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

**ABZUGSVORRICHTUNG IN SIMULIRTER WAFFE**

**DISPOSITIF DE DÉTENTE DANS UNE ARME DE SIMULATION**

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## Description

## Technical Field

**[0001]** The present invention relates to a trigger apparatus in a simulation gun in which a sear 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. A trigger apparatus of the known art is disclosed in US 2016/0047620 A1 for instance.

**[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. 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.

**[0004]** 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 sear member is released.

**[0005]** However, the so-called intermediate member of the invention is a part of the sear 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 sear 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 **[0006]** [PTL 1] JP-A-2005-114260

## Summary of Invention

## Technical Problem

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**[0007]** 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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**[0008]** In order to attain the above-described objects, according to the present invention, there is provided a trigger apparatus according to claim 1. 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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**[0009]** The present invention has a configuration in which the intermediate member disposed between the trigger and the sear 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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**[0010]** 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 can be reflected. Thus, it is possible to obtain a simulation gun in which using feeling is further improved.

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**[0011]** 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 sear, and the trigger acts in an intersecting direction with respect to the intermediate member receiving the force added to the sear. Since the trigger acts in the intersecting direction with respect to the intermediate member, by selecting the position of the acting

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point, the adding force can be more easily adjusted.

**[0012]** In addition, it is also desirable to have a configuration in which the sear has a first sear attached to the gun main body side and a second sear attached to the first sear, the second sear is interlocked with the piston, the intermediate member is interlocked with the first sear in order to release the first sear in the state of cocking in response to an operation of the trigger, and the second sear is separated from a state of being interlocked with the piston in accordance with separation from the interlocked state. In other words, the sear can be configured by combining two members of the first sear and the second sear together. However, the shear in the present invention does not limit a configuration of a single member.

#### Advantageous Effects of Invention

**[0013]** 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 sear. 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

##### **[0014]**

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

**[0015]** Hereinafter, with reference to an illustrated embodiment, the present invention will be described in more detail. A simulation gun 10 according to the present in-

vention 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.

**[0016]** 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.

**[0017]** 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.

**[0018]** 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.

**[0019]** 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 inter-

mediate 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 sear 24 in sears made of two members (refer to Fig. 3). The first sear 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 sear 24. In addition, the first sear 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.

**[0020]** A second sear 27 is rotatably and pivotally supported by a support pivot 27a in the first sear 24. The second sear 27 is biased so as to protrude in a direction of the piston 14 by a sear 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 sear 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.

**[0021]** 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 sear 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.

**[0022]** 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.

**[0023]** 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.

**[0024]** 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 14 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 sear 27.

**[0025]** 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 sear 27. Therefore, an acting force of the piston spring 18 compressing the piston 14 is first applied to the second sear 27 and is also applied as a load with respect to the first sear 24 in which the second sear 27 is pivotally supported. However, the spring 24b for returning also acts on the first sear 24, and the load is very small.

**[0026]** Moreover, the first sear 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.

**[0027]** 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 sear 24 is lowered downward. Accordingly, the engagement between the engagement portion 28 of the piston 14 and the tip 29 of the second sear 27 is released (Fig. 6), and the bullet B is shot.

**[0028]** 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.

**[0029]** 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

#### [0030]

10 SIMULATION GUN  
11 SHOOTING DEVICE SECTION  
12 BARREL SECTION  
13 STOCK SECTION  
14 PISTON  
15 PISTON CYLINDER DEVICE  
16 CYLINDER  
17 OPERATION HANDLE PORTION  
18 PISTON SPRING  
19 NOZZLE  
20 OPERATION MEMBER  
21 BOLT MEMBER  
22 TRIGGER

