



(19) **United States**

(12) **Patent Application Publication**
KANG

(10) **Pub. No.: US 2017/0176132 A1**

(43) **Pub. Date:** **Jun. 22, 2017**

(54) **TOY GUN**

F41B 11/55 (2006.01)

F41B 11/89 (2006.01)

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(52) U.S. Cl.

CPC **F41B 11/646** (2013.01); **F41B 11/89**
(2013.01); **F41B 11/71** (2013.01); **F41B 11/55**
(2013.01)

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(57)

ABSTRACT

(21) Appl. No.: 15/384,331

(22) Filed: **Dec. 20, 2016**

(30) **Foreign Application Priority Data**

Dec. 21, 2015 (KR) 10-2015-0183020

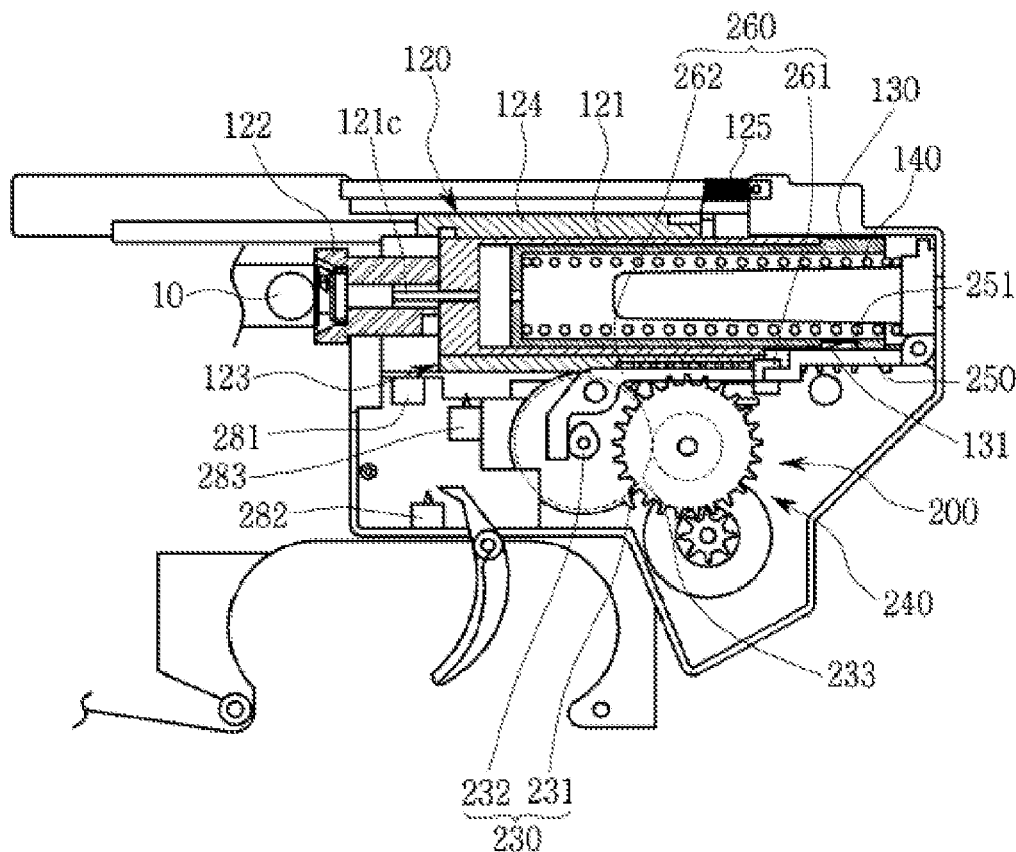
Publication Classification

(51) **Int. Cl.**

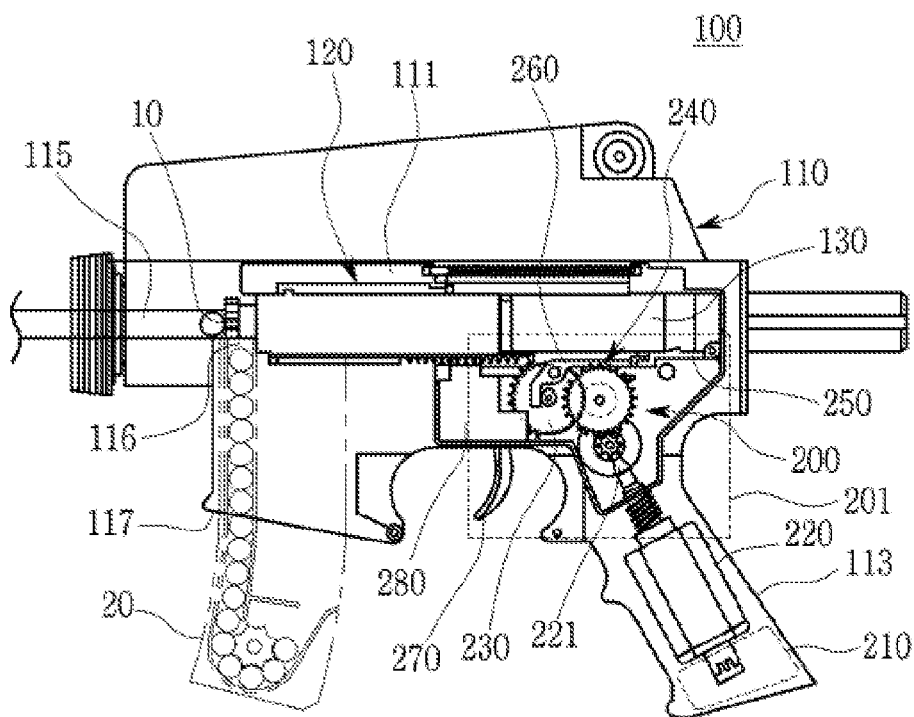
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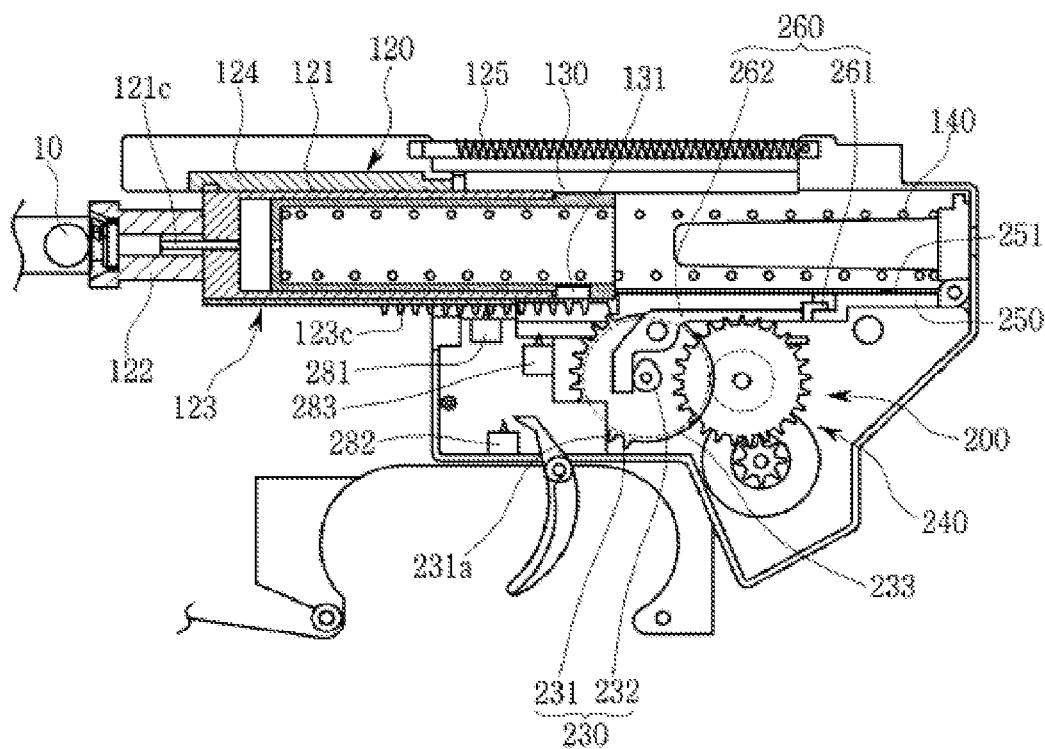
Provided is a toy gun with an exterior mimicking a real gun and operating very similarly as a real gun, and the toy gun includes a main body provided with a cartridge chamber into which a projectile is loaded, a cylinder formed to reciprocate inside the main body for being ready to fire, a piston which moves backward along with the cylinder when the cylinder moves backward and enters the cylinder to provide the cartridge chamber with compressed air when the projectile is fired, a driving unit which moves the cylinder backward in the main body, and a control unit which controls power supplied to the driving unit depending on a position of the cylinder.



