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(54) **Sensing device of true-simulating bullet magazine**

(57) A sensing device of a true-simulating bullet magazine is disclosed. When a bullet driving element (4, 4a, 4b) forward advance bullets, position of a movable guide bar (2, 2a) is controlled so that when the bullets are used up or a bullet magazine get loosened, an activation element (3, 3a) arranged at one end of the movable guide bar (2, 2a) is triggered to cut off power supply required for a firing operation of a toy gun. As such, without modifying the toy gun and the outside appearance of a true-simulating bullet magazine, a simple structure is provided to prevent firing of the toy gun under a condition of no bullet loaded so as to reduce the potential risk of damaging internal mechanisms of the toy gun and to achieve an effect of simulation of a real gun.

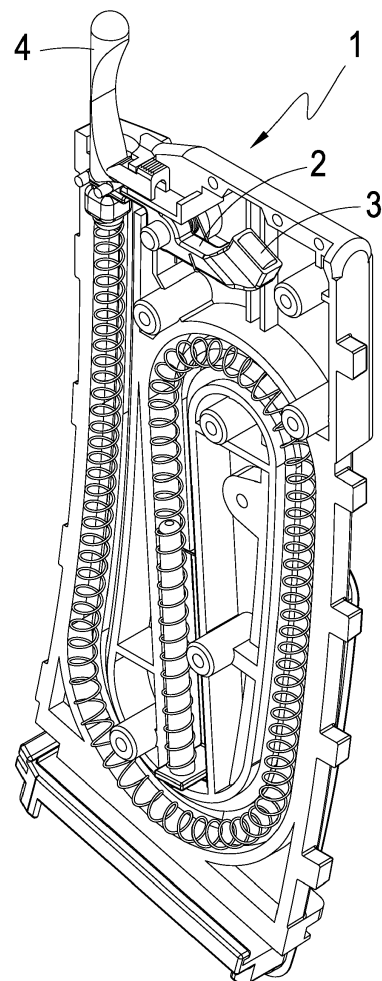


FIG. 1

Description

BACKGROUND OF THE INVENTION

(a) Technical Field of the Invention

[0001] The present invention generally relates to a sensing device of a true-simulating bullet magazine, and more particularly to a sensing device of a true-simulating bullet magazine that reduces the chance of damage of a toy gun by using a simple structure to constrain a firing operation of the toy gun in a condition of no bullet loaded or no magazine attached.

(b) Description of the Prior Art

[0002] To suit the needs of players who love military weapons, in a condition of no ammunition loaded, simple measures are often taken to constrain the operation of pulling a trigger by preventing it from being depressed or limiting the movement of a bolt. A common issue of such measures is numerous components must be added in such a way that the collaborative operations of these components are allowed to control the firing operations of the toy guns so as to prevent the it from shooting or simply invalid the firing.

[0003] Those known toy guns, however, suffer certain problems and drawbacks in the uses thereof and some are listed below. Further improvements thus are needed.

(1) The number of the components used is large and the operations of these components are complicated, making it extremely easy to break the combination relationships or the operations of the components simply due to hit or fall.

(2) The materials used are complicated, making the manufacture cost high and maintenance difficult.

(3) Although the firing operation is constrained, consumption of electrical power continues.

(4) There is no way for a user to identify if the next firing operation is still constrained.

SUMMARY OF THE INVENTION

[0004] The primary object of the present invention is to use a bullet driving element to control the advancing of bullets and using an activation element to control the supply of power to a toy gun and to arrange a movable guide bar between the bullet driving element and the activation element, so that when the bullet driving element has completely advanced all the bullets, the movable guide bar may trigger the activation element to cut off the supply of power of the toy gun thereby preventing firing of empty bullet, which may cause a waste of electrical power or a damage to the mechanisms.

[0005] To achieve above object, the present invention provides a structure that comprises: a movable guide bar that is movably mounted in a true-simulating bullet mag-

azine, an activation element that is mounted to an end of the movable guide bar and selectively activate/deactivate power required for firing of a toy gun, and a bullet driving element that is movably arranged in the true-simulating bullet magazine to selectively contact and move the movable guide bar. When a user is playing a toy gun that includes the present invention therein, before the true-simulating bullet magazine is installed, since the activation element is not activated, no electrical connection is established in the toy gun so that no firing can be performed, meaning it is not possible to shoot. After the true-simulating bullet magazine that is loaded with bullets is installed, the activation element is immediately triggered and the bullet driving element sequentially advances the bullets to be shot out, and then, the bullet driving element contacts and moves the movable guide bar so that the activation element mounted at one end of the movable guide bar that is distant from the bullet driving element is also moved to have the activation element is triggered again to cut off the power supply of the toy gun. As such, protection of the toy gun against firing at no bullet loaded is achieved.

[0006] The present invention provides a breakthrough solution for the existing problems of the prior art toy guns and achieves the above-described advantages.

[0007] The foregoing objectives and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

[0008] Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG 1 is a perspective view of the present invention. FIG 2 is a schematic side view showing inside details of the present invention.

FIG 3 is a schematic side view illustrating an operation of the present invention.

FIG 4 is another schematic side view illustrating the operation of the present invention.

FIG 5 is a schematic side view showing inside details of another embodiment of the present invention.

FIG 6 is a schematic side view illustrating a condition of use of said another embodiment of the present invention.

FIG 7 is another schematic side view illustrating the condition of use of said another embodiment of the present invention.

FIG 8 is a schematic side view illustrating an operation of said another embodiment of the present invention.

FIG 9 is a perspective view of a further embodiment of the present invention.

FIG 10 is an exploded view of said further embodiment of the present invention.

FIG 11 is a schematic view illustrating an operation of said further embodiment of the present invention.

FIG 12 is another schematic view illustrating the operation of said further embodiment of the present invention.

FIG 13 is an enlarged view of a portion of FIG 12.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] The following descriptions are exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

[0011] Referring to FIGS. 1 and 2, these drawings clearly show the present invention provides a sensing device of a true-simulating bullet magazine 1, which comprises:

a movable guide bar 2, which is movably mounted in the true-simulating bullet magazine 1, the movable guide bar 2 comprising a guide bar spring 21 attached thereto;

a constraint section 22, which is mounted in the true-simulating bullet magazine 1 to constrain a movement range of the movable guide bar 2;

an activation element 3, which is mounted to an end of the movable guide bar 2 to selectively activate/deactivate power required for a firing operation of a toy gun;

a bullet forwarding track 41, which is mounted in the true-simulating bullet magazine 1 for receiving bullets therein; and

a bullet driving element 4, which is movably arranged in the bullet forwarding track 41 to selectively contact and move the movable guide bar 2, the bullet driving element 4 having an end that is opposite to an opening of the bullet forwarding track 41 and is provided with a bullet driving spring 42 attached thereto.

[0012] Collectively referring to FIGS. 1-4, loading bullets (where BB bullets are taken as an example for illustration) is carried out by first pressing the bullet driving

element 4 into the bullet forwarding track 41 and then BB bullets are inserted, one by one, into the bullet forwarding track 41. In the insertion of first BB bullet, it can be found that the bullet driving element 4 releases the engagement thereof with the movable guide bar 2 to allow the spring force of the guide bar spring 21 to rotate the movable guide bar 2 in such a way that the activation element 3 that is mounted to the opposite end of the movable guide bar 2 is caused to contact an inner wall of the true-simulating bullet magazine 1. However, before the true-simulating bullet magazine 1 is installed, electrical power of the toy gun is not activated, meaning the activation element 3 may detect the no magazine loaded condition and prevent firing from being performed. When BB bullets are completely loaded and the true-simulating bullet magazine 1 is then installed, the activation element 3 is triggered so as to establish electrical connection of a driving motor of the toy gun to allow an operation to be normally carried out by a user. At the moment when the last one of the BB bullets is shot, the bullet driving element 4 is once again brought into contact with and thus moves the movable guide bar 2 to set the movable guide bar 2 resting on one side of the constraint section 22 so that the activation element 3 breaks the electrical connection of the toy gun to interrupt the supply of power for next firing thereby preventing firing from being performed in a condition of no bullet loaded.