23 INTERMEDIATE MEMBER  
24 FIRST SEAR  
  
25 SHOOTING MECHANISM  
26 INTERLOCK PORTION  
27 SECOND SEAR  
  
28, 33 ENGAGEMENT PORTION  
29 TIP OF SECOND SEAR  
  
30 INDICATOR  
31 INDICATOR SPRING  
32 INDICATOR LOCK  
34 INTERLOCK COUNTERPART PORTION  
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 (10) in which a sear (24, 27) in a state of cocking is released in response to an operation of a trigger (22), the trigger apparatus being configured to:

rotatably and pivotally support an intermediate member (23) disposed between the trigger (22) and the sear (24, 27) by a gun main body; interlock the intermediate member (23) so as to be able to be interlocked and be released with respect to the sear (24, 27) on a rotary end portion side separated from a pivotal support point thereof; and

**characterized in that** the trigger apparatus is further configured to act an operation force of the trigger (22) on a spot between the pivotal support point and an interlocking point with respect to the sear (24, 27) .

2. The trigger apparatus in a simulation gun (10) according to Claim 1, wherein a spring acts on the intermediate member (23) from a side opposing an operation direction of the trigger (22), 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 (10) according to Claim 1 or 2, wherein the simulation gun (10) includes a piston cylinder mechanism (15), a force acting in a pressurizing direction of a piston (14) in response to cocking is added to the sear (24, 27), and an operation force of the trigger (22) acts in an intersecting direction with respect to the intermediate member (23) receiv-

ing the force added to the sear (24, 27).

4. The trigger apparatus in a simulation gun (10) according to Claim 3, wherein the sear (24, 27) has a first sear (24) attached to the gun main body side and a second sear (27) attached to the first sear (24), the second sear (27) is interlocked with the piston (14), the intermediate member (23) is interlocked with the first sear (24) in order to release the first sear (24) in the state of cocking in response to an operation of the trigger (22), and the second sear (27) is separated from a state of being interlocked with the piston (14) in accordance with separation from the interlocked state.

#### Patentansprüche

1. Abzugsvorrichtung in einer Simulationswaffe (10), in der als Reaktion auf eine Betätigung eines Abzuges (22) ein Abzugsstollen (24, 27) in einem Zustand des Spannens ausgelöst wird, wobei die Abzugsvorrichtung ausgestaltet ist:

ein Zwischenglied (23), das zwischen dem Abzug (22) und dem Abzugsstollen (24, 27) angeordnet ist, durch einen Hauptkörper der Waffe drehbar und schwenkend zu stützen;

das Zwischenglied (23) so zu verriegeln, dass es fähig ist, bezüglich des Abzugsstollens (24, 27) auf einer Drehendabschnittseite, die von einem Schwenkstützpunkt davon getrennt ist, verriegelt und ausgelöst zu werden; und

**dadurch gekennzeichnet, dass** die Abzugsvorrichtung ferner ausgestaltet ist, eine Betätigungskraft des Abzuges (22) auf eine Stelle zwischen dem Schwenkstützpunkt und einem Verriegelungspunkt bezüglich des Abzugsstollens (24, 27) auszuüben.

2. Abzugsvorrichtung in einer Simulationswaffe (10) nach Anspruch 1, wobei eine Feder von einer Seite, die einer Betätigungsrichtung des Abzuges (22) entgegengesetzt ist, aus auf das Zwischenglied (23) wirkt und eine Stellschraube an einer Stelle vorgesehen ist, welche die Feder aufnimmt, um die Stärke der Feder einzustellen.

3. Abzugsvorrichtung in einer Simulationswaffe (10) nach Anspruch 1 oder 2, wobei die Simulationswaffe (10) einen Kolbenzylindermechanismus (15) aufweist, der Abzugsstollen (24, 27) mit einer Kraft beaufschlagt wird, die in einer Druckbeaufschlagungsrichtung eines Kolbens (14) als Reaktion auf das Spannen wirkt, und eine Betätigungskraft des Abzuges (22) in einer Überschneidungsrichtung bezüglich des Zwischengliedes (23)

wirkt, das die Kraft aufnimmt, mit der der Abzugsstollen (24, 27) beaufschlagt wird.