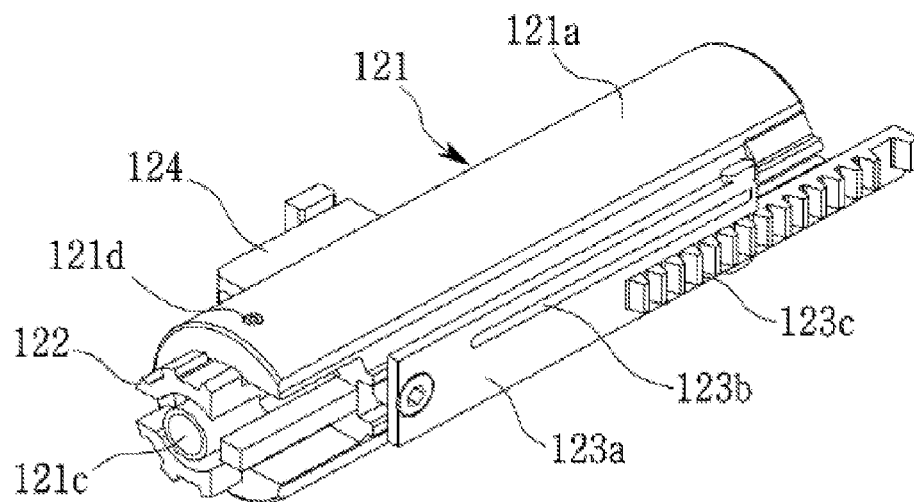
【FIG 1】



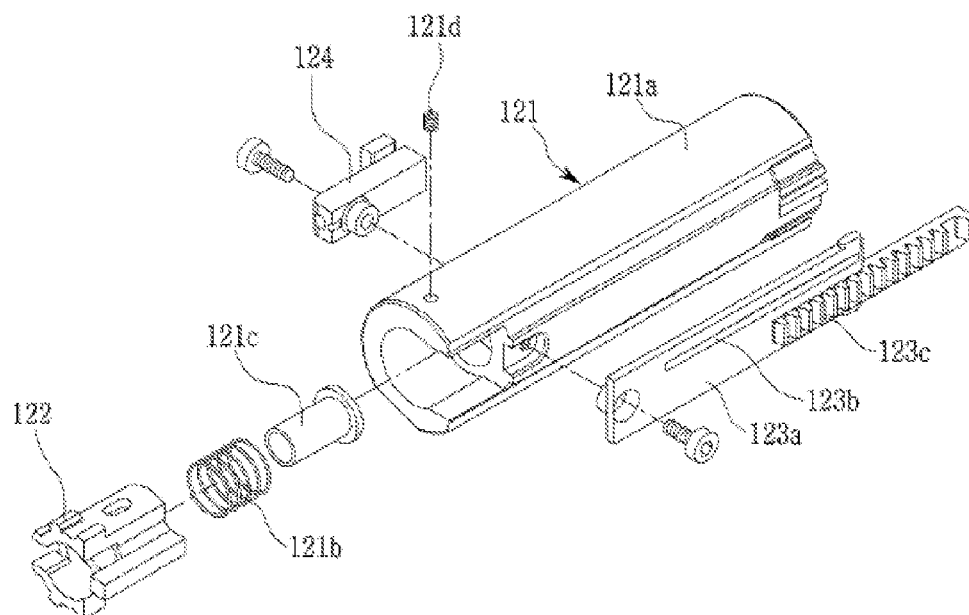
【FIG 2】



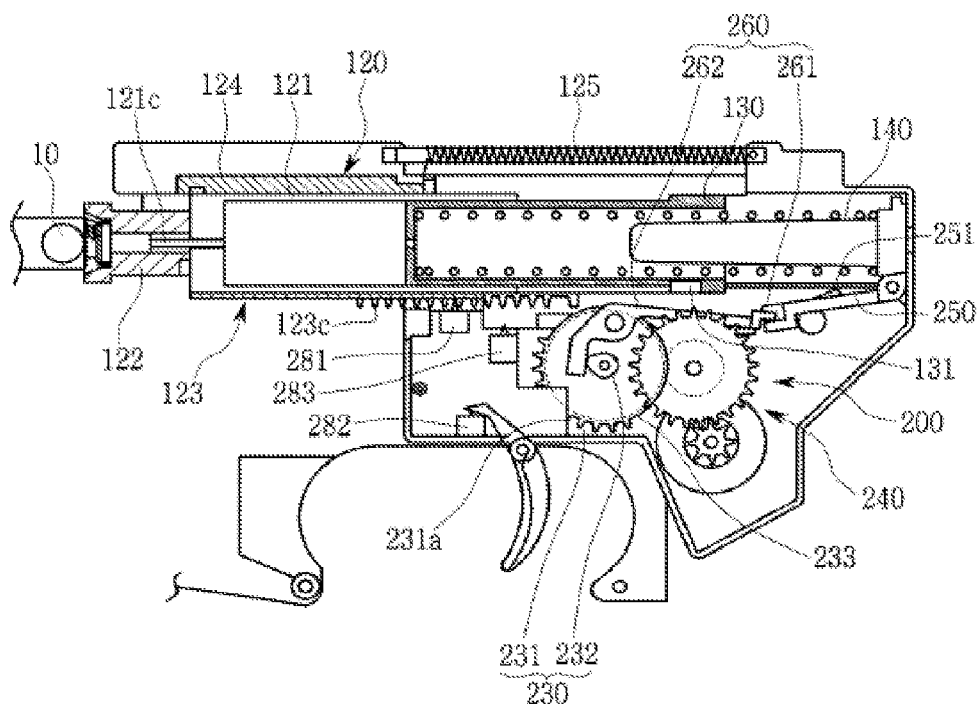
【FIG. 3】



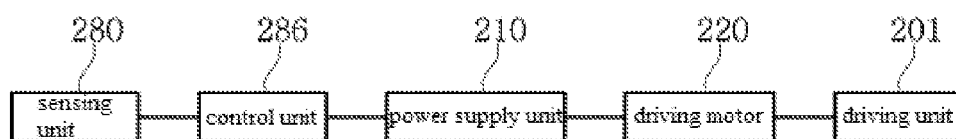
【FIG. 4】



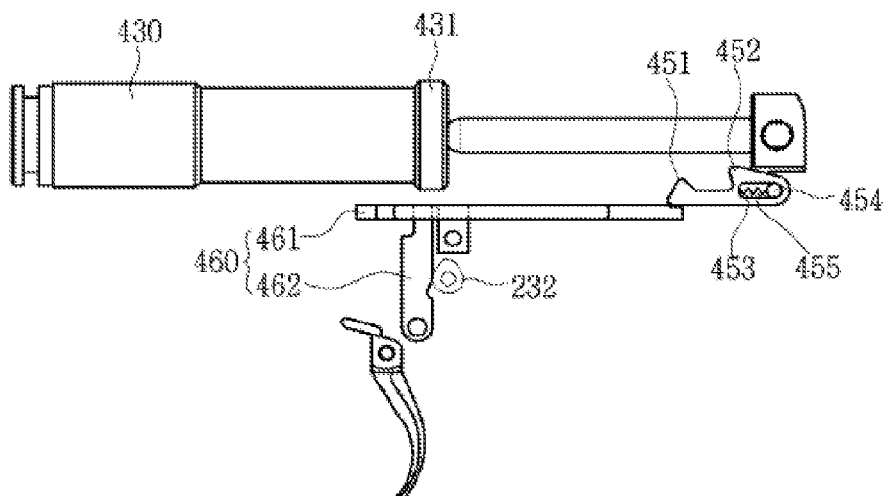
【FIG. 7】



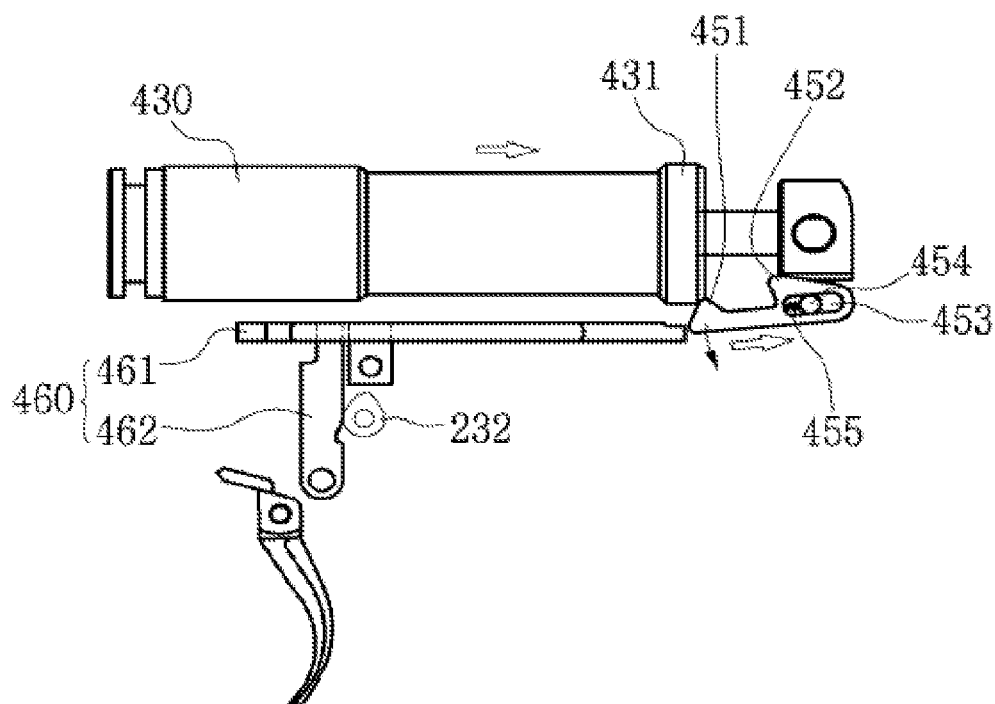
【FIG. 8】



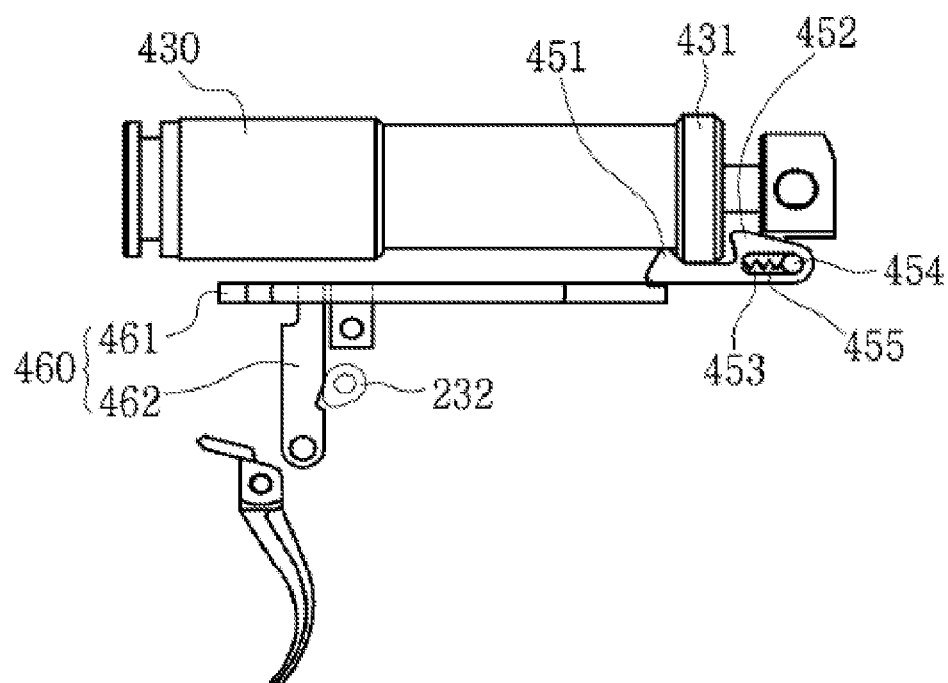
【FIG. 9a】



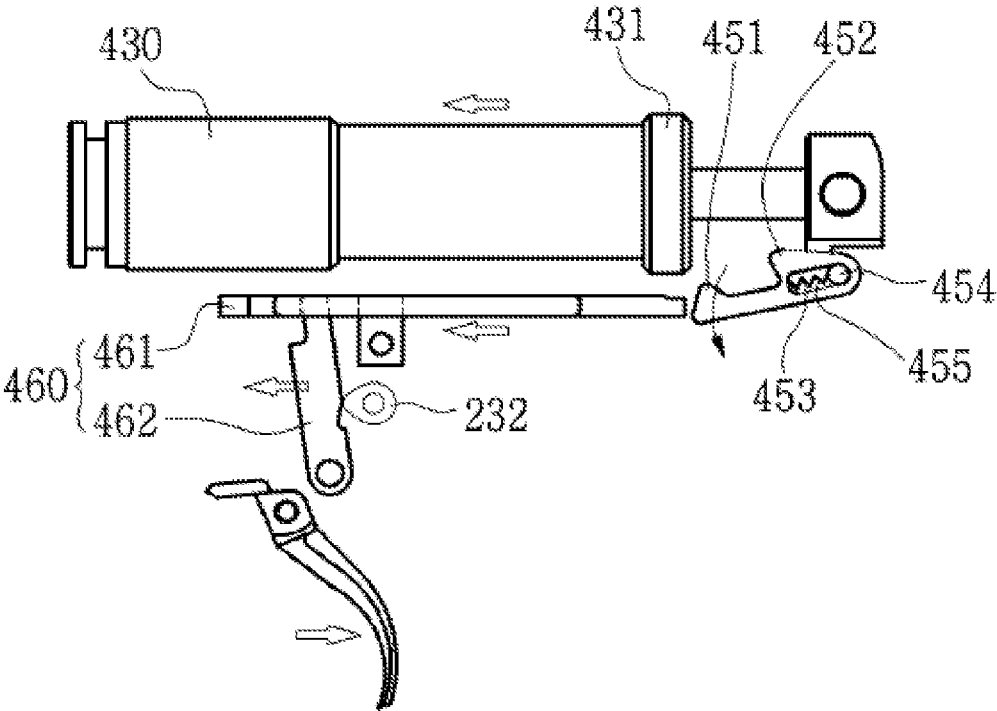
【FIG. 9b】



【FIG. 9c】



【FIG. 9d】



TOY GUN

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 2015-0183020, filed on Dec. 21, 2015, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The present invention relates to a toy gun and, more particularly, to a toy gun with an exterior that mimics a real gun and capable of operating similarly as a real gun.

[0004] 2. Discussion of Related Art

[0005] As societies develop, people have come to enjoy diverse leisure activities for reasons such as health, hobbies, and the like, and leisure activity population is also gradually increasing. Among the diverse leisure activities, survival games are gradually growing in developed countries in terms of participating population as well as market size. In the case of such a survival game, a mock allied force and a mock enemy force play a game of survival using a toy gun in a shape similar to a real gun, thereby promoting health, stress reduction, friendship, realistic military training, and the like.