[0013] Referring to FIGS. 5-8, it can be seen from FIG. 5 that in this embodiment is constructed by modifying portions of the previous embodiment, wherein the activation element 3a comprises a detection magnet and the activation element 3a further comprises a magnetic reed switch 31a mounted to an installation opening of the true-simulating bullet magazine 1a. The activation element 3a further comprises a microcontroller 32a that is electrically connected to the toy gun and is operable to detect an activation/deactivation condition of the magnetic reed switch 31a. Further, a projection section 43a is formed on one side of the bullet driving element 4a and an engagement section 23a is formed on one end of the movable guide bar 2a that is distant from the activation element 3a. An operation achieved with such modifications will be described. Firstly, referring to FIG. 6, before the true-simulating bullet magazine 1a is installed, since the magnetic reed switch 31a and the activation element 3a are separate from each other so that the microcontroller 32a detects such a condition and interrupts the supply of electrical power of the toy gun so that the toy gun does not have power for firing. Then, as shown in FIG. 7, an operation of loading bullets in this embodiment is similar to that of the previous embodiment with the only exception that the projection section 43a and the engagement section 23a are included to stabilize the operative and driving relationship between the bullet driving element 4a and the movable guide bar 2a. When the true-simulating bullet magazine 1a is installed with bullets loaded therein, the activation element 3a and the magnetic reed switch 31a are moved to approach each other so that the

microcontroller 32a detects such a condition and establish connection for electricity supply of the toy gun. When the bullets are used up, as shown in FIG. 8, the subsequent operation is similar to that of the previous embodiment and repeated description will be omitted. Using the activation element 3 a and the magnetic reed switch 31a to serve as a detection based activation device makes it possible to use a less number of components and having a small volume and reduced weight and they are respectively installed in the true-simulating bullet magazine 1a and the interior of the gun, causing no damage to the outside appearance so that the overall degree of true-simulation is better, the resistance against wear and abrasion is achieved, the lifespan is extended, the reaction is fast, and activation/deactivation operations are stable, making it an economic and advantageous non-contact sensing device.

[0014] Referring to FIGS. 9-13, to improve the degree of true simulation of a true-simulating bullet magazine 1b, firstly, the true-simulating bullet magazine 1b comprises an outer casing 11b in which an inner casing spring 13b is mounted, an inner casing 12b that is arranged inside the outer casing 11b to be movable upwards/downward with respect thereto and is connected via the inner casing spring 13b to a bottom of the outer casing 11b, a simulation bullet 14b, which is movably arranged in the outer casing 11b and is set in contact engagement with an end of the inner casing 12b that is opposite to the inner casing spring 13b, and a constraint block 15b, which is fit, through elastic means, to the outer casing 11b to selectively constrain upward/downward movement of the inner casing 12b. For visual purposes, the outer casing 11b is provided with at least one observation window 111b and a false bullet piece 112b that is arranged inside the observation window 111b and is structured to achieve the purposes of mimicking loading of bullets so that a user is allowed to observe through the observation window 111b and perceives a feeling of true loading of bullets into the magazine. Through such an arrangement, as shown in FIG. 11, it can be seen that the simulation bullet 14b that is mounted to an upper end of the inner casing 12b is arranged for simulate a bullet carrying board of a real bullet magazine in order to enhance the strength and perception of loading a first bullet into the magazine. To operate, the bullet driving element 4b is first pressed down into the inner casing 12b and at least one decorative bullet 5b is then loaded. Loading the decorative bullet 5b causes the inner casing spring 13b to be compressed so that the inner casing 12b is moved downward to achieve the simulation of a true device. To load BB bullets, the decorative bullet 5b is removed to thereby resume the initial condition as that shown in FIG. 9, and meanwhile, the constraint block 15b is depressed to have it engaging and holding the inner casing 12b so as to prevent the inner casing 12b from being depressed down due to compression of the inner casing spring 13b caused by the operation of loading the BB bullets thereby avoiding unsmooth performance of

bullet loading and making the present invention easy and convenient to operate and showing high degree of true simulation.

[0015] Thus, with reference to all the drawings, the present invention, when put into use, demonstrates the following advantages over the prior art devices:

- (1) The power supply is interrupted when there is no bullet or magazine loaded in order to prevent damage to the mechanisms thereof and also to prevent wasting energy.
- (2) An activation element 3 is used to replace the complicated combination of numeral components adopted in the prior art devices so as to reduce cost and simplify assembly.
- (3) Adopting the characteristics of a magnetic reed switch 31a in the present invention to help improve the development thereof.
- (4) The arrangement of the present invention requires no modification or damage to the outside appearance so that a high degree of true simulation can be achieved in respect of the outside appearance, the feeling of hand, and a perception of careful operation of a true magazine.

[0016] It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

[0017] While certain novel features of this invention have been shown and described and are pointed out in the annexed claim, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Claims

1. A sensing device of a true-simulating bullet magazine, comprising:
 - a movable guide bar (2, 2a), which is movably mounted in a true-simulating bullet magazine (1, 1a, 1b);
 - an activation element (3, 3a), which is mounted to an end of the movable guide bar (2, 2a) to selectively activate/de-activate power required for a firing operation of a toy gun; and
 - a bullet driving element (4, 4a, 4b), which is movably arranged in the true-simulating bullet magazine (1, 1a, 1b) to selectively contact and move the movable guide bar (2, 2a).
2. The sensing device of the true-simulating bullet mag-

azine according to claim 1, wherein the true-simulating bullet magazine (1, 1a, 1b) comprises a bullet forwarding track (41) mounted therein for receiving bullets therein, the bullet driving element (4, 4a, 4b) being movably arranged in the bullet forwarding track (41), the bullet driving element (4, 4a, 4b) having an end that is opposite to an opening of the bullet forwarding track (41) and is provided with a bullet driving spring (42) attached thereto.

3. The sensing device of the true-simulating bullet magazine according to claim 1, wherein the activation element (3, 3a) comprises a detection magnet and the activation element (3, 3a) further comprises a magnetic reed switch (31a) mounted to an installation opening of the true-simulating bullet magazine (1, 1a, 1b).
4. The sensing device of the true-simulating bullet magazine according to claim 3, wherein the activation element (3, 3a) further comprises a microcontroller (32a) that is electrically connected to the toy gun and is operable to detect an activation/deactivation condition of the magnetic reed switch (31a).
5. The sensing device of the true-simulating bullet magazine according to claim 1, wherein a projection section (43a) is formed on one side of the bullet driving element (4, 4a, 4b) and an engagement section (23a) is formed on one end of the movable guide bar (2, 2a) that is distant from the activation element (3, 3a).
6. The sensing device of the true-simulating bullet magazine according to claim 1, wherein the movable guide bar (2, 2a) comprises a guide bar spring (21) attached thereto and the true-simulating bullet magazine (1, 1a, 1b) comprises a constraint section (22) mounted therein to constrain a movement range of the movable guide bar (2, 2a).
7. The sensing device of the true-simulating bullet magazine according to claim 1, wherein the true-simulating bullet magazine (1, 1a, 1b) has an outer wall in which at least one observation window (111b) is formed and a false bullet piece (112b) for simulation of bullet loading is arranged inside the observation window (111b).
8. The sensing device of the true-simulating bullet magazine according to claim 1, wherein the true-simulating bullet magazine (1, 1a, 1b) comprises an outer casing (11b) in which an inner casing spring (13b) is mounted and an inner casing (12b) that is arranged inside the outer casing (11b) to be movable upwards/downward with respect thereto and is connected via the inner casing spring (13b) to a bottom of the outer casing (11b).

9. The sensing device of the true-simulating bullet magazine according to claim 8, wherein the true-simulating bullet magazine (1, 1a, 1b) further comprises a simulation bullet (14b) that is movably arranged in the outer casing (11b), the simulation bullet (14b) being set in contact engagement with an end of the inner casing (12b) that is opposite to the inner casing spring (13b).