4. Abzugsvorrichtung in einer Simulationswaffe (10) nach Anspruch 3, wobei der Abzugsstollen (24, 27) einen ersten Abzugsstollen (24), der an der Waffenhauptkörperseite befestigt ist, und einen zweiten Abzugsstollen (27), der an dem ersten Abzugsstollen (24) befestigt ist, aufweist, der zweite Abzugsstollen (27) mit dem Kolben (14) verriegelt ist, das Zwischenglied (23) mit dem ersten Abzugsstollen (24) verriegelt ist, um als Reaktion auf eine Betätigung des Abzuges (22) den ersten Abzugsstollen (24) in dem Zustand des Spannens auszulösen, und der zweite Abzugsstollen (27) aus einem Zustand, in dem er mit dem Kolben (14) verriegelt ist, entsprechend dem Lösen aus dem Verriegelungszustand gelöst wird.

#### Revendications

1. Dispositif de détente dans une arme de simulation (10) dans laquelle une gâchette (24, 27) dans un état d'armement est libérée en réponse à un fonctionnement d'une détente (22), le dispositif de détente étant configuré pour :

supporter de manière rotative et pivotante un élément intermédiaire (23) disposé entre la détente (22) et la gâchette (24, 27) par un corps principal d'arme ;

enclencher l'élément intermédiaire (23) de manière à pouvoir être enclenché et libéré par rapport à la gâchette (24, 27) sur un côté de partie d'extrémité rotative séparé d'un point de support pivotant de celui-ci ; et

**caractérisé en ce que** le dispositif de détente est en outre configuré pour agir par une force de fonctionnement de la détente (22) sur un repère entre le point de support pivotant et un point d'enclenchement par rapport à la gâchette (24, 27).

2. Dispositif de détente dans une arme de simulation (10) selon la revendication 1, dans lequel un ressort agit sur l'élément intermédiaire (23) depuis un côté opposé à une direction de fonctionnement de la détente (22), et une vis d'ajustement est fournie dans un endroit recevant le ressort afin d'ajuster la résistance du ressort.
3. Dispositif de détente dans une arme de simulation (10) selon la revendication 1 ou 2, dans lequel l'arme de simulation (10) comporte un mécanisme de cylindre de piston (15), une force agissant dans une direction de mise sous pression d'un piston (14) en réponse à l'armement est ajoutée

à la gâchette (24, 27), et une force de fonctionnement de la détente (22) agit dans une direction d'intersection par rapport à l'élément intermédiaire (23) recevant la force ajoutée à la gâchette (24, 27).

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4. Dispositif de détente dans une arme de simulation (10) selon la revendication 3, dans lequel la gâchette (24, 27) présente une première gâchette (24) fixée au côté de corps principal d'arme et une seconde gâchette (27) fixée à la première gâchette (24), la seconde gâchette (27) est enclenchée avec le piston (14), l'élément intermédiaire (23) est enclenché avec la première gâchette (24) afin de libérer la première gâchette (24) dans l'état d'armement en réponse à un fonctionnement de la détente (22), et la seconde gâchette (27) est séparée d'un état d'enclenchement avec le piston (14) en fonction de la séparation par rapport à l'état enclenché.