[0006] Specifically, in the case of a conventional toy gun for a survival game, a projectile such as BB pellet supplied from a magazine and positioned at front end of a cylinder is fired when a piston moved back in the cylinder suddenly thrusts forward by force of compressed air or a spring.

[0007] In the case of the conventional toy gun for a survival game described above, with the cylinder fixed, only the piston reciprocates forward and backward to fire the projectile. In addition, a rack gear portion is formed outside of the piston, a gear train connected to the rack gear portion by gear engagement is driven by an electric motor, and thereby the piston is automatically moved to a position (a moved back position) ready for firing.

[0008] Meanwhile, in the case of the conventional toy gun for a survival game described above, when damage occurs to a gear due to repetitive use, impacts, malfunction, etc., there arises a problem in which the whole piston assembly needs to be replaced because the piston and the rack gear portion are integrally formed. In addition, such a piston is formed of an expensive metal material, resulting in much of financial burden put on a user.

[0009] In addition, the above-described conventional toy gun has problems in which exterior as well as operation lack a sense of reality because only the piston reciprocates, with the cylinder fixed. That is, since a realistic toy gun having features very similar to a real gun is desirable from the viewpoint of a user, a need for satisfying such a desire of a user is increasing.

SUMMARY OF THE INVENTION

[0010] The present invention is directed to providing a toy gun with an exterior mimicking a real gun and operating very similarly as a real gun.

[0011] In addition, the present invention is directed to providing a toy gun capable of enhancing durability by minimizing damage to the toy gun caused by physical impacts of a cylinder and malfunction.

[0012] The technical objectives of the present invention are not limited to the above objects, and other objectives not described herein may become apparent to those of ordinary skill in the art based on the following description.

[0013] According to an aspect of the present invention, there is provided a toy gun, which includes a main body provided with a cartridge chamber into which a projectile is loaded, a cylinder formed to reciprocate inside the main body for being ready to fire, a piston which moves backward along with the cylinder when the cylinder moves backward and enters the cylinder to provide a cartridge chamber with compressed air when the projectile is fired, a driving unit which moves the cylinder backward in the main body, and a control unit which controls power supplied to the driving unit depending on a position of the cylinder.

[0014] The driving unit may include a cam gear which moves the cylinder backward using power generated from a motor, and the cam gear may include a gear tooth formed at a portion of a circumference of the cam gear to selectively engage with a rack gear tooth of a rack gear portion formed under the cylinder.

