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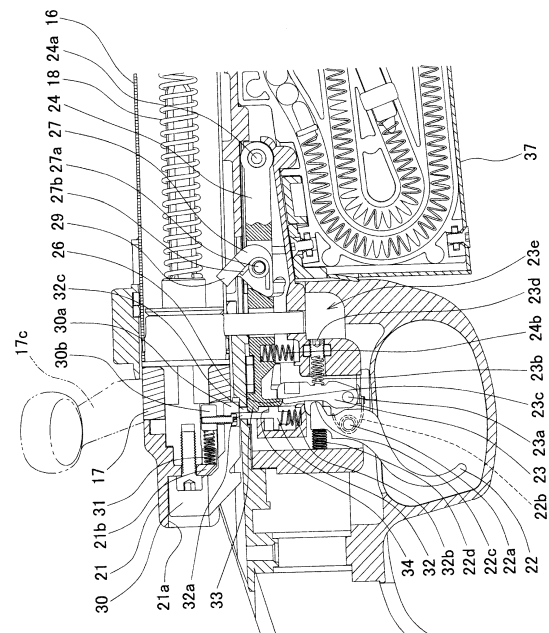
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(54) **TRIGGER DEVICE IN SIMULATED GUN**

(57) [Problem] Operation feeling of a trigger in a simulation gun is further improved, and delicate operation feeling can be adjusted by a user himself/herself.

[Solution] A simulation gun has a configuration in which a shear in a state of cocking is released in response to an operation of a trigger, an intermediate member disposed between the trigger and the shear is rotatably and pivotally supported by a gun main body, the intermediate member is interlocked so as to be able to be interlocked and be released with respect to the shear on a rotary end portion side separated from the pivotal support point, and an operation force of the trigger acts on a spot between the pivotal support point and an interlocking point with respect to the shear.

【Fig. 3】



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## Description

## Technical Field

**[0001]** The present invention relates to a trigger apparatus in a simulation gun in which a shear in a state of cocking is released in response to an operation of a trigger.

## Background Art

**[0002]** A simulation gun shooting a so-called airsoft pellet is also referred to as an airsoft gun or the like. There are various types of guns such as guns for juveniles to the extent of having 18 years or older as targets, and the guns are widely used. Particularly, in some aspects, guns provided for adults have been developed as an item having high tasty elements. Accordingly, it is desired to be provided with the shape, the structure, and the operability as a real gun true to life. However, even if the shape and the operability can be equal to those of a real gun, it is natural to have internal mechanisms different from each other.

**[0003]** The simulation gun and the real gun are essentially different from each other. Nevertheless, there are common demands of users. For example, there are demands related to a shooting device called a trigger or a gunlock, particularly related to operation feeling. Similar to the real gun, the simulation gun also demands accurate operability and high bullet-collecting characteristics.

**[0004]** In a case where the operation feeling is not appropriate when the trigger is operated, shaking occurs, leading to a result in which a planned shooting record cannot be achieved.

**[0005]** The applicant of this case has grasped this point as a technical problem to be solved from the related art and has formerly proposed the invention of JP-A-2005-114260. The invention of the literature discloses a gun which is enabled to shoot a bullet by a lighter operation even in a case of a simulation gun using a strong spring or the like. The invention has a configuration in which an intermediate member is moved to a different position due to leverage when the gunlock is pulled, and thereby latching by a shear member is released.

**[0006]** However, the so-called intermediate member of the invention is a part of the shear member, and an engagement portion at the rear end thereof is configured to be applied to an upper portion of the gunlock as a load. As a result, in a state where cocking is completed, a force pressurizing a piston in a piston cylinder mechanism is easily applied to the gunlock via the shear member and the intermediate member. The load acts when the gunlock is operated, and the load is sensed as resistance. Therefore, leaving a comparison with existing guns aside, there is a possibility of insufficient feeling for the demands such as improving more delicate operation feeling.

## Citation List

## Patent Literature

5 **[0007]** [PTL 1] JP-A-2005-114260

## Summary of Invention

## Technical Problem

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**[0008]** The present invention has been made in consideration of the foregoing points, and an object thereof is to further improve operation feeling of a trigger in a simulation gun. In addition, another object of the present invention is to provide a trigger apparatus in a simulation gun in which delicate operation feeling can be adjusted by a user himself/herself.

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## Solution to Problem

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**[0009]** In order to attain the above-described objects, according to the present invention, there is provided means for a simulation gun having a configuration in which a shear in a state of cocking is released in response to an operation of a trigger, in which an intermediate member disposed between the trigger and the shear is rotatably and pivotally supported by a gun main body, the intermediate member is interlocked so as to be able to be interlocked and be released with respect to the shear on a rotary end portion side separated from a pivotal support point thereof, and an operation force of the trigger acts on a spot between the pivotal support point and an interlocking point with respect to the shear. Operation feeling in the present invention includes quite sensuous feeling such as so-called pulling feeling and an applying condition of the trigger. However, technically, the operation feeling is considered to be easiness of grasping the applying timing of the trigger in which a force and a stroke required for an operation of the trigger are involved.

