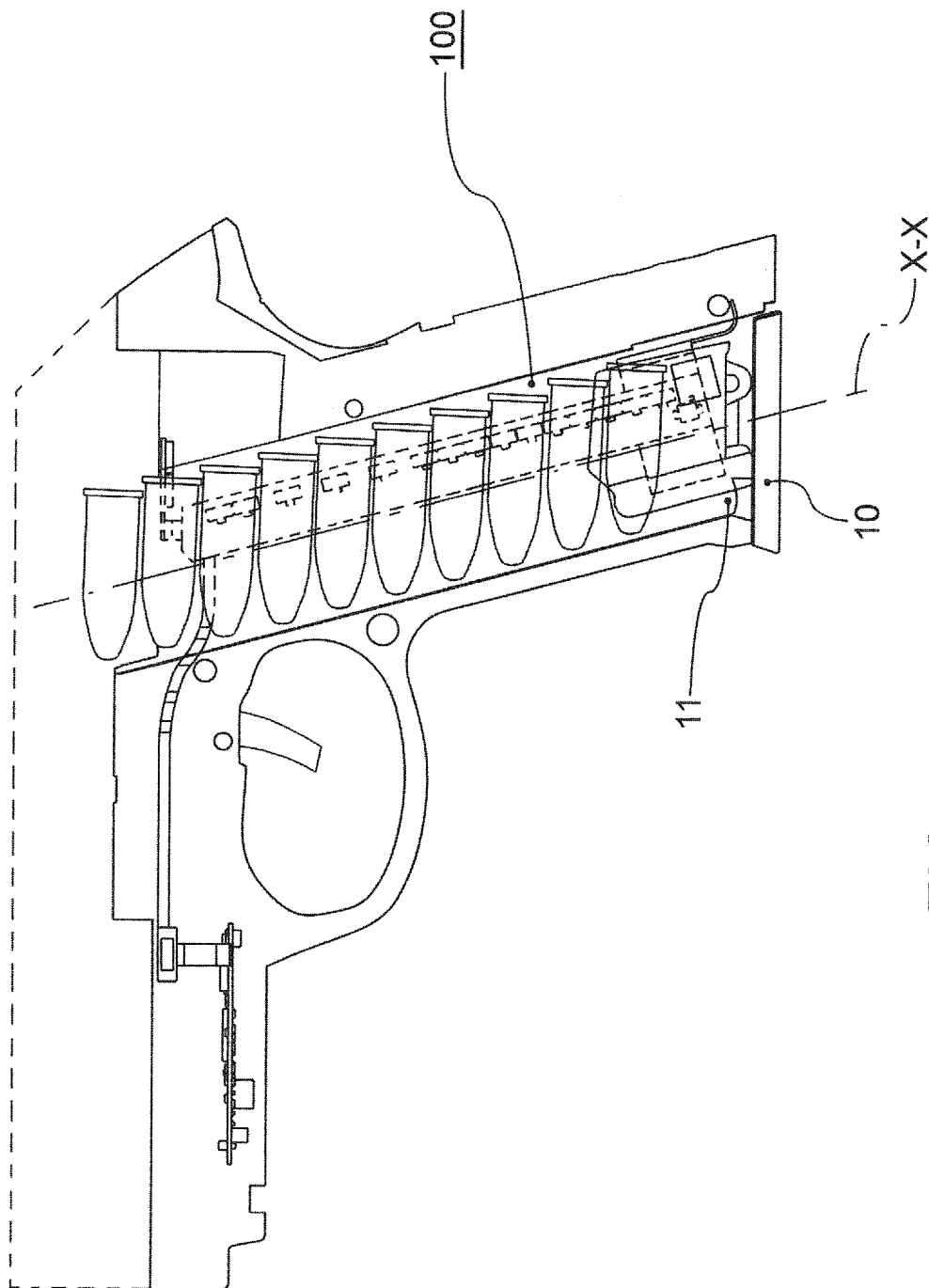


FIG.4

REFERENCES CITED IN THE DESCRIPTION

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