[0015] In addition, the toy gun according to the present invention may further include a first sensor which senses a position of the cylinder, a second sensor which senses motion of pulling a trigger and a third sensor which senses the number of times cocking occurred. The first sensor may be positioned on a moving path of a rack gear portion formed under the cylinder and sense a position of the cylinder by being in contact with the rack gear portion. For this, the rack gear portion may include a contact surface which is in contact with the first sensor and a groove formed not to be in contact with the first sensor.

[0016] The cylinder may include a cylinder body, a cylinder head inserted into a front end of the cylinder body, a spring positioned between the cylinder body and the cylinder head to space the cylinder head from the cylinder body, and a nozzle inserted into the cylinder head to pass through the cylinder head. In addition, right and left side surfaces of the cylinder may face right and left inside surfaces of the main body.

[0017] The control unit may determine a position of the cylinder while the cylinder moves backward and forward, and cut power supplied to the driving unit unless the cylinder returns back to an initial position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

[0019] FIG. 1 is a schematic configuration view of a toy gun according to one embodiment of the present invention;

[0020] FIG. 2 is a view illustrating a state in which a cylinder and a piston of a toy gun are at initial positions according to one embodiment of the present invention;

[0021] FIGS. 3 and 4 are detailed views illustrating a cylinder assembly of a toy gun according to one embodiment of the present invention;

[0022] FIG. 5 is a view illustrating a state in which a cylinder and a piston of a toy gun are moved back according to one embodiment of the present invention;

[0023] FIG. 6 is a view illustrating a state in which a cylinder of a toy gun is moved forward (a state ready to fire) according to one embodiment of the present invention;

[0024] FIG. 7 illustrates a process in which a piston of a toy gun moves forward according to one embodiment of the present invention;

[0025] FIG. 8 is a diagram illustrating a driving control mechanism of a toy gun according to one embodiment of the present invention; and

[0026] FIGS. 9A to 9D illustrates a piston, a locking member, and a release lever according to another embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0027] The objects, features, and advantages described above will become more apparent from the following detailed description of the embodiments of the present invention with reference to the accompanying drawings, and thereby those skilled in the art may easily implement the technical spirit of the present invention. In the following description, detailed descriptions of well-known technologies will be omitted where they may unnecessarily obscure the subject matters of the present invention.

[0028] Hereinafter, a toy gun according to embodiments of the present invention will be described in detail and with reference to the accompanying drawings.

[0029] Referring to FIG. 1, a toy gun 100 according to one embodiment of the present invention includes a toy gun main body 110 having a cartridge chamber in which a projectile supplied from a magazine 20 is individually loaded, a cylinder assembly 120, a piston 130, and a driving control mechanism 200.

[0030] The toy gun main body 110 includes a barrel portion 111, a handgrip 113 connected to a lower portion of the barrel portion 111, and a cartridge chamber 115 provided at a front end of the barrel portion 111. The cylinder assembly 120 and the piston 130 are installed to reciprocate in the barrel portion 111.

[0031] A power supply unit 210 and a driving motor 220 of the driving control mechanism 200 may be built in the handgrip 113.

[0032] A projectile 10 (may be a BB pellet or a combined BB pellet and pellet-shell) is individually supplied and loaded into the cartridge chamber 115. An outlet 116 through which a projectile 10 is supplied from the magazine is formed to be in communication with the cartridge chamber 115, and a magazine coupling portion 117 to which the magazine 20 is coupled is provided at a portion corresponding to the outlet 116.

[0033] The projectile 10 may include a configuration of normal BB pellet combined to front end of a pellet-shell and also include only a normal BB pellet. The projectile 10 in the magazine 20 is individually supplied to the cartridge chamber 115 via the outlet 116.

[0034] The cylinder assembly 120 is formed to reciprocate in the barrel portion 111. As illustrated in FIG. 2, the cylinder assembly 120 includes a cylinder 121, a rack gear portion 123 detachably installed at the cylinder 121, and a guide portion 124.

[0035] As illustrated in FIGS. 3 and 4, the cylinder 121 includes a cylinder body 121a in a cylindrical shape, a cylinder head 122 inserted into front end of the cylinder body 121a, a spring 121b positioned between the cylinder

body 121a and the cylinder head 122 to space the cylinder head 122 from the cylinder body 121a, a nozzle 121c inserted into the cylinder head 122 to pass through the cylinder head 122, and a stopper 121d for preventing separation between the cylinder body 121a and the cylinder head 122.

[0036] The cylinder 121 is formed to reciprocate (moving backward and moving forward) in the toy gun main body 110 to be ready for firing, and no other structure (not even a side surface guider for the cylinder) exists between left and right side surfaces of the cylinder 121 and left and right inside surfaces of the toy gun main body 110 so that the left and right side surfaces of the cylinder 121 face the left and right inside surfaces of the toy gun main body 110 at the closest distance. In this case, a sense of reality may be increased because a user may feel and visually check the reciprocating actions of the cylinder 121 like a real gun. In addition, capacity of the cylinder 121 may be maximized and thus an amount of compressed air generated at the cylinder 121 may be maximized because other structures, such as a side surface guider, do not exist.

[0037] The spring 121b provides elasticity that pushes the cylinder head 122 from the cylinder body 121a, thereby mitigating a physical impact occurring when the cylinder 121 moves forward and collides with the toy gun main body 110. In addition, when the cylinder 121 moves backward due to recoiling after the collision, the spring 121b pushes the cylinder head 122 forward, and thereby the cartridge chamber 115 may maintain sealing.

[0038] Since the nozzle 121c has a smaller diameter than the spring 121b, the nozzle 121c is inserted not only into the cylinder head 122 but also into the spring 121b. In addition, a portion of front end of the nozzle 121c protrudes forward from the cylinder head 122 to discharge high pressure air, and rear end of the nozzle 121c is inserted into front end of the cylinder body 121a.

[0039] The stopper 121d passes through a hole formed at one side surface of the cylinder body 121a and is inserted into a groove formed at a side surface of the cylinder head 122 corresponding to the one side surface of the cylinder body 121a.

[0040] The rack gear portion 123 is formed under the cylinder 121 with a length corresponding to the length of the cylinder body 121a. Unlike the cylinder body 121a, the rack gear portion 123 may be formed of a nonmetal material or may also be formed of a metal material.

[0041] The rack gear portion 123 includes a rack gear tooth 123c formed at a lower surface and in a length direction of the rack gear portion 123. In addition, the rack gear portion 123 includes a contact surface 123a in contact with a first sensor 281 of a sensing unit 280 and a groove 123b formed in a length direction of the rack gear portion 123 not to be in contact with the first sensor 281. The contact surface 123a and the groove 123b are positioned at a lower surface of the rack gear portion 123 and next to the rack gear tooth 123c.