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**[0010]** The present invention has a configuration in which the intermediate member disposed between the trigger and the shear is rotatably and pivotally supported by the gun main body. Therefore, the action of the trigger can be replaced by a rotation of the intermediate member. Accordingly, by selecting an abutting position of the trigger, the length of a moment arm of an acting point with respect to the intermediate member can be changed, and a force required to operate the trigger can be arbitrarily set.

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**[0011]** It is desirable for the present invention to have a configuration in which a spring acts on the intermediate member from a side opposing an operation direction of the trigger, and an adjustment screw is provided in a place receiving the spring in order to adjust the strength of the spring. Since a user can operate the adjustment screw from the outside of a gun, the strength of the spring can be adjusted and the taste of the user himself/herself

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can be reflected. Thus, it is possible to obtain a simulation gun in which using feeling is further improved.

**[0012]** It is preferable for the apparatus of the present invention to have a configuration in which the simulation gun includes a piston cylinder mechanism, a force acting in a pressurizing direction of a piston in response to cocking is added to the shear, and the trigger acts in an intersecting direction with respect to the intermediate member receiving the force added to the shear. Since the trigger acts in the intersecting direction with respect to the intermediate member, by selecting the position of the acting point, the adding force can be more easily adjusted.

**[0013]** In addition, it is also desirable to have a configuration in which the shear has a first shear attached to the gun main body side and a second shear attached to the first shear, the second shear is interlocked with the piston, the intermediate member is interlocked with the first shear in order to release the first shear in the state of cocking in response to an operation of the trigger, and the second shear is separated from a state of being interlocked with the piston in accordance with separation from the interlocked state. In other words, the shear can be configured by combining two members of the first shear and the second shear together. However, the shear in the present invention does not limit a configuration of a single member.

#### Advantageous Effects of Invention

**[0014]** The present invention has a configuration and acts as described above, thereby exhibiting an effect of being able to more remarkably improve operation feeling of the trigger in a simulation gun by using the intermediate member disposed between the trigger and the shear. In addition, according to the present invention, it is possible to allow a user himself/herself to be able to manually adjust delicate operation feeling, and thus, it is possible to provide a trigger apparatus in a simulation gun in which delicate operation feeling suitable for each of users can be individually obtained.

#### Brief Description of Drawings

##### **[0015]**

Fig. 1 relates to an example of a trigger apparatus in a simulation gun according to the present invention and is a view describing a longitudinal cross section in which a part of a gun main body is omitted.

Fig. 2 is a view describing a cross section in which a main portion of the same apparatus is enlarged.

Fig. 3 is a view describing a cross section in which a part around a shooting mechanism is further enlarged.

Fig. 4 is a view describing a cross section in which the surroundings of a trigger is enlarged.

Fig. 5 is a view describing a cross section illustrating

a state immediately before operating the trigger after cocking in the trigger apparatus in a simulation gun according to the present invention.

Fig. 6 is a view describing a cross section illustrating a state succeeding Fig. 5, after operating the trigger after cocking.

#### Description of Embodiment

**[0016]** Hereinafter, with reference to an illustrated embodiment, the present invention will be described in more detail. A simulation gun 10 according to the present invention illustrated in the embodiment is modelled on a bolt action rifle and is broadly divided into sections such as a shooting device section 11 embedded in a gun main body, a barrel section 12 positioned in the front portion thereof, and a stock section 13 positioned in the rear portion of the shooting device section 11.

**[0017]** The shooting device section 11 includes a piston 14 and a cylinder 16 and is provided with an operation member 20 having a piston cylinder mechanism 15 generating compressed air for shooting a bullet, a shooting mechanism 25 for controlling a shooting operation performed by a trigger 22 (will be described later), and a bullet loading mechanism 35. The piston cylinder mechanism 15 has the piston 14 and the cylinder 16, is attached so as to be movable in a forward/rearward direction of the gun main body, and configures the front portion of the operation member 20 performing cocking. A bolt member 21 (will be described later) is provided on the rear side of the piston cylinder mechanism 15. In addition, the bolt member 21 configures the rear portion of the operation member 20.

**[0018]** The operation member 20 including the piston cylinder mechanism 15 and the bolt member 21 is movable in the forward/rearward direction of the gun main body. In order to operate the operation member 20, an operation handle portion 17 is provided on the bolt member side. The operation handle portion 17 includes a lever 17c which is mounted on the bolt action rifle and has a shape and a structure copying a member so as to serve as a bolt handle. In Figs. 1, 2, and the like, the lever 17c of the operation handle portion 17 is indicated by the two-dot chain line because the shooting device section cannot be seen in the illustrated state, thereby illustrating only the installation position.

**[0019]** The configuration for movably attaching the piston cylinder mechanism 15 to the gun main body is well known, and the case of the embodiment may also adopt a configuration similar to a general configuration. Accordingly, detailed description will be omitted. However, the basic configuration of the embodiment is as follows. That is, the piston cylinder mechanism 15 stores pressure due to retraction of the piston 14 inserted into the cylinder 16 and has a piston spring 18 which causes the piston 14 to advance due to a release thereof. In addition, the cylinder 16 is embedded on the gun main body side so as to be able to advance and be retracted and is configured

to ensure a space for raising a bullet B in the front portion of a nozzle 19 at the tip when being retracted and to load the bullet B in a cartridge part at the rear end of a barrel in the tip portion of the nozzle 19 when advancing.