10. The sensing device of the true-simulating bullet magazine according to claim 8, wherein the outer casing (11b) comprises a constraint block (15b) mounted thereto in an elastic manner constrain upward/downward movement of the inner casing (12b)

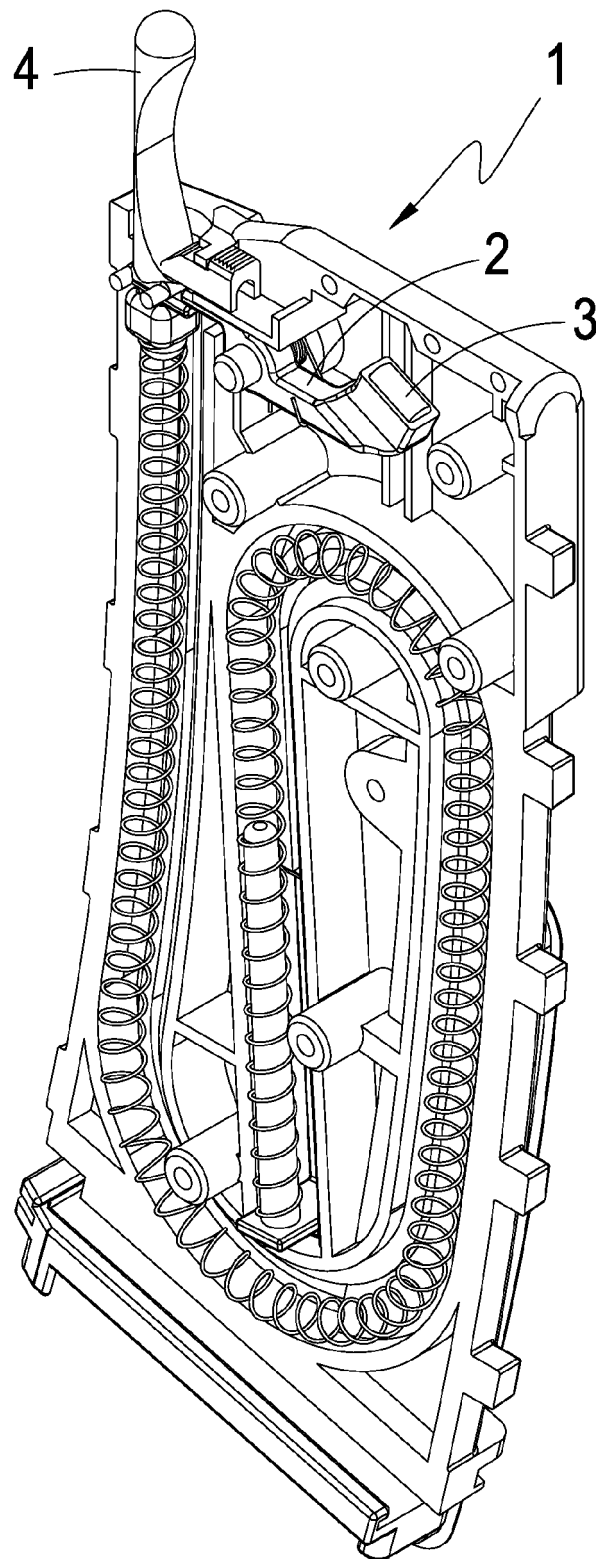


FIG. 1

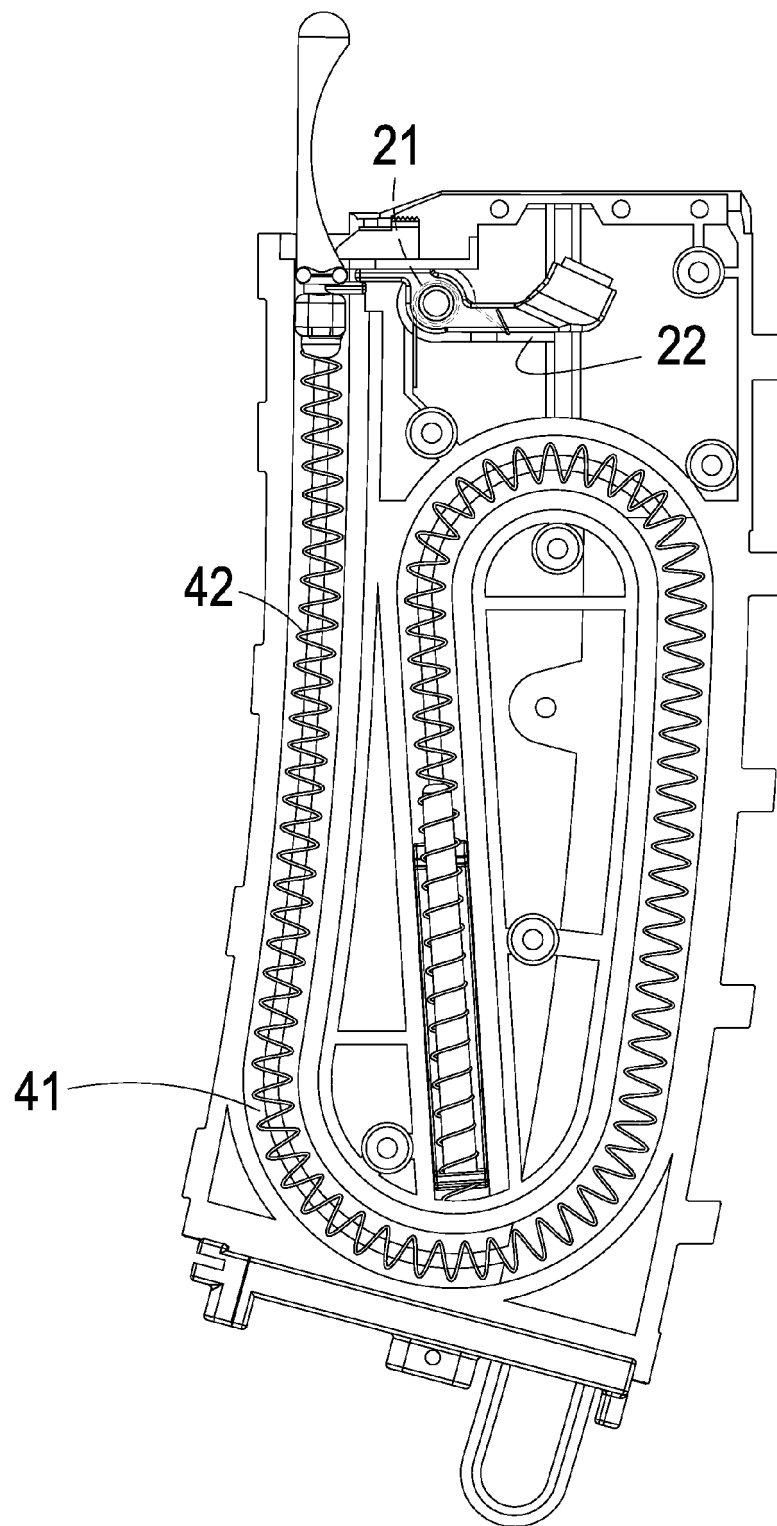


FIG. 2

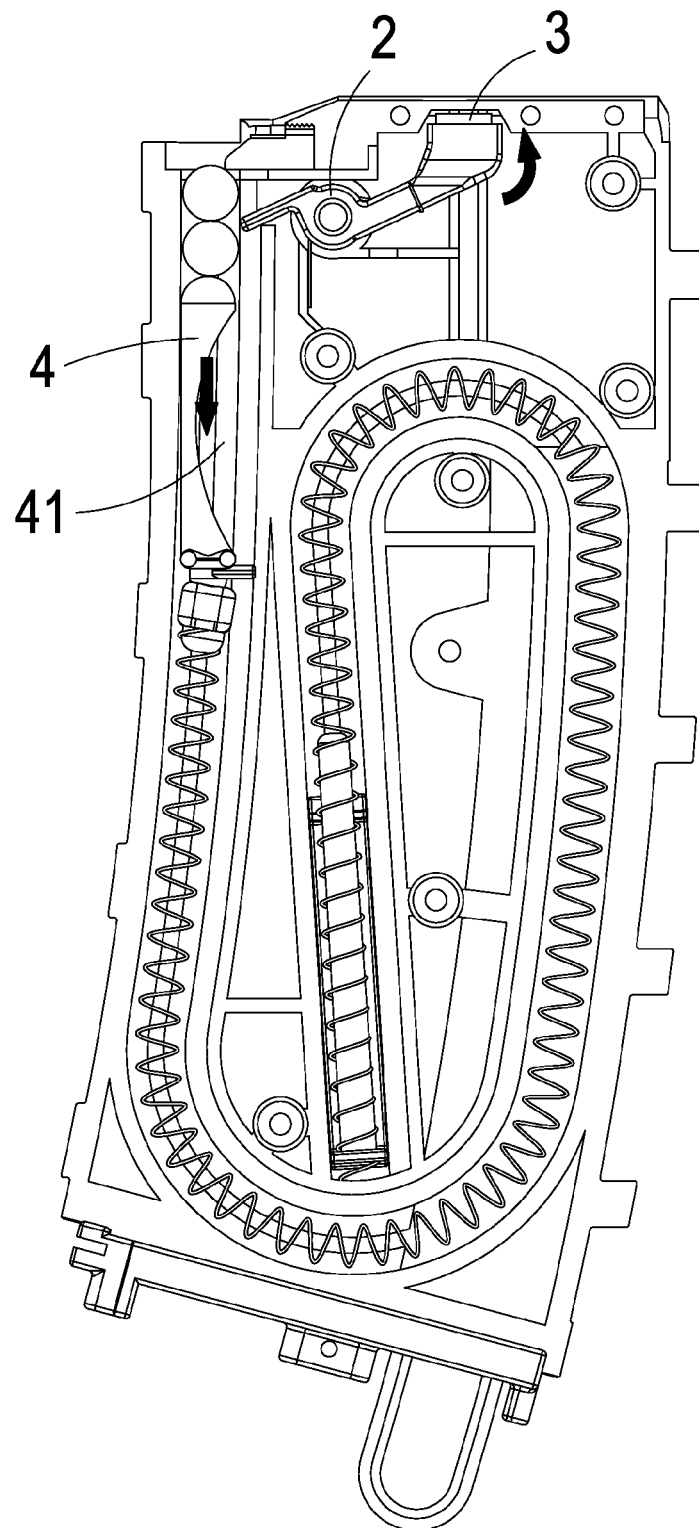