[0042] The rack gear portion 123 is separately provided by the cylinder body 121a and is formed to be assembled and separated by a bolt or the like so that the rack gear portion 123 may be replaced with a new one in the case that the rack gear tooth 123c of the rack gear portion 123 does not work normally due to damage or breakage when used for a long time. That is, only the rack gear portion 123 may be replaced unlike the conventional method in which the whole expen-

sive cylinder assembly 120 needs to be replaced and thereby having an advantage of reducing cost. Specifically, since the cylinder body 121a normally is made of expensive brass to prevent deformation while maintaining certain solidity and to reduce weight, the configuration provided with the separate rack gear portion 123 to be coupled instead of integrally manufacturing the rack gear and the expensive cylinder body 121a provides an advantage of not only reducing a financial burden for a user but also reducing waste of resources.

[0043] In addition, the rack gear portion 123 guides the reciprocating action of the cylinder assembly 120 in the toy gun main body 110 without contact between the surfaces of the cylinder 121 and the inside surfaces of the toy gun main body 110. Since the rack gear portion 123 does not bring the surfaces of the cylinder 121 into contact with the inside surfaces of the toy gun main body 110, the rack gear portion 123 can reduce the frictional resistance of the cylinder assembly 120.

[0044] The guide portion 124 is formed on the cylinder body 121a, and stably guides the reciprocating action of the cylinder assembly 120 along with the rack gear portion 123. A return spring 125 is connected to the guide portion 124 to return the cylinder assembly 120 to an initial position from a state in which the cylinder assembly 120 is moved back. The guide portion 124 may be made of a nonmetal material such as a plastic or the like or may also be made of a metal material.

[0045] The piston 130 is installed to reciprocate in the cylinder body 121a, moves backward along with the cylinder 121 when the cylinder 121 moves backward as illustrated in FIG. 5, and is locked by a locking member 250 of the driving control mechanism 200 to maintain a state ready to fire. After this, only the cylinder assembly 120 separately moves forward as illustrated in FIG. 6.

[0046] A locking portion 131 coupled to and locked by the locking member 250 of the driving control mechanism 200 is formed at an outer side of the piston 130. The locking portion 131 may be variously implemented in a shape of a hooked jaw, a hole, or the like. Therefore, with the piston 130 completely moved back to be in a state ready to fire, the locking portion 131 is hooked by a locking protrusion 251 of the locking member 250 to maintain the state ready to fire. In addition, when the locking is released by the locking member 250, the piston 130 enters the cylinder 121 by an elastic force of a main spring 140 installed at a rear of the piston 130, and thereby compressed air at high pressure is provided to the nozzle 121c to fire the projectile 10. Here, the main spring 140 is installed at the rear of the piston 130 in the barrel portion 111, is compressed by the piston 130 moving backward, launches the piston 130 into the cylinder body 121a by the elastic force when a lock by the locking member 250 is released, and thereby the projectile 10 may be fired using the air at high pressure.

[0047] The cylinder assembly 120 with the configuration described above moves forward by spring restoring force of the return spring 125 when the rack gear tooth 123c is separated from a cam gear 230 with the cylinder assembly 120 moved back along with the piston 130. In addition, the projectile 10 supplied to the cartridge chamber 115 may be positioned in front of the cylinder head 122 when the cylinder assembly 120 is moved backward.

[0048] As illustrated in FIGS. 1 and 8, the driving control mechanism 200 includes a driving unit 201, the power supply unit 210, the driving motor 220, the sensing unit 280, and a control unit 286.

[0049] The driving unit 201 includes the cam gear 230, a gear train 240, the locking member 250, a release lever 260, a trigger 270, etc. The cam gear 230 includes a gear tooth 231a formed at a portion of an outer circumference of the cam gear 230 to selectively engage with the rack gear tooth 123c of the rack gear portion 123 to move the cylinder 121 backward using power generated by the driving motor 220.

[0050] In addition, as illustrated in FIG. 2, the cam gear 230 includes a cam gear body 231, a cam portion 232 eccentrically installed at the rotating center of the cam gear body 231, and a driven gear 233 which receives power from the gear train 240. The cam gear 230 with the configuration described above rotates by receiving the power of the driving motor 220 via the gear train 240. In the state of FIG. 2, the gear tooth 231a is connected and interlocked with the rack gear tooth 123c when the cam gear 230 makes one rotation, and thereby the cylinder assembly 120 moves backward along with the piston 130. Here, it is preferable that the number of the gear tooth 231a be the same as the number of the rack gear tooth 123c so that the backward movement of the cylinder 121 is completed by the one rotation of the cam gear 230.

[0051] When the cylinder assembly 120 and the piston 130 are completely moved back, the piston 130 is hooked by the locking member 250 to maintain being moved back (a state ready to fire), and the cylinder assembly 120 moves forward by an elastic restoring force of the return spring 125 when the gear tooth 231a of the cam gear 230 and the rack gear tooth 123c become separated.

[0052] The gear train 240 is for decelerating power of a driving gear 221 installed at the shaft of the driving motor 220 and transferring the power to the driven gear 233 of the cam gear 230, and, since diverse examples are available and the present invention is not limited by technical configurations of the gear train, detailed descriptions thereof will be omitted.

[0053] One end of the locking member 250 is rotatably installed in the toy gun main body 110, and the other end is connected to the release lever 260 to be interlocked. The locking member 250 described above includes the locking protrusion 251 coupled and locked to the locking portion 131 of the piston 130 moved back, as illustrated in FIG. 5.

[0054] As an example, the release lever 260 is rotatably installed in the toy gun main body 110 and includes an interlocking bar 261 which extends in one direction from the center of rotation and is connected to the other end of the locking member 250 and an interference bar 262 which extends in a direction opposite the interlocking bar 261 from the center of rotation. The interference bar 262 is a portion interfered by the cam portion 232 when the cam gear 230 rotates, and when the cam portion 232 moves from the state of FIG. 6 to the state of FIG. 7, the interference bar 262 rotates by the cam portion 232 to be the state of FIG. 7. Then, the release lever 260 rotates, the locking member 250 connected to the release lever 260 also rotates in conjunction therewith, the locking protrusion 251 is separated from the piston 130, and thereby the piston 130 may be launched. Although not shown in the drawings, the interference bar 262 may be formed in a shape extending toward an upper portion of the sensing unit 280, the interference bar 262

moves toward the upper portion of the sensing unit 280 when cocking the toy gun, and the movement of the interference bar 262 may be detectable by the sensing unit 280. Here, the term “cocking” refers to a movement of the piston 130 into the cylinder 121 to fire the projectile 10.