**[0020]** The shooting mechanism 25 controlling the shooting operation described above is rotatably and pivotally supported by a support pivot 22a on the gun main body side and has the trigger 22 biased by a trigger spring 22b.

The trigger 22 has an input portion 22c protruding so as to abut an intermediate member 23, on the front side. In addition, the trigger 22 has a trigger screw 22d adjusting the protruding amount with respect to the intermediate member 23, on the rear side. The intermediate member 23 is pivotally supported by a support pivot 23a on the gun main body side and transmits an operation of the trigger 22 to a first shear 24 in shears made of two members (refer to Fig. 3). The first shear 24 is rotatably and pivotally supported by a support pivot 24a on the front portion, on the gun main body side. Springs 23b and 24b respectively act on the intermediate member 23 and the first shear 24. In addition, the first shear 24 has an engagement portion 33 in the rear portion and is configured to be interlocked with an interlock counterpart portion 34 of an indicator lock 32 acting on an indicator 30 (will be described later) so as to be able to be locked in the state thereof.

**[0021]** A second shear 27 is rotatably and pivotally supported by a support pivot 27a in the first shear 24.

The second shear 27 is biased so as to protrude in a direction of the piston 14 by a shear spring 27b. Meanwhile, an engagement portion 28 is provided in the rear portion of the piston 14 and is configured to engage with a protruding tip 29 of the second shear 27 at a piston retraction position (refer to Fig. 5). In addition, for engagement with the piston 14, a slit 16a through which the tip 29 passes is formed in the longitudinal direction of the lower surface of the cylinder 16.

**[0022]** As described above, the intermediate member 23 is pivotally supported at the lower portion on the gun main body side and is interlocked with an interlock counterpart portion 26 formed in the rear portion of the first shear 24, in an interlock portion 23c formed in the upper portion (refer to Fig. 4). In addition, the intermediate member 23 has the length of the arm such that a gap between the support pivot 23a and the interlock portion 23c is arbitrarily set. In the embodiment, the input portion 22c of the trigger 22 is in a state of being able to abut the position approximately half thereof. Therefore, depending on an abutting position of the trigger input portion 22c, the length of a moment arm from the support pivot 23a of the intermediate member 23 to a force point can be changed, and a force required to operate the trigger can be arbitrarily set.

**[0023]** Therefore, while paying attention to that the torque applied to the trigger 22 increases as the abutting position of the input portion 22c approaches the support pivot 23a and the length of the arm becomes shorter and

the torque applied to the trigger 22 decreases as the abutting position is separated from the support pivot 23a and the length of the arm becomes longer, and in consideration of a force generated in the interlock counterpart portion 26 and the interlock portion 23c, the position is set. Moreover, the strength of the spring 23b acting on the intermediate member 23 is configured to be adjustable by an adjustment screw 23d. The adjustment screw 23d has fitting means for an operation performed by a tool such as a wrench and can be adjusted by inserting the tool into the fitting means. The reference number 23e indicates a blank space for adjustment and is provided such that a user himself/herself adjusts the strength of the spring 23b by operating the tool.

**[0024]** The bullet loading mechanism 35 described above is a part of the simulation gun 10 and is illustrated as a type of mounting a magazine 37 which is attachable/detachable with respect to a magazine insertion port 36 provided on the gun main body side. The bullet B is biased forward by a magazine spring 38 from a state of being loaded into the magazine 37, passes through a bullet feeding section 39, and is fed to a position at the rear of the barrel.

**[0025]** An operation of a trigger apparatus in a simulation gun according to the present invention having such a configuration will be described with reference to the drawings. Figs. 1 and 2 illustrate a state where a cocking operation is not performed. The lever 17c is at the lower position. Subsequently, the handle lever 17c is operated and is rotated to the upper position. Then, the operation member 20 is fully pulled rearward, and the piston 14 is retracted in the piston cylinder mechanism 15. As the piston 24 is retracted, the engagement portion 28 thereof moves to a position so as to be able to engage with the tip 29 of the second shear 27.

**[0026]** Fig. 5 illustrates a state where a cocking operation is performed and preparation for shooting is completed, that is, a state where the engagement portion 28 of the retracted piston 14 engages with the tip 29 of the second shear 27. Therefore, an acting force of the piston spring 18 compressing the piston 14 is first applied to the second shear 27 and is also applied as a load with respect to the first shear 24 in which the second shear 27 is pivotally supported. However, the spring 24b for returning also acts on the first shear 24, and the load is very small.

**[0027]** Moreover, the first shear 24 is interlocked at the interlock part between the interlock counterpart portion 26 provided at the rear end thereof and the interlock portion 23c provided at the upper end of the intermediate member 23. The load also reaches the intermediate member 23. However, the load is very small and is applied in the longitudinal direction at the end portion of the rotating intermediate member 23. Therefore, the load does not significantly affect the operation force of the intermediate member 23. In this state, a biasing force of the spring 23b acts on the intermediate member 23 rearward from the front. In addition, the trigger input portion 22c is configured to be able to be in contact at the rear

and is in a state where a biasing force of the trigger spring 22b acts forward.