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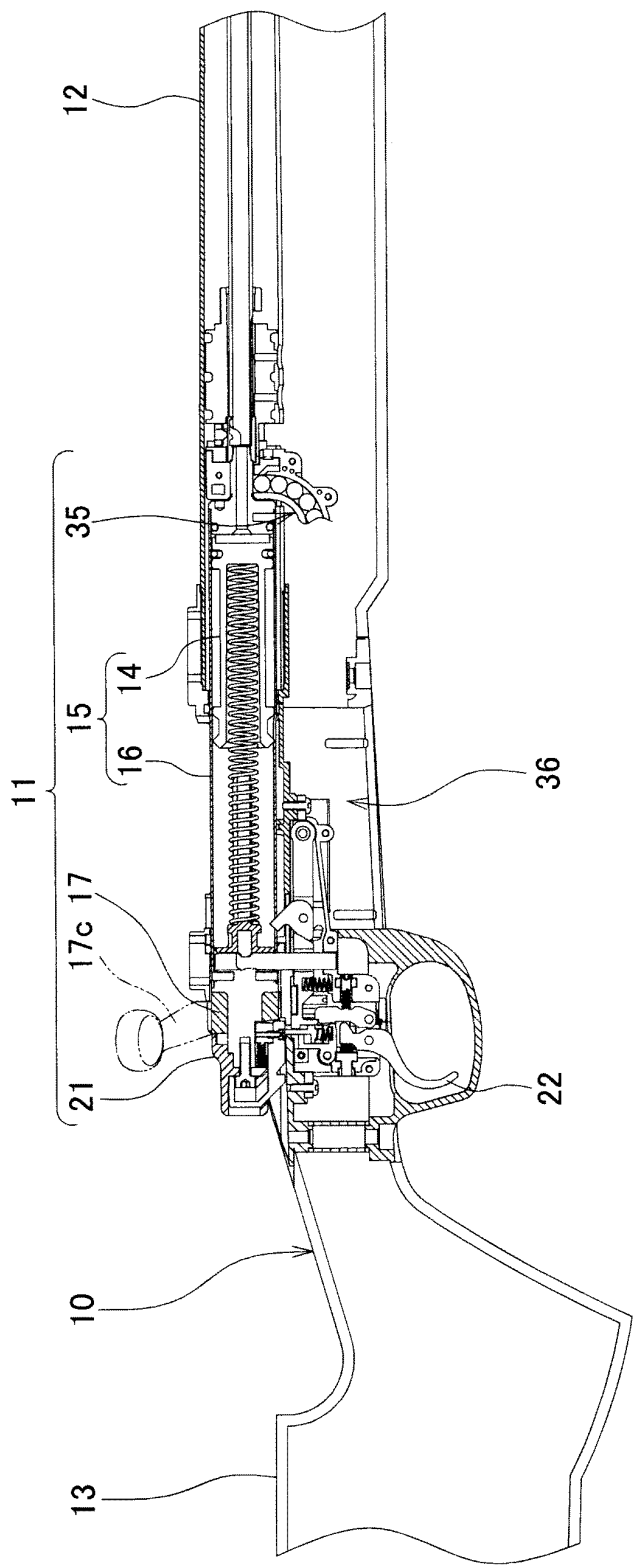
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