[0055] FIGS. 9A to 9D illustrate a piston 430, a locking member 450, and a release lever 460 according to another embodiment of the present invention, FIG. 9A illustrates a case in which the piston 430 is at an initial position, FIG. 9B illustrates a case in which the piston 430 moves backward, FIG. 9C illustrates a state in which the piston 430 is fixed by the locking member 450, and FIG. 9D illustrates a case in which the piston 430 moves forward when cocking the toy gun.

[0056] The piston 430 includes a locking portion 431 at rear end thereof in order to be coupled with and separated from the locking member 450. The locking portion 431 has a shape of a hooked jaw, and the hooked jaw has a slope inclined at a certain angle (for example, 45°).

[0057] The locking member 450 includes a locking protrusion 451, a stopper 452, a hole 453, a rotating shaft 454, and a spring 455. The locking protrusion 451 has right and left slopes for easier coupling and separation between the locking member 450 and the piston 430, and particularly it is preferable that the right slope have the same inclination angle (for example, 45°) as the inclination angle at the slope of the locking portion 431. The stopper 452 is for stopping a backward movement of the piston 430 and is positioned to be spaced a certain distance behind the locking protrusion 451. The hole 453 is formed to pass through a rear end portion of the locking member 450, and the width of the hole 453 in a lateral direction is greater than the width thereof in a vertical direction to allow the locking member 450 to move backward and forward. The rotating shaft 454 is fixed to the toy gun main body 110 and is inserted into the hole 453. The rotating shaft 454 allows the locking member 450 to rotate. The spring 455 provides the locking member 450 with elasticity and pushes the locking member 450 forward from the rotating shaft 454.

[0058] As illustrated in FIG. 9B, rear end of the piston 430 comes in contact with a left slope of the locking protrusion 451 when the piston 430 moves backward, and at this point, the locking member 450 moves backward and rotates downward about the rotating shaft 454 due to the pressure by the piston 430. After this, rear end of the piston 430 passes the locking protrusion 451 and comes in contact with the stopper 452, and at this point, the locking member 450 moves upward as the piston 430 presses the stopper 452. In addition, as illustrated in FIG. 9C, the piston 430 is fixed by the locking member 450 to be in a state ready to fire.

[0059] As illustrated in FIG. 9D, when the toy gun is cocked, the locking member 450 moves downward due to pressure of the piston 430 as an interlocking bar 461 of the release lever 460 moves forward. Accordingly, released from a binding of the locking member 450, the piston 430 moves forward.

[0060] In conventional cases, abrasion easily occurred at the piston and the locking protrusion due to collision and friction therebetween. However, the abrasion caused from the collision and friction may be minimized as the locking member 450 moves forward and backward and rotates using the slopes of the locking portion 431 and the locking protrusion 451, the hole 453, the spring 455, etc. in the embodiment of the present invention.

[0061] The release lever 460 includes the interlocking bar 461 and an interference bar 462. The interlocking bar 461 is formed to move forward and backward, and the interference bar 462 rotates by the pressure of the cam portion 232 when the cam gear 230 rotates. For example, when the cam portion 232 rotates as illustrated in FIG. 9D, the interference bar 462 rotates by the cam portion 232, and the interlocking bar 461 interlocked with the interference bar 462 moves forward. As the interlocking bar 461 moves forward, the locking member 450 rotates downward, and thereby the piston 430 may be launched.

[0062] The trigger 270 is installed so that a portion thereof is exposed outward from the toy gun main body 110 and is rotatably installed. By pulling the trigger 270, the sensing unit 280 senses the signal and the projectile 10 is fired.

[0063] The power supply unit 210 includes a battery installed inside the toy gun main body 110, and either a rechargeable battery or a normal battery may be used for the battery.

[0064] The driving motor 220 may be installed inside the handgrip 113 of the toy gun main body 110 and operates by receiving power from the power supply unit 210.

[0065] The sensing unit 280 includes the first sensor 281 for sensing a position of the cylinder 121, a second sensor 282 for sensing motion of pulling the trigger, and a third sensor 283 for sensing the number of times firing occurred.

[0066] The first sensor 281 is positioned on a moving path of the rack gear portion 123 and senses the position of the cylinder 121 by being in contact with the rack gear portion 123. When the first sensor 281 comes in contact with the contact surface 123a positioned behind the groove 123b, the control unit 286 determines that the cylinder 121 starts to move backward and the cartridge chamber 115 is open. After this, since the first sensor 281 is inserted into the groove 123b during the backward movement of the cylinder 121, the first sensor 281 is not in contact with the rack gear portion 123 and thereby the control unit 286 determines that the cylinder 121 is in a process of moving backward. In addition, when the first sensor 281 does not come in contact with the rack gear portion 123 after the first sensor 281 comes in contact with the contact surface 123a positioned in front of the groove 123b, the control unit 286 determines that the cylinder 121 completed the backward movement. That is, the control unit 286 may determine the position of the cylinder 121 and whether or not the backward movement of the cylinder 121 is completed depending on whether or not the first sensor 281 is in contact with the rack gear portion 123. In the same manner, the control unit 286 may determine the position of the cylinder 121 and whether or not a forward movement of the cylinder 121 is completed by using the first sensor 281 when the cylinder 121 moves forward.

[0067] In addition, the control unit 286 controls power supplied to the driving unit 201 depending on the position and the completion state of the backward and forward movement of the cylinder 121, that is, depending on whether the cylinder 121 has returned back to the initial position. For example, when the cylinder 121 stops during the movement before completing the backward and forward movement, the control unit 286 controls the power supply unit 210 to cut the power supplied to the driving unit 201. When the cam gear 230 rotates again in a state in which the cylinder 121 has not returned back to the initial position, the cylinder 121 collides with rear end of the toy gun main body 110, the cam gear

230 and the rack gear portion 123 continue to engage and run even though the cylinder 121 cannot move backward any more, and thereby the cylinder 121, the cam gear 230, the rack gear portion 123, and the like may be damaged. For the reason described above, the control unit 286 controls the power supply unit 210 to cut the power supplied to the driving unit 201.

[0068] The second sensor 282 is for sensing motion of pulling the trigger 270 by being in contact with the trigger 270. It is preferable that the second sensor 282 be installed on a control board inside the toy gun main body 110, and be a switching sensor which generates on/off switching signal.

[0069] The third sensor 283 may sense a release motion of the locking member 250 or 450 and occurrence of the cocking by being in contact with the interference bar 262 or the interlocking bar 461, and the control unit 286 may count the number of the cocking occurred using the third sensor 283 and store the number of the cocking occurred in a memory (not shown). The third sensor 283 is used for sensing the number of times cocking actually occurred (the number of forward movements of the cylinder).