**[0028]** When the trigger 22 is operated in this state, an intermediate part of the intermediate member 23 in which the very small load and the biasing force of the spring 23b act is pushed by the trigger input portion 22c. Therefore, an operation force of the trigger 22 becomes light, and the user feels the light operation force and a release of the interlocked state in the interlock part through fingers as the operation feeling. The protruding amount of the trigger 22 can be adjusted by the trigger screw 22d. Accordingly, a stroke for pulling the trigger 22 can also be adjusted to be shallow and deep. In addition, the strength of pushing the interlock portion 23c against the interlock counterpart portion 26 can be changed by the adjustment screw 23d via the spring 23b.

As a result of operating the trigger, the interlocked state between the interlock counterpart portion 26 and the interlock portion 23c is released, and the first shear 24 is lowered downward. Accordingly, the engagement between the engagement portion 28 of the piston 14 and the tip 29 of the second shear 27 is released (Fig. 6), and the bullet B is shot.

**[0029]** The operation feeling includes quite sensuous feeling such as so-called pulling feeling and an applying condition of the trigger 22 as described above. However, according to the trigger apparatus in a simulation gun of the present invention, a force required to operate the trigger 22 is within an extremely light range. In addition, the stroke can also be short, and the setting conditions acting on the trigger 22 can be changed. Accordingly, it is easy to feel the delicate timing of applying the trigger 22. Besides, the setting conditions can be adjusted depending on the necessity of the user himself/herself. Therefore, according to the trigger apparatus of the present invention, it is possible to obtain remarkably appropriate operation feeling as appropriate as can be when the trigger is operated.

**[0030]** According to the present invention, there are a plurality of adjustment elements related to the pulling feeling of the trigger 22. The adjustment elements include an element which is adjusted at the manufacturing stage in the manufacturer, and an element which is adjusted by a user who has purchased the simulation gun. For example, the strength of the spring 23b can be changed by the user using the adjustment screw 23d. However, the adjustment is related to the strength of pushing the interlock portion 23c against the interlock counterpart portion 26 and is significantly related to the pulling feeling of the trigger 22. Thus, according to the present invention, quite sensuous operation feeling such as so-called pulling feeling and an applying condition of the trigger can be remarkably improved.

Reference Signs List

**[0031]**

10	SIMULATION GUN
11	SHOOTING DEVICE SECTION
12	BARREL SECTION
13	STOCK SECTION
5 14	PISTON
15	PISTON CYLINDER DEVICE
16	CYLINDER
17	OPERATION HANDLE PORTION
18	PISTON SPRING
10 19	NOZZLE
20	OPERATION MEMBER
21	BOLT MEMBER
22	TRIGGER
23	INTERMEDIATE MEMBER
15 24	FIRST SHEAR
25	SHOOTING MECHANISM
26	INTERLOCK PORTION
27	SECOND SHEAR
28,	33 ENGAGEMENT PORTION
20 29	TIP OF SECOND SHEAR
30	INDICATOR
31	INDICATOR SPRING
32	INDICATOR LOCK
34	INTERLOCK COUNTERPART PORTION
25 35	BULLET LOADING MECHANISM
36	MAGAZINE INSERTION PORT
37	MAGAZINE
38	MAGAZINE SPRING
39	BULLET FEEDING SECTION

## Claims

1. A trigger apparatus in a simulation gun in which a shear in a state of cocking is released in response to an operation of a trigger, the trigger apparatus being configured to:

rotatably and pivotally support an intermediate member disposed between the trigger and the shear by a gun main body;  
interlock the intermediate member so as to be able to be interlocked and be released with respect to the shear on a rotary end portion side separated from a pivotal support point thereof; and  
act an operation force of the trigger on a spot between the pivotal support point and an interlocking point with respect to the shear.

2. The trigger apparatus in a simulation gun according to Claim 1,  
wherein a spring acts on the intermediate member from a side opposing an operation direction of the trigger, and an adjustment screw is provided in a place receiving the spring in order to adjust the strength of the spring.

3. The trigger apparatus in a simulation gun according to Claim 1 or 2,  
wherein the simulation gun includes a piston cylinder mechanism, a force acting in a pressurizing direction of a piston in response to cocking is added to the shear, and an operation force of the trigger acts in an intersecting direction with respect to the intermediate member receiving the force added to the shear. 5
4. The trigger apparatus in a simulation gun according to Claim 3, 10  
wherein the shear has a first shear attached to the gun main body side and a second shear attached to the first shear, the second shear is interlocked with the piston, the intermediate member is interlocked 15  
with the first shear in order to release the first shear in the state of cocking in response to an operation of the trigger, and the second shear is separated from a state of being interlocked with the piston in accordance with separation from the interlocked 20  
state.