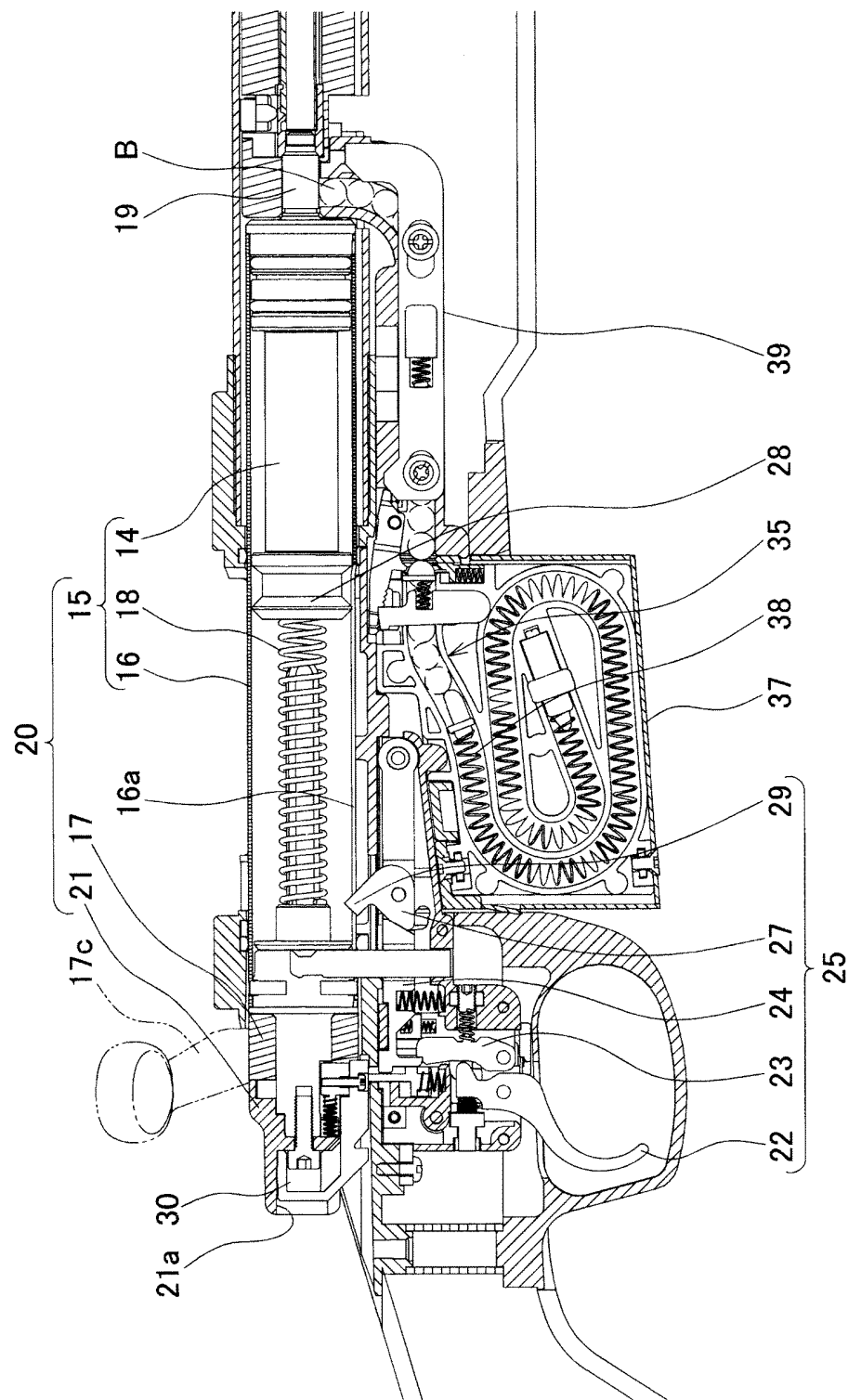
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【 Fig. 1 】