FIG. 3

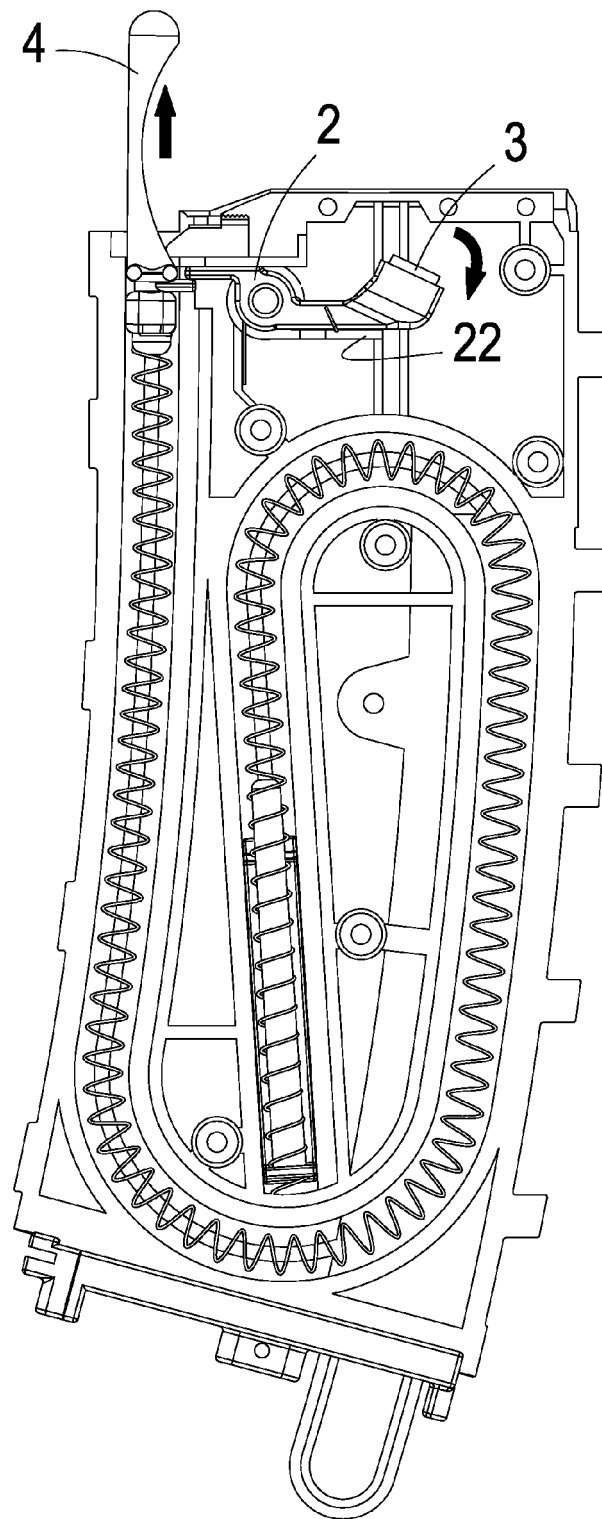


FIG. 4

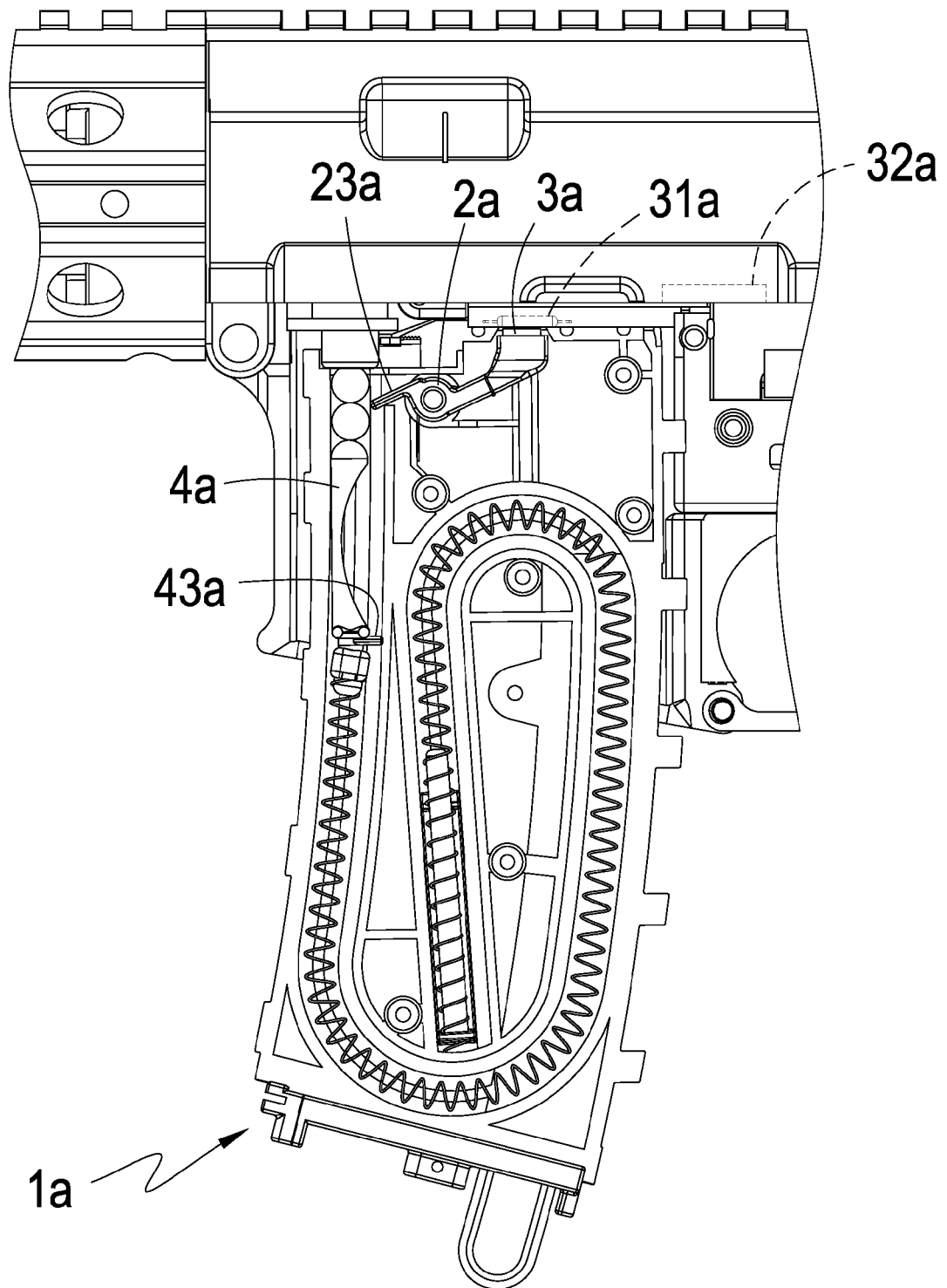


FIG. 5

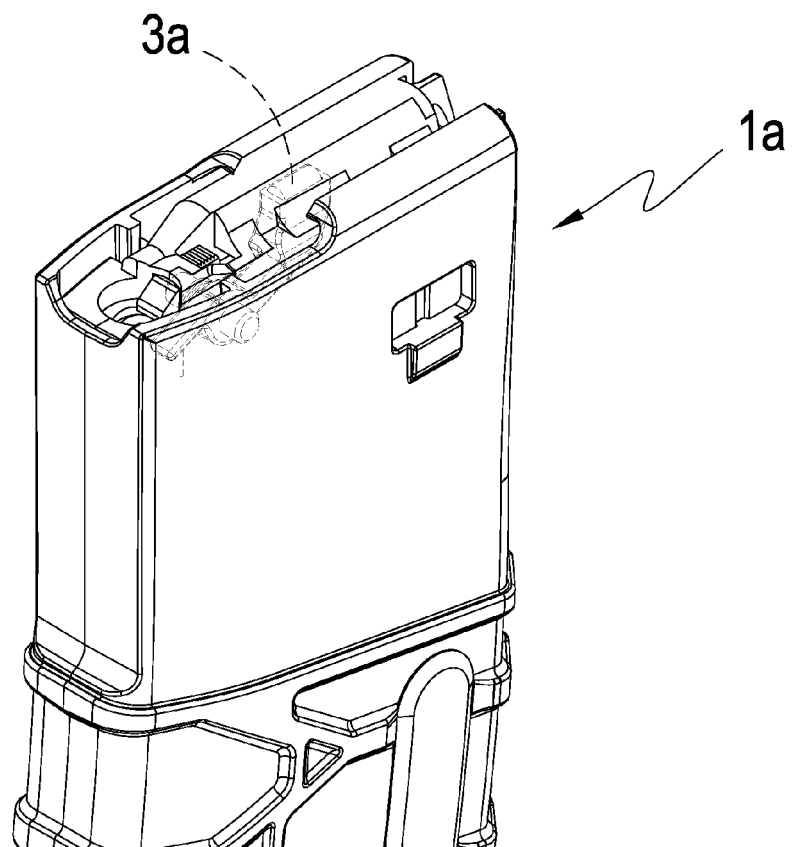
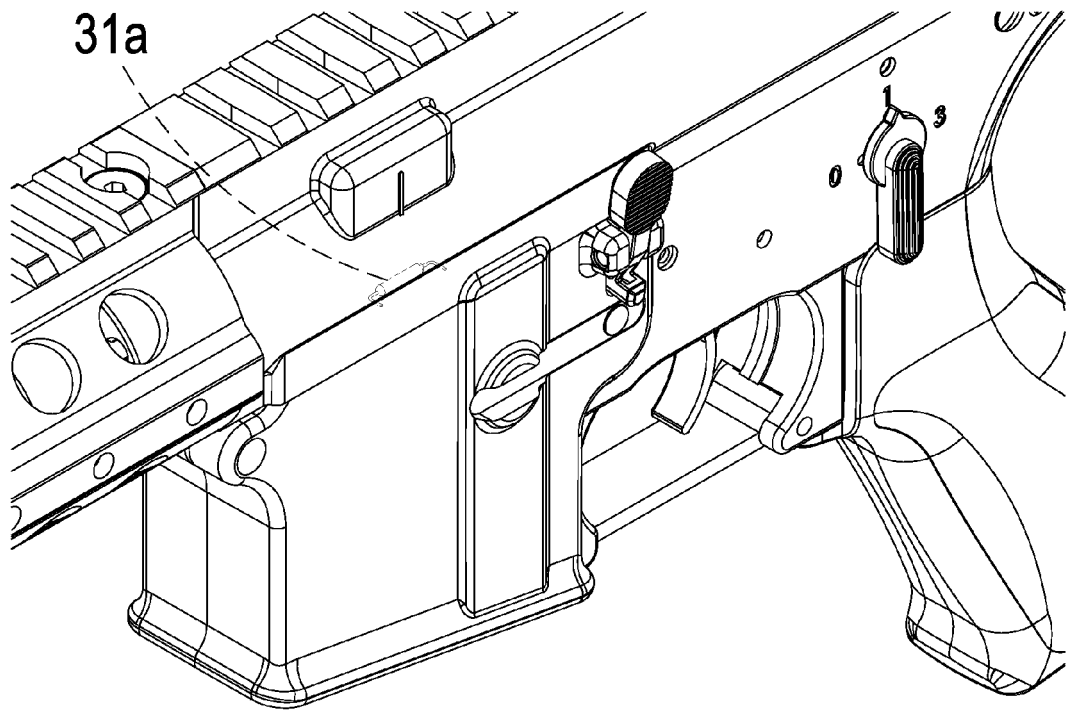