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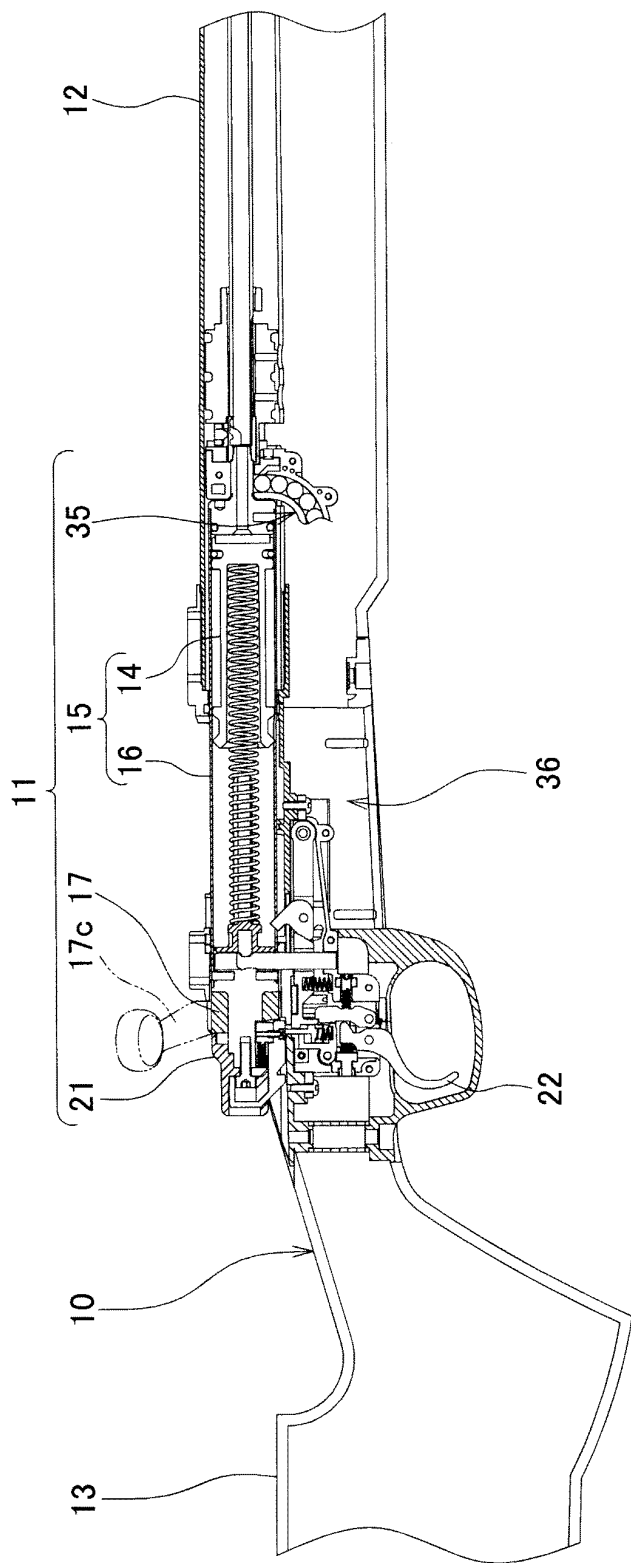
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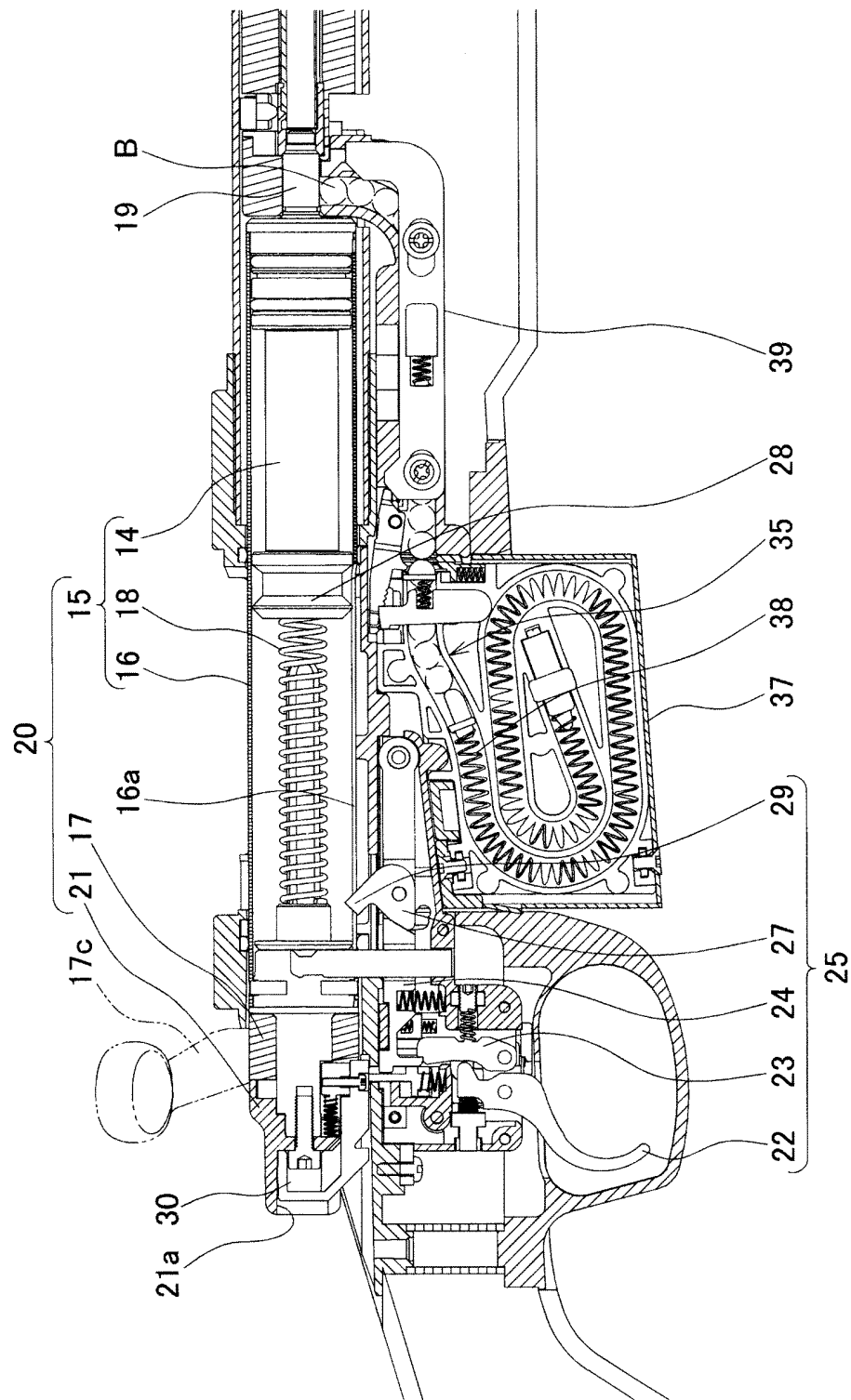
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【 Fig. 1 】