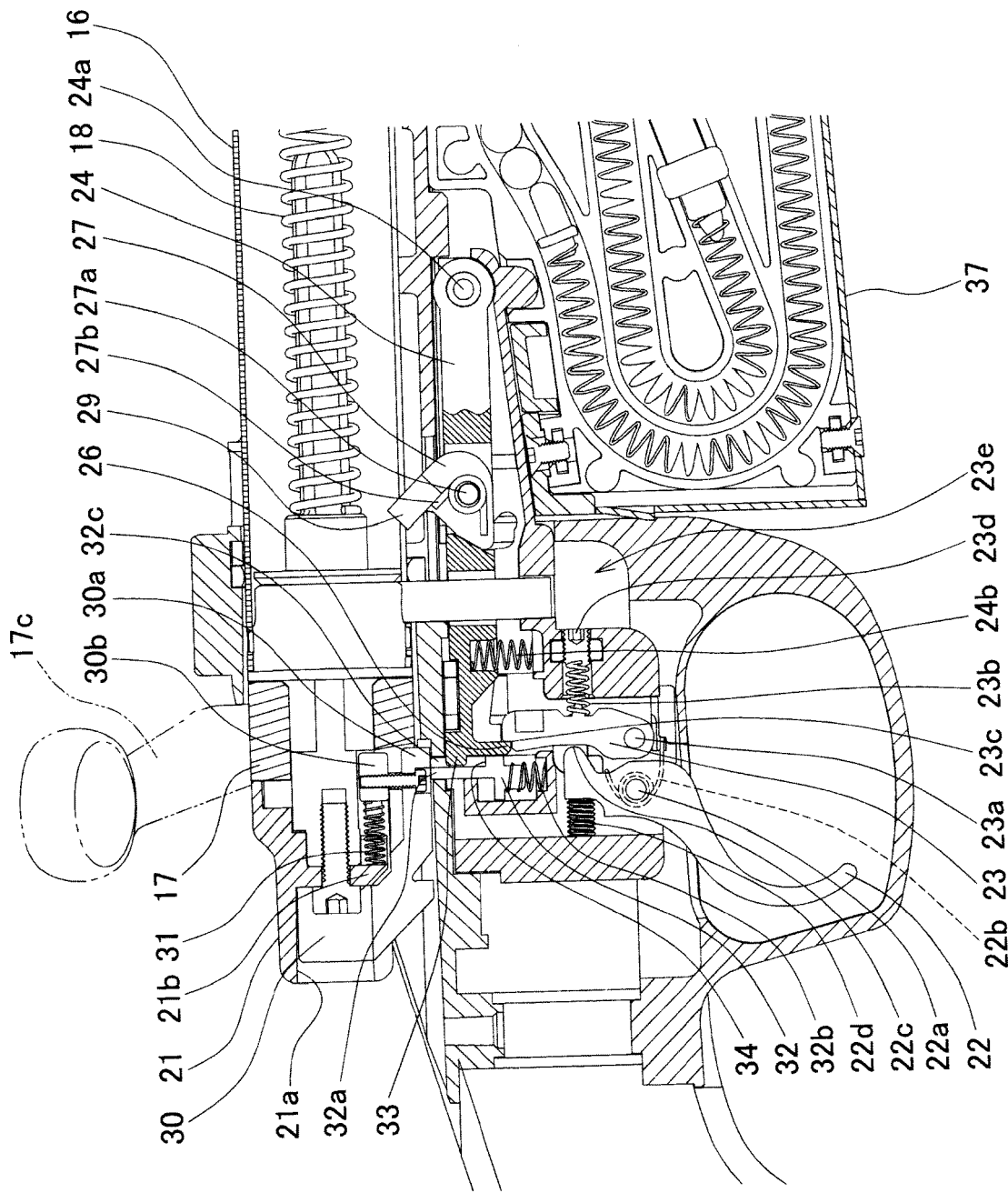




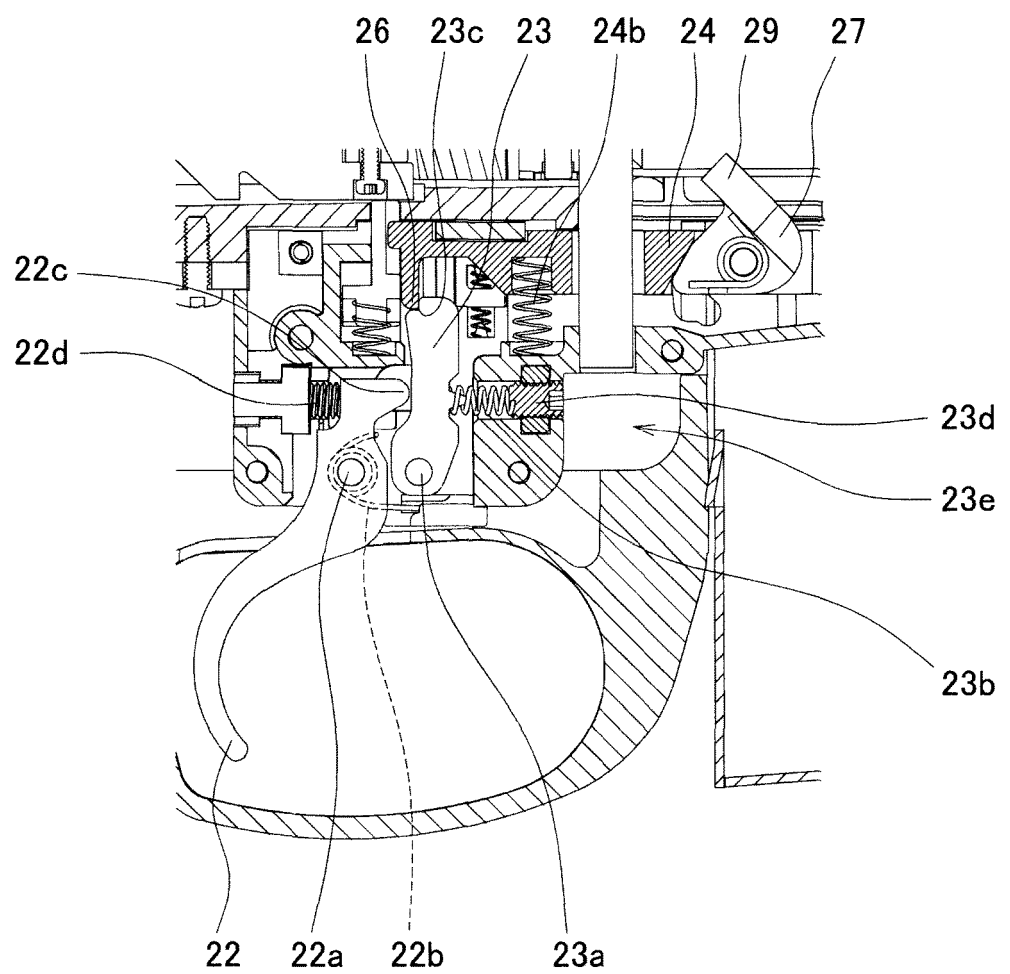
【Fig. 2】