FIG. 6

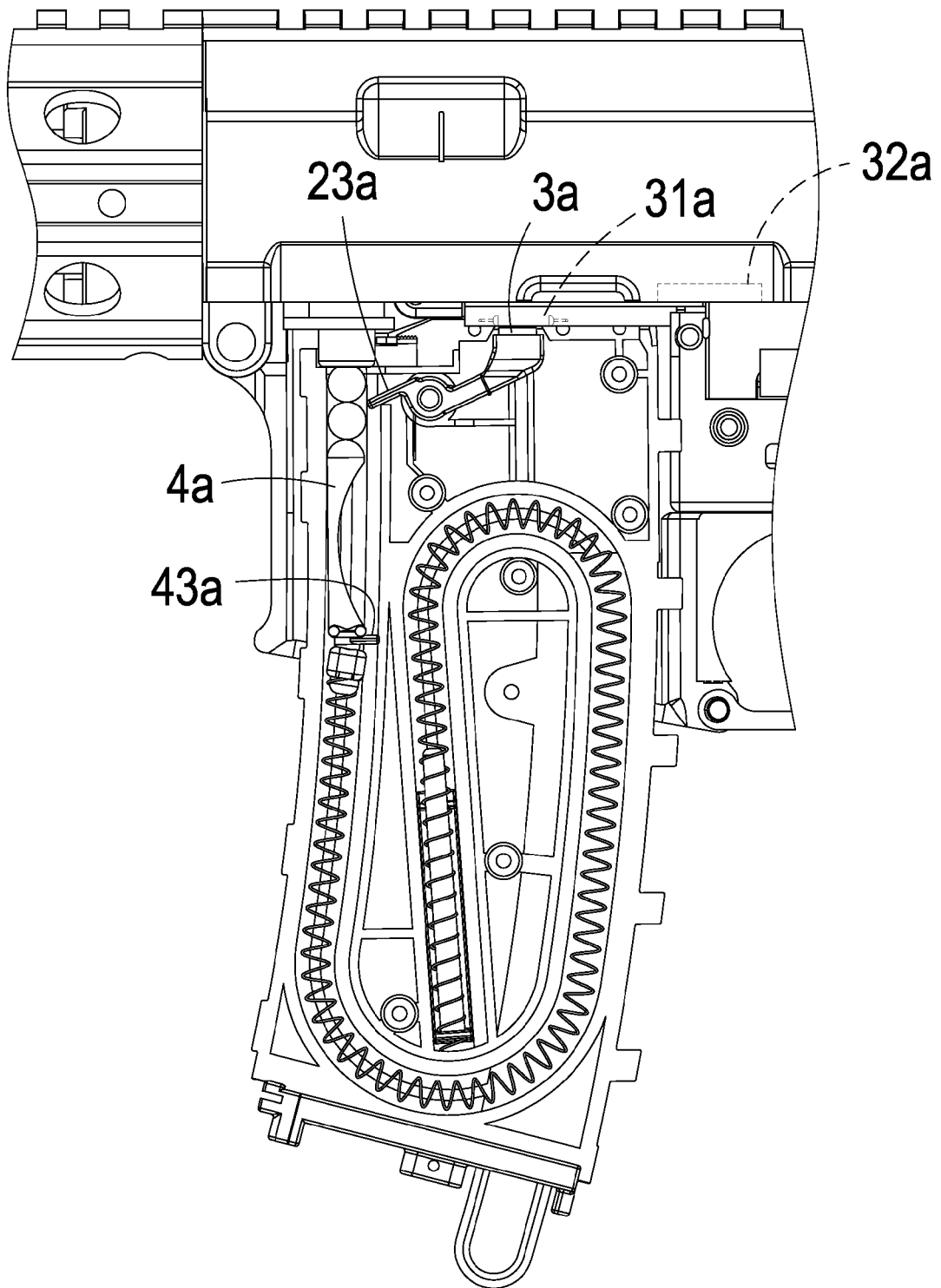


FIG. 7

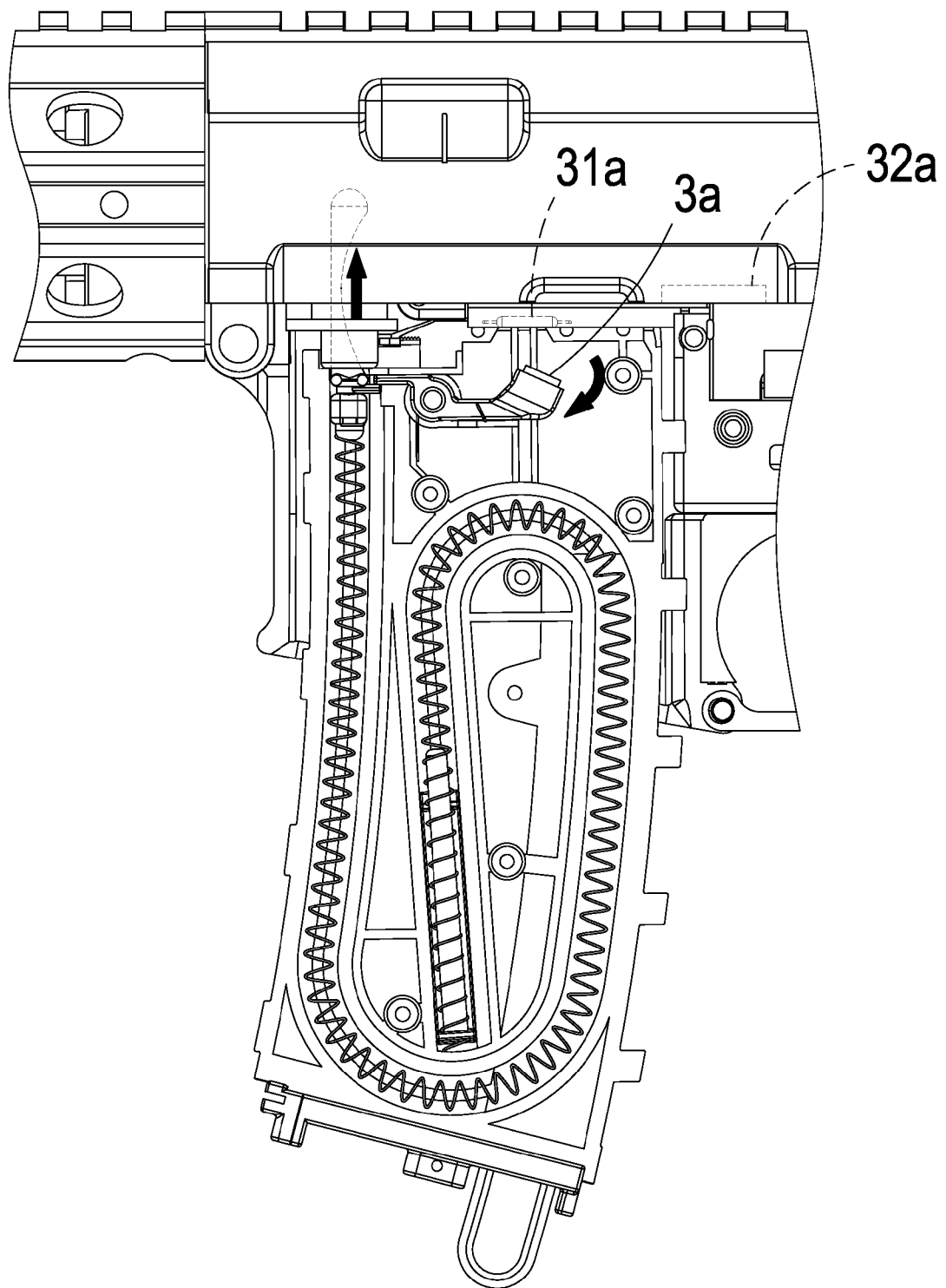


FIG. 8

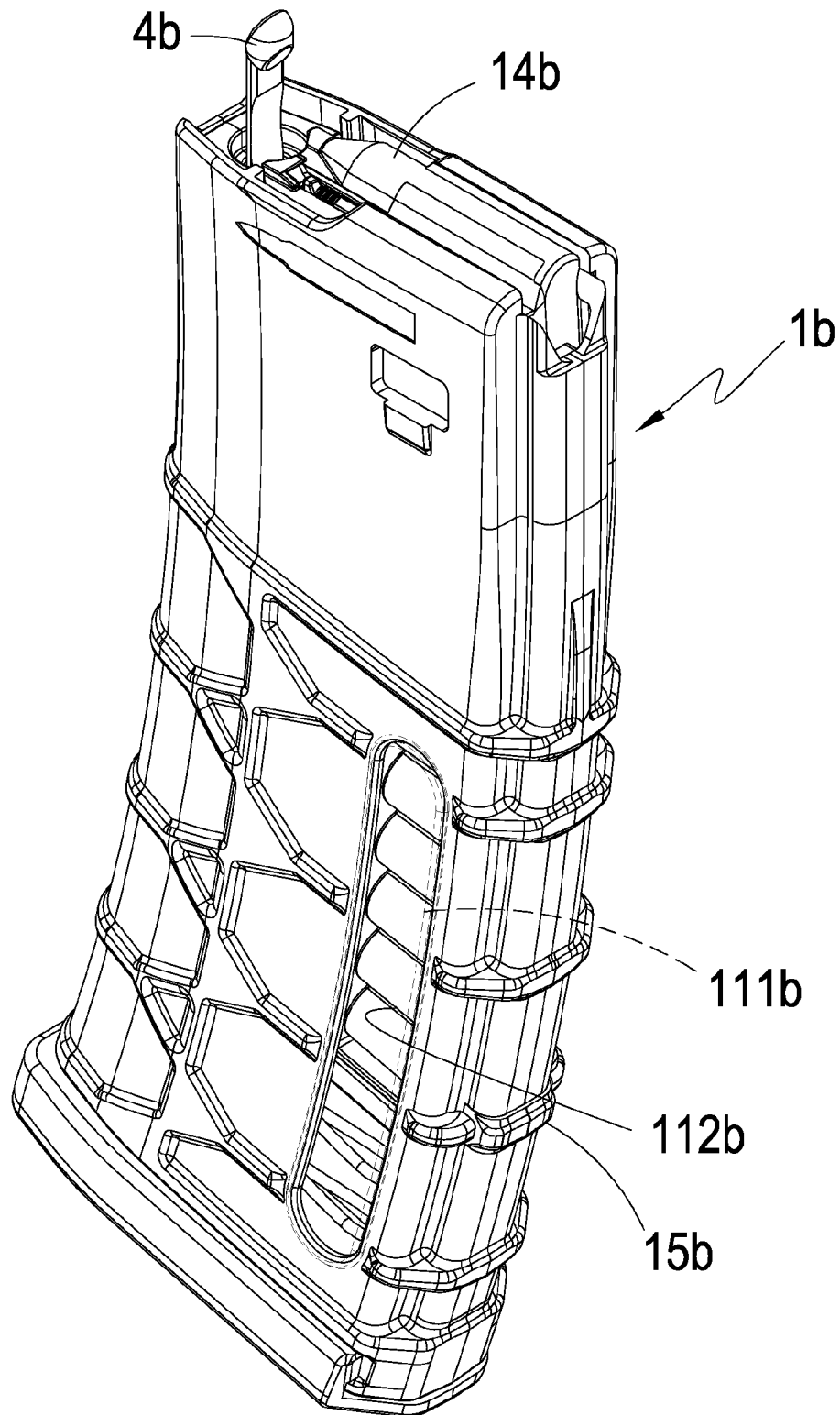


FIG. 9

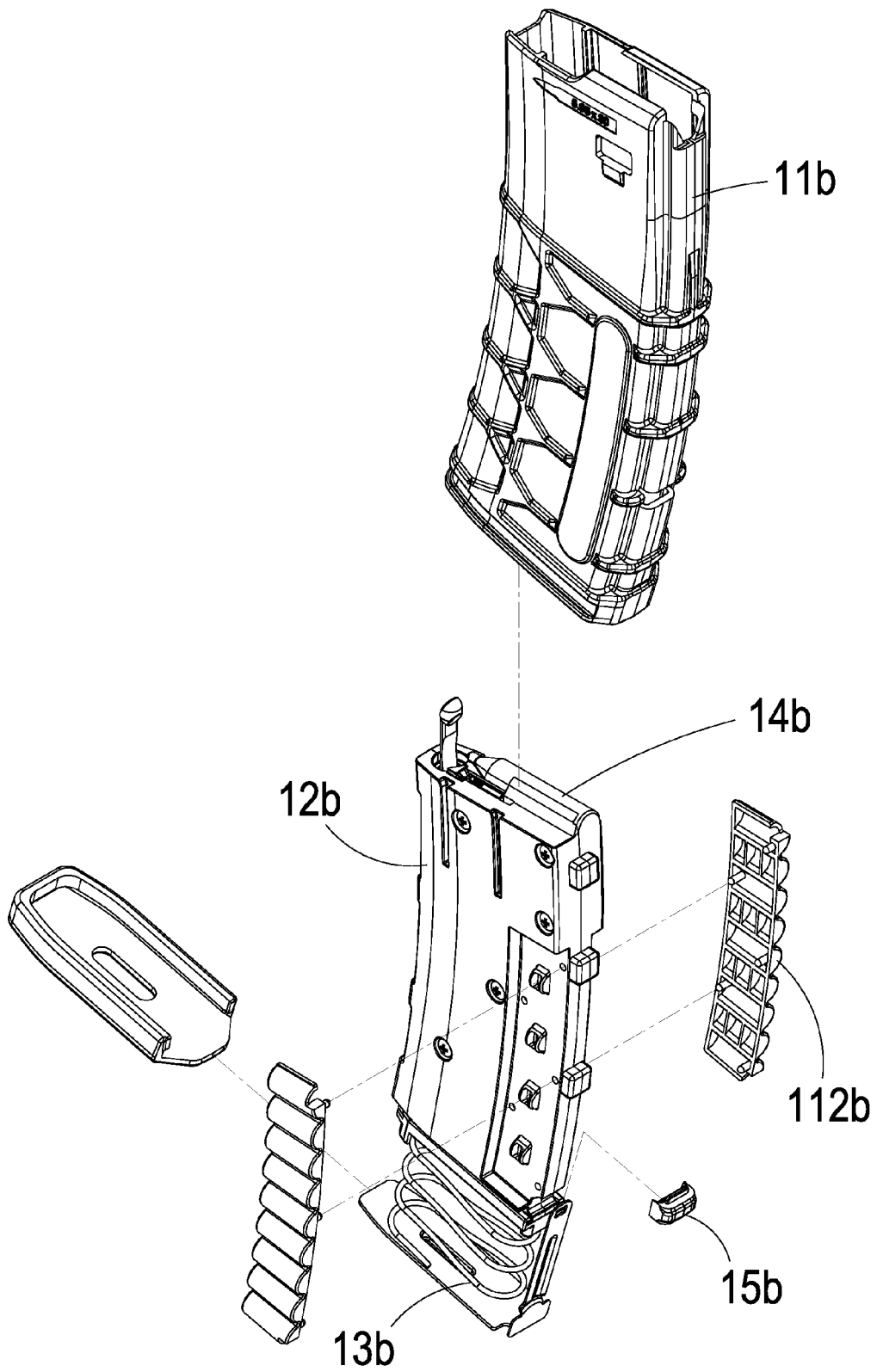


FIG. 10

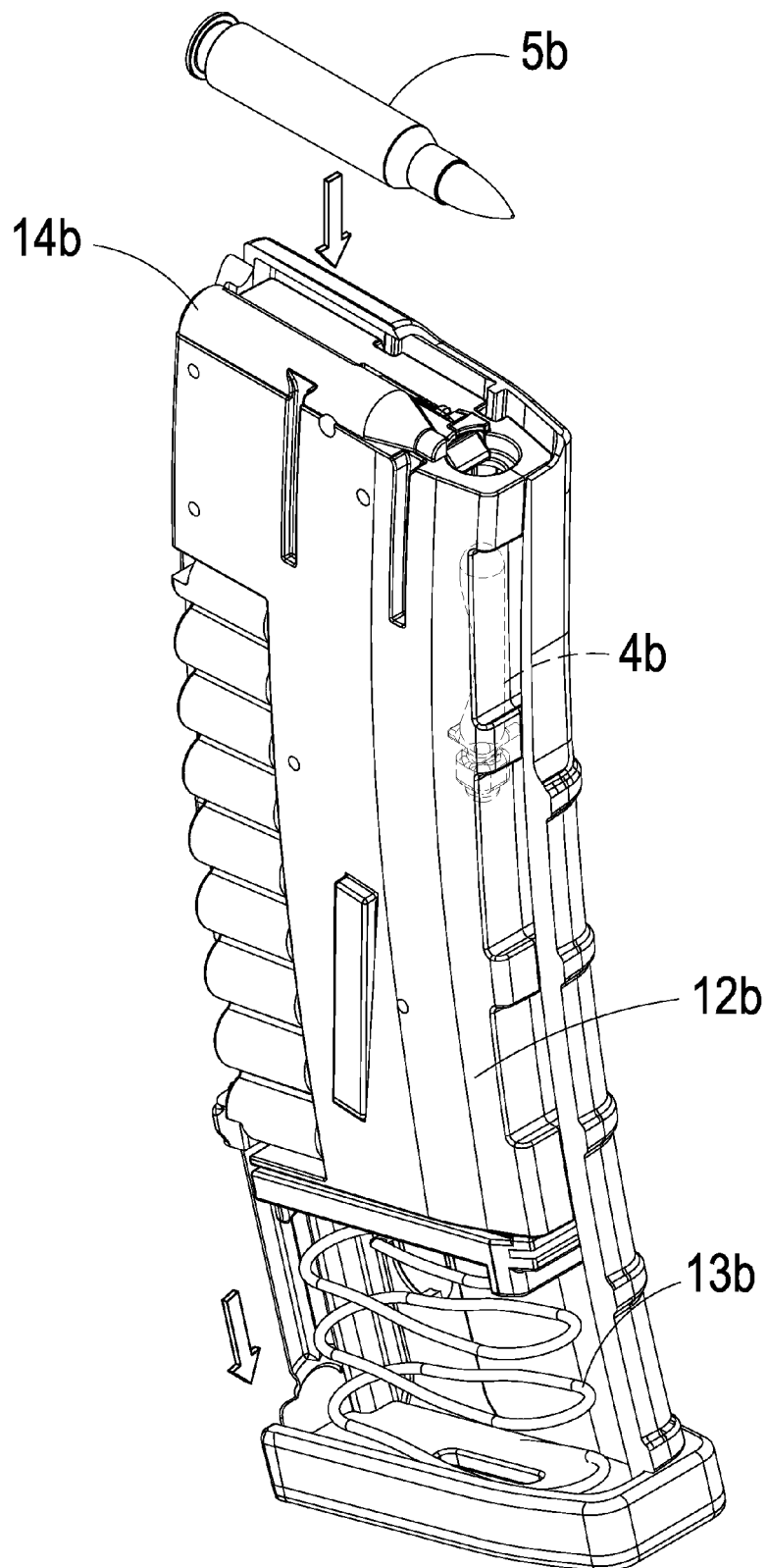


FIG. 11

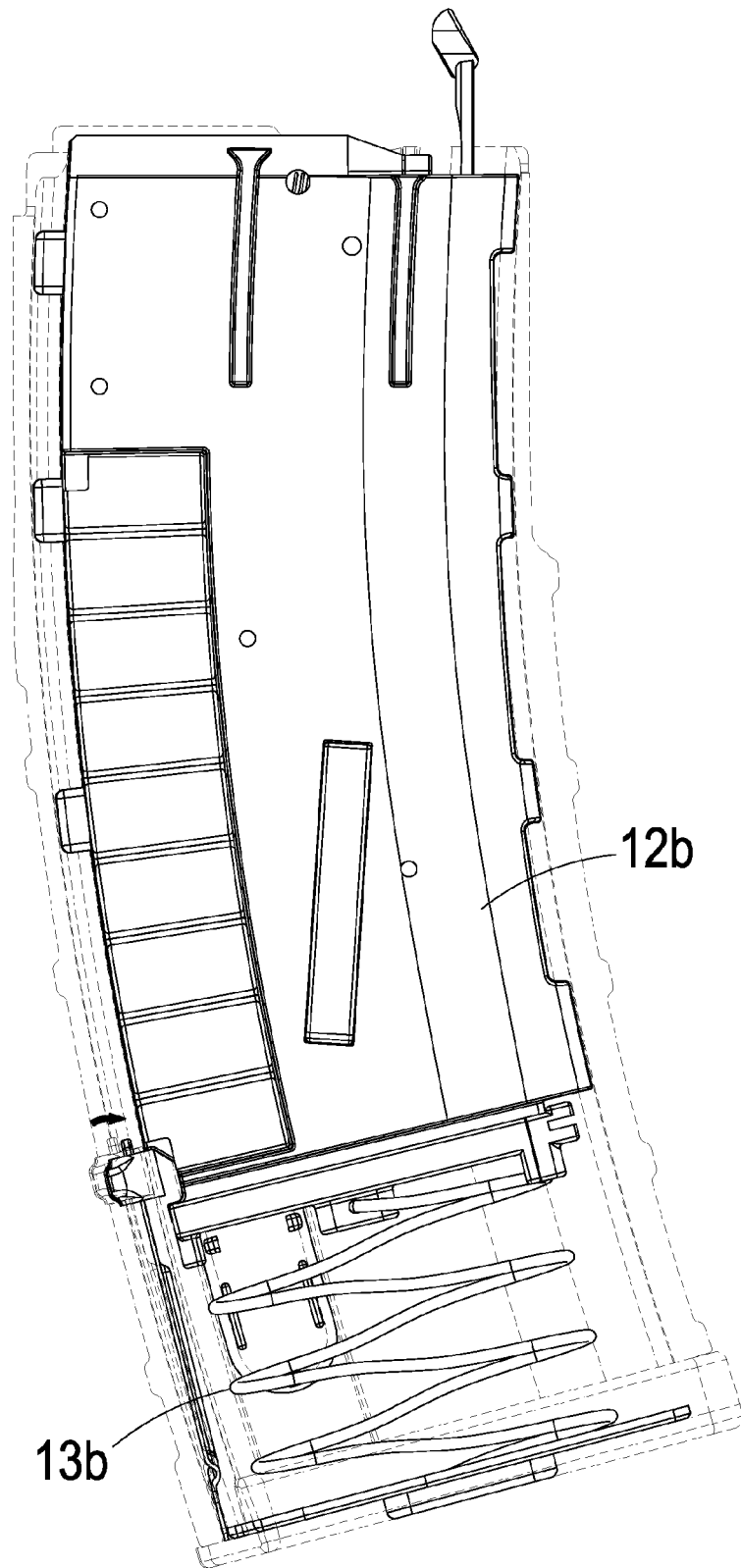


FIG. 12

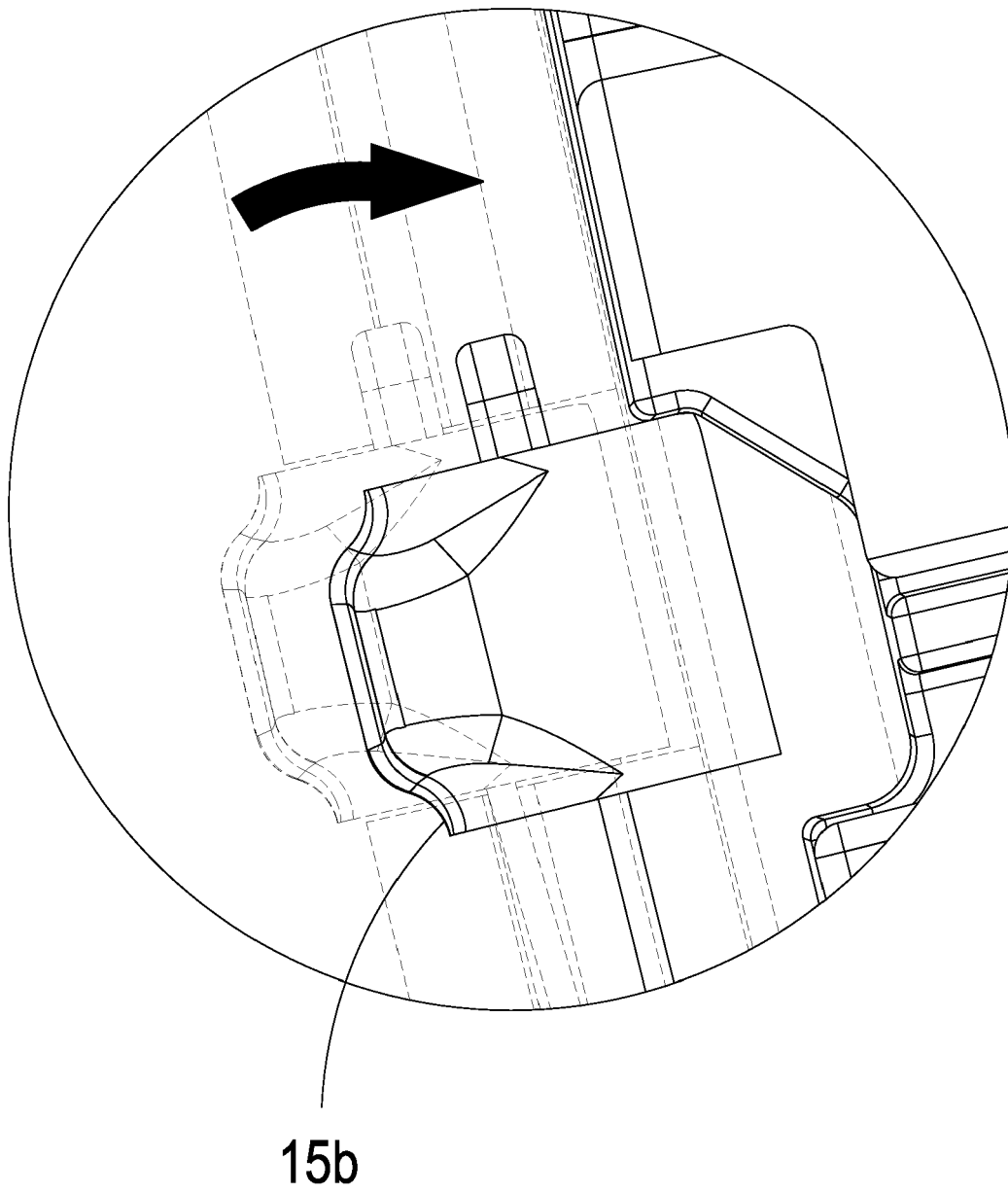


FIG. 13



EUROPEAN SEARCH REPORT

Application Number
EP 14 19 0406

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 390 614 A1 (YIH KAI ENTPR CO LTD [TW]) 30 November 2011 (2011-11-30) * paragraphs [0010] - [0016]; figures 1-9 *	1,2,5-7	INV. F41A17/36 F41B11/55
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A	US 2007/000483 A1 (TSURUMOTO KOICHI [JP]) 4 January 2007 (2007-01-04) * paragraphs [0048] - [0055], [0069] - [0081]; figures 1-5, 7-9, 23 *	1	
A	US 7 861 702 B1 (SZE YAT MING [HK]) 4 January 2011 (2011-01-04) * column 3, line 9 - column 4, line 67; figures 1, 2, 6 *	7-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			F41A F41B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 July 2015	Examiner Kasten, Klaus
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)



Application Number

EP 14 19 0406

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 14 19 0406

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-6

Power break in case of empty magazine

2. claims: 1, 7-10

Imitation of a cartridge receiving magazine

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 19 0406

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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20-07-2015

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