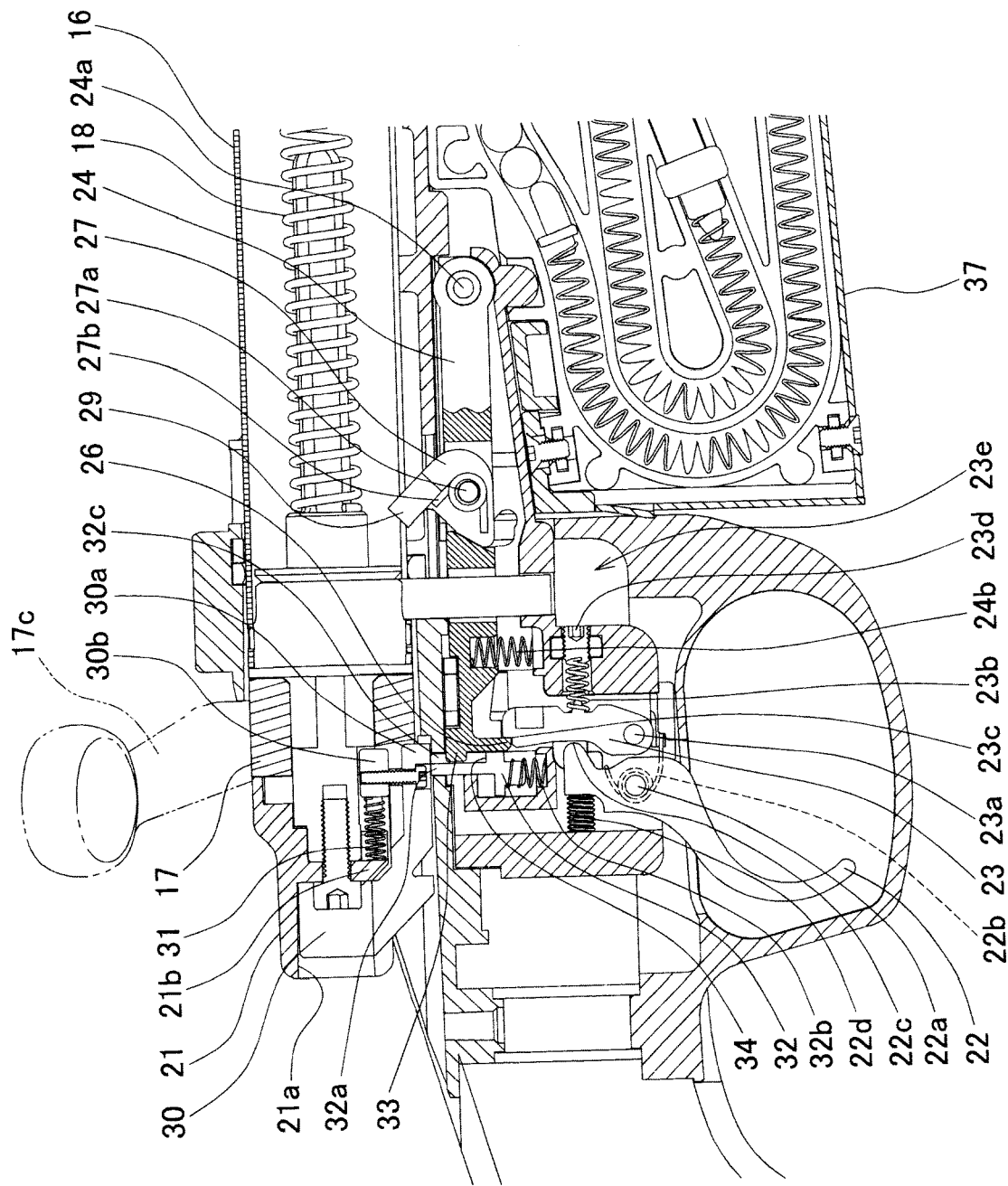


【Fig. 2】

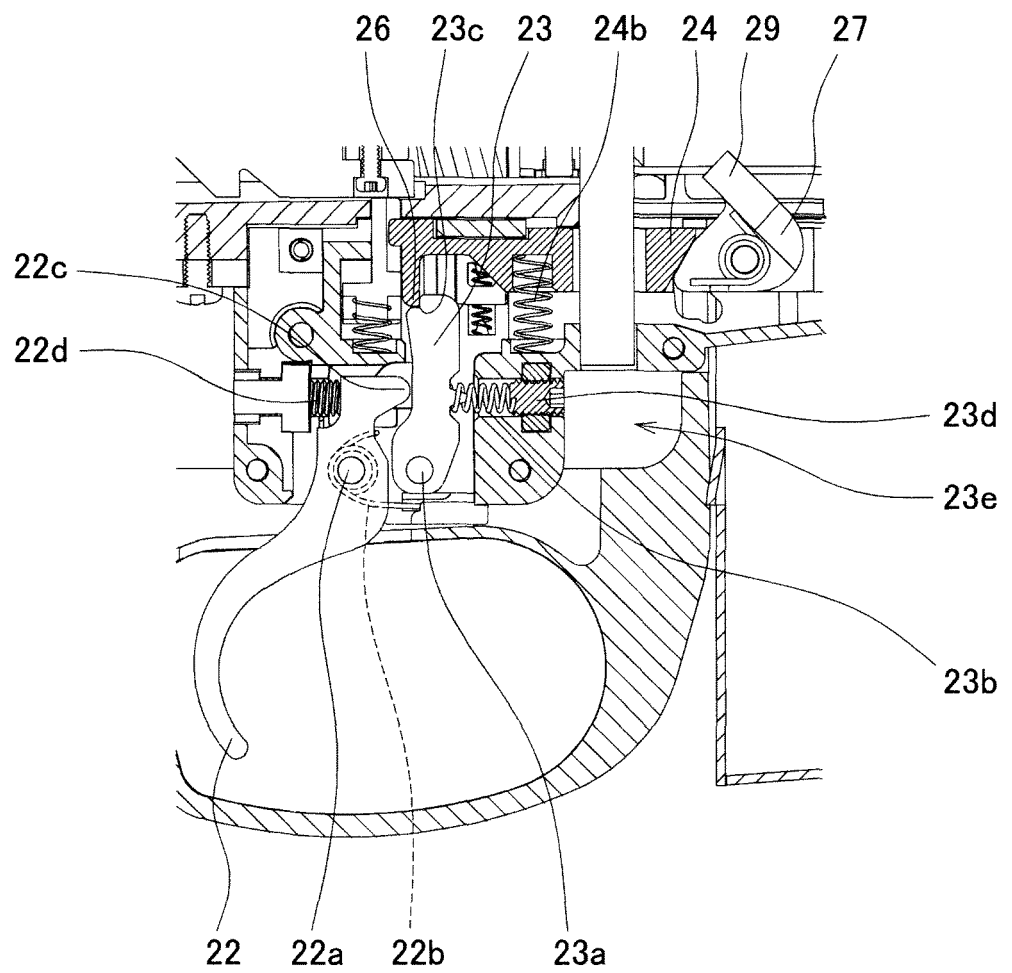




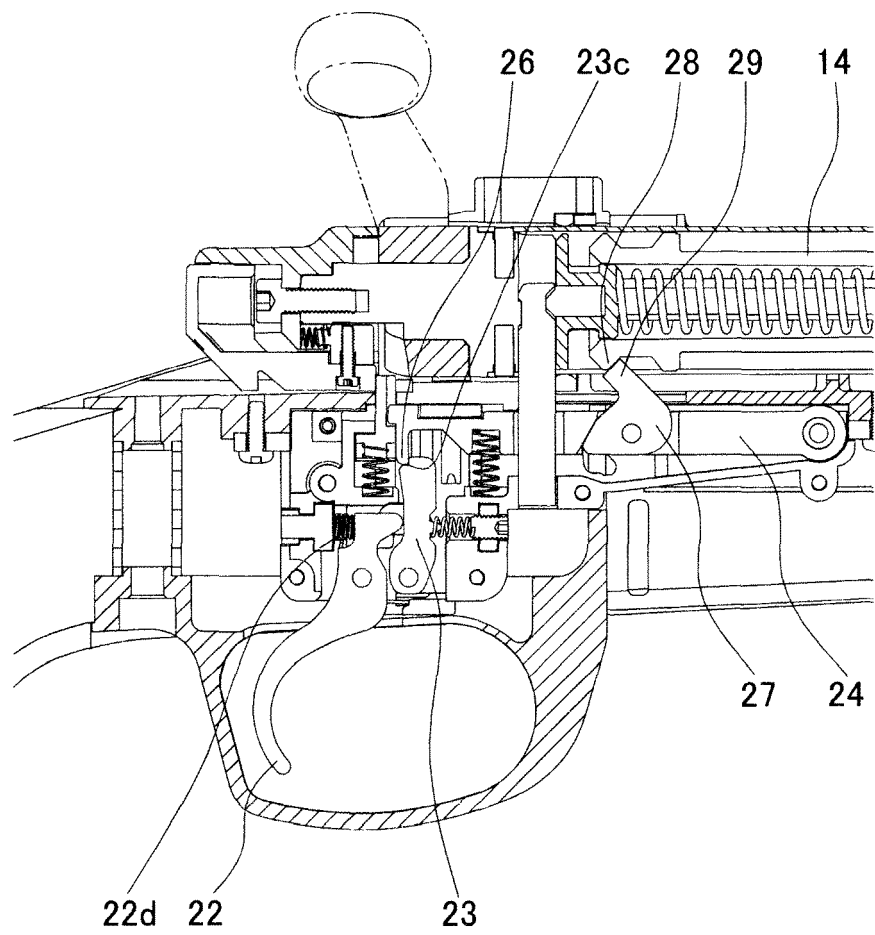
【 Fig. 3 】



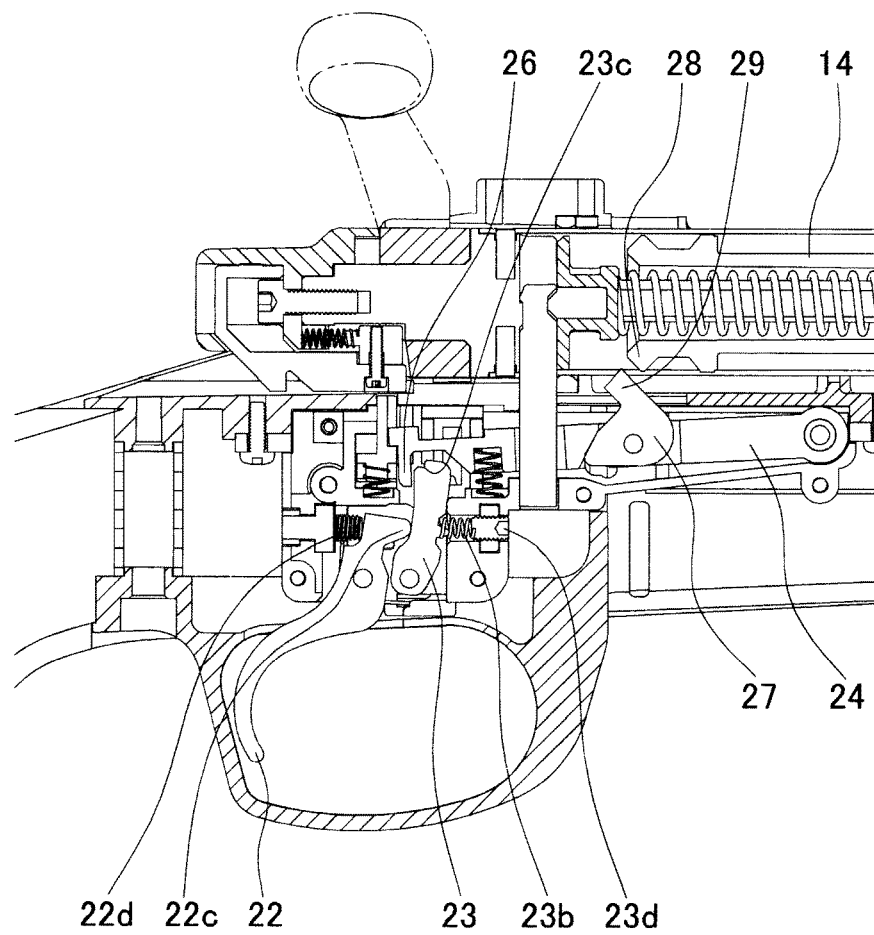
【 Fig. 4 】



【 Fig. 5 】



【Fig. 6】



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/063909

## A. CLASSIFICATION OF SUBJECT MATTER

F41A19/06(2006.01) i, F41B11/64(2013.01) i

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)

F41A19/06, F41B11/64

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016

Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2016/0047620 A1 (TSENG, Jui-Fu), 18 February 2016 (18.02.2016), paragraphs [0036] to [0040]; fig. 1 to 12 (Family: none)	1, 3-4 2
A	JP 2013-217546 A (Maruzen Co., Ltd.), 24 October 2013 (24.10.2013), & US 2013/0263840 A1 & EP 2647946 A2	1-4
A	JP 2003-75096 A (Kabushiki Kaisha Tanaka), 12 March 2003 (12.03.2003), (Family: none)	1-4
A	US 2006/0027224 A1 (LIN, Ting-huei), 09 February 2006 (09.02.2006), (Family: none)	1-4

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

\* Special categories of cited documents:

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Date of the actual completion of the international search

08 July 2016 (08.07.16)

Date of mailing of the international search report

19 July 2016 (19.07.16)

Name and mailing address of the ISA/

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**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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