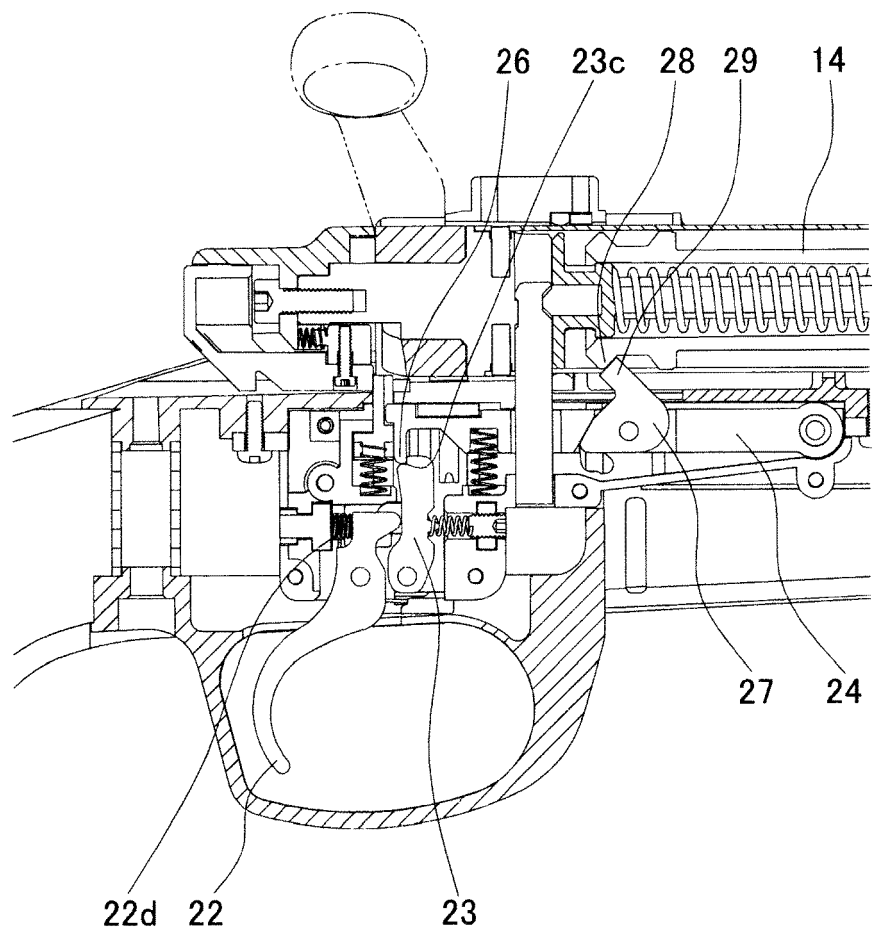
【 Fig. 3 】



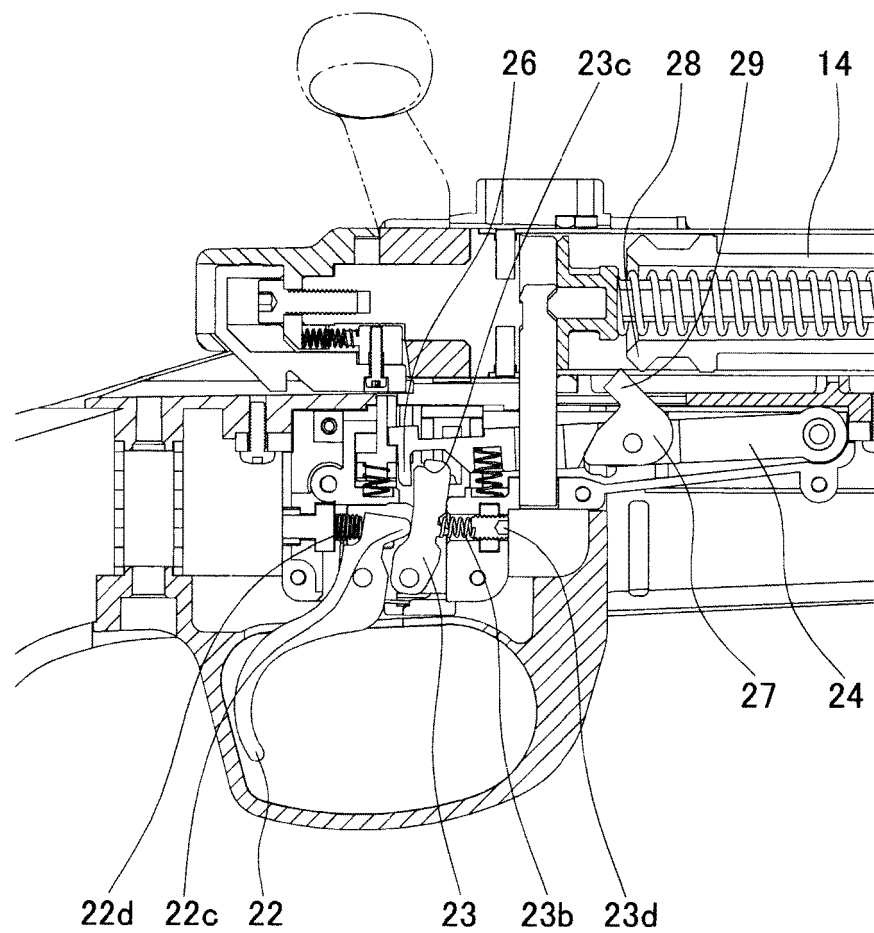
【 Fig. 4 】



【Fig. 5】



【Fig. 6】



**REFERENCES CITED IN THE DESCRIPTION**

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