[0070] In addition, although not illustrated in the drawings, a fourth sensor for sensing loading and unloading of the magazine 20 may be further included.

[0071] The control unit 286 not only controls an operation of the driving motor 220 according to each sensed signal from first to third sensors 281, 282, 283 and the fourth sensor but also controls the power supply unit 210 to selectively cut or allow a power supply to the driving motor 220.

[0072] Hereinafter, an operation of the toy gun with the configuration described above according to the embodiment of the present invention will be described in detail.

[0073] To prepare for firing, the control unit 286 controls the power supply unit 210, the driving motor 220, the driving unit 201, etc. to reciprocate the cylinder 121 (moving backward and moving forward) in the toy gun main body 110. First, the rack gear portion 123 and the cam gear 230 engage to move the cylinder 121 backward while the cam gear 230 makes one rotation. Here, the piston 130 or 430 moves backward along with the cylinder 121.

[0074] After this, when the cylinder assembly 120 and the piston 130 or 430 have completely moved back as illustrated in FIG. 5, the piston 130 or 430 is fixed by the locking member 250 or 450 in a state of being moved back, and the cylinder 121 moves forward by the return spring 125 as the rack gear portion 123 and the cam gear 230 are separated, as illustrated in FIG. 6.

[0075] The control unit 286 determines the position of the cylinder 121 and whether or not the backward and forward movement of the cylinder 121 is completed using the first sensor 281 while the cylinder 121 moves backward and forward. When the backward and forward movement of the cylinder 121 is not completed, the control unit 286 cuts power supplied to the driving unit 201 to prevent the cam gear 230 from rotating again.

[0076] In addition, even when a user pulls the trigger 270 before the cylinder 121 is not completely returned back to the initial position, the control unit 286 controls the locking member 250 or 450 to prevent the piston 130 or 430 from moving forward.

[0077] Conversely, when the cylinder 121 returns normally back to the initial position, the control unit 286 supplies power again to maintain a state ready to fire, and when a user pulls the trigger 270 in this state, the control unit

286 drives the driving motor 220 based on a switching signal of the second sensor 282. Next, the cam gear 230 further rotates to make the cam portion 232 rotate the interference bar 262 or 462, and the piston 130 or 430 hooked by the locking member 250 or 450 interlocked with the interference bar 262 or 462 rotating as illustrated in FIG. 7 is strongly launched by elastic force of the main spring 140. In addition, the projectile 10 loaded into the cartridge chamber at front end of the cylinder assembly 120 is fired by high pressure of air generated when the piston 130 or 430 rapidly returns back to the inside of the cylinder body 121a.

[0078] As described above, the cam gear 230 is controlled to make one rotation, and an operation of firing one shot of the projectile 10 is performed by the one rotation of the cam gear 230.

[0079] According to the toy gun of the embodiment of the present invention described above, since the cylinder assembly 120 is formed to perform the operation of moving backward and returning back along with the piston 130 or 430, the projectile 10 is supplied to a space of the cartridge chamber 115 generated by the backward movement of the cylinder assembly 120, and the projectile 10 is loaded by the cylinder assembly 120 returning back.

[0080] In addition, a recoil force as is generated when a real gun is fired may be implemented through the operation of the cylinder assembly 120 that repeatedly moves backward and forward, that is, by the recoil generated when the cylinder assembly 120 returns back, and thereby providing a user with a sense of reality when firing.

[0081] The toy gun according to the present invention provides an effect of providing an exterior mimicking a real gun and operating very similarly as a real gun since the cylinder is formed to reciprocate backward and forward inside the toy gun for readying cocking of the toy gun.

[0082] In addition, the toy gun according to the present invention provides an effect of enhancing durability of the toy gun since the toy gun is formed to minimize damage to the toy gun due to a physical impact generated from the reciprocating movement of the cylinder.

[0083] In addition, the toy gun according to the present invention provides an effect of reducing damage to the toy gun by sensing the position of the cylinder and providing power for driving the cylinder depending on the position of the cylinder sensed.

[0084] Although exemplary embodiments to describe the principle of the present invention are illustrated and described as above, the present invention is not limited to the configurations and operations as illustrated and described herein. Rather, it should be understood by those skilled in the art that various changes and modifications may be made without departing from the scope and the technical spirit of the invention.

What is claimed is:

1. A toy gun comprising:

- a main body including a cartridge chamber into which a projectile is loaded;
- a cylinder formed to reciprocate inside the main body for being ready to fire;
- a piston which moves backward along with the cylinder when the cylinder moves backward and enters the cylinder to provide a cartridge chamber with compressed air when the projectile is fired;
- a driving unit which moves the cylinder backward in the main body; and

a control unit which controls power supplied to the driving unit depending on a position of the cylinder.

2. The toy gun of claim 1, wherein the driving unit includes a cam gear which moves the cylinder backward using power generated from a motor.

3. The toy gun of claim 2, wherein the cam gear includes a gear tooth formed at a portion of a circumference of the cam gear to selectively engage with a rack gear tooth of a rack gear portion formed under the cylinder.

4. The toy gun of claim 1, further comprising a first sensor which senses a position of the cylinder.

5. The toy gun of claim 4, wherein the first sensor is positioned on a moving path of a rack gear portion formed under the cylinder and senses a position of the cylinder by being in contact with the rack gear portion.

6. The toy gun of claim 5, wherein the rack gear portion includes a contact surface in contact with the first sensor and a groove formed not to be in contact with the first sensor.

7. The toy gun of claim 1, further comprising a second sensor which senses motion of pulling a trigger and a third sensor which senses the number of times cocking occurred.

8. The toy gun of claim 1, wherein the cylinder includes:
a cylinder body;
a cylinder head inserted into front end of the cylinder body;

a spring positioned between the cylinder body and the cylinder head to space the cylinder head from the cylinder body; and

a nozzle inserted into the cylinder head to pass through the cylinder head.

9. The toy gun of claim 8, wherein the cylinder further includes a stopper to prevent separation between the cylinder body and the cylinder head.

10. The toy gun of claim 1, wherein right and left side surfaces of the cylinder face right and left inside surfaces of the main body.

11. The toy gun of claim 1, wherein the control unit determines a position of the cylinder while the cylinder moves backward and forward.

12. The toy gun of claim 11, wherein the control unit cuts power supplied to the driving unit unless the cylinder returns back to an initial position.

13. The toy gun of claim 1, wherein the driving unit further includes a locking member to fix the piston, and the locking member includes a locking protrusion having right and left slopes to ease coupling with and separating from the piston, a hole formed to pass through rear end of the locking member, and a spring which pushes the locking member forward from a rotating shaft inserted in the hole.

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