(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 698 848 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
06.09.2006 Bulletin 2006/36

(21) Application number: **03780878.9**

(22) Date of filing: **18.12.2003**

(51) Int Cl.:
F41B 7/08 *(2006.01)* ***F41B 11/14*** *(2006.01)*

(86) International application number:
PCT/JP2003/016224

(87) International publication number:
WO 2005/061984 (07.07.2005 Gazette 2005/27)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR

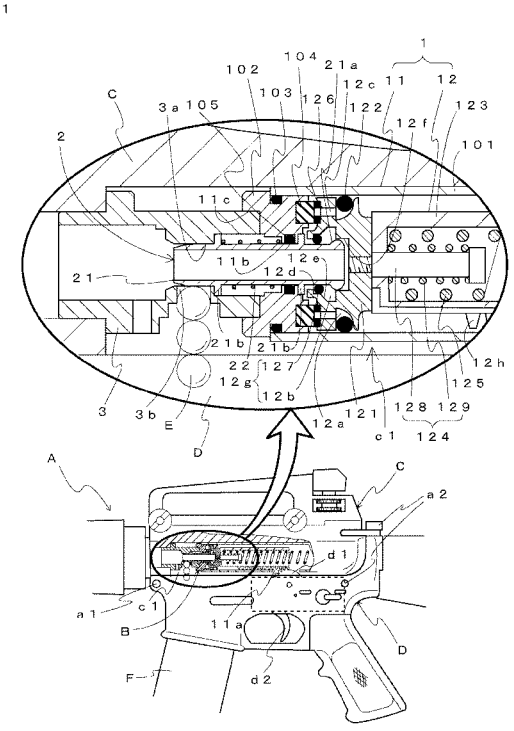
(71) Applicant: **Tsurumoto, Koichi**
Tokyo 112-0012 (JP)

(72) Inventor: **Tsurumoto, Koichi**
Tokyo 112-0012 (JP)

(74) Representative: **Schneider, Günther Martin et al**
Bettinger Schneider Schramm,
Postfach 86 02 67
81629 München (DE)

(54) FEEDER FOR AIR GUN AND AIR GUN

(57) A feeder B as shown in Fig. 1 is constructed so that a nozzle unit (2) is located in a cylinder unit (11) of a bullet-firing unit (1), and that in response to the movement of a piston unit (12) is capable of being connected to or disconnected from the piston unit (12), and where a bullet-feed port (3b) can be closed or opened. Furthermore, with a force that is greater than the force of an elastic member (nozzle spring) (22) and a force that is less than the engagement force between a locking section (21a) and a locked section (12g), a joint unit (124) connects the piston head (121) with the piston body (123), and within a limited space, efficiently increases the amount of time that the bullet-feed port (3b) is open. In this way, it is possible to improve durability of the feeder and increase reliability of feeding bullets, as well as it is possible to reproduce the operation of a real gun that can be taken down. Moreover, it is possible for the user to easily replace the feeder.



EP 1 698 848 A1

Description

BACKGROUND OF THE INVENTION

[0001] This invention relates to a feeder for air gun and an air gun in which that feeder is installed.

DESCRIPTION OF THE RELATED ART

[0002] As an example of a prior feeder for air gun, there is a feeder comprising a bullet-feed port that is located inside a bullet-feed chamber that is in front of an air nozzle located inside a cylinder; a shutter that opens and closes the bullet-feed port; a locking section that is located on a rotating gear at a fixed radial distance from the axis of rotation of the rotating gear; and a sliding arm that is pressed by a spring in a sliding direction and that connects an engagement unit, which engages with the locking section, with the shutter, so that the rotation of the rotating gear opens and closes the shutter by way of the sliding arm (for example, see Japanese Publication of Examined Utility Model Application H07-022634).

[0003] By the way, in order to improve merchantability, this kind of air gun often has an external appearance of a real gun, or in other words, all of the mechanisms, including the aforementioned feeder, are efficiently housed within a limited area so as not to hinder that external appearance.

[0004] As shown in the patent document above referred, in order to house the feeder for air gun described above inside a limited area, it is necessary that the plate thickness of the sliding arm is made thin.

[0005] Also, since this feeder for air gun is a so-called slider-crank mechanism, combined stresses that include bending stress act on the sliding arm.

[0006] Therefore, due to the aforementioned thin plate thickness, it becomes easy for damage (or deformation) to occur due to fatigue.

[0007] Also, many air guns are equipped with a mode for continually firing bullets at high speed (high-speed-continual-fire mode), and, for example, the magazine that contains these bullets (BBs) is constructed so that the bullets are progressively fed by the force of a compression spring. Therefore, the force for feeding the bullets differs when there are plenty of bullets inside the magazine from when there are only a few remaining, and particularly, in the aforementioned highspeed-continual-fire mode, when there are only a few bullets remaining, often bullets are not fed in time, resulting in feeding errors.

[0008] Furthermore, there are various kinds of air guns, from those that are used as so-called toys, to those that are used in training such as close quarter combat training (CQB training). Especially in the case of air guns that are used for training, in order to increase tension during training and to become accustomed to handling a gun (including maintenance), it is preferable that the air gun is perfectly patterned after a real gun in external appearance as well as weight and operability.

[0009] For example, in the case of reproducing a real gun that can be taken down (reproducing operability), when reproducing the gun using the prior feeder described above, the base of the sliding arm engages with a gear of a decelerating mechanism, so reproduction becomes extremely difficult and impractical. It is conceivable that this prior feeder is not for an air gun that can be taken down, or in other words, an air gun for which the user cannot perform maintenance of the air gun (including replacement of parts).

[0010] The object of the present invention is to provide an feeder for air gun and the air gun in which that feeder is installed that improves durability of the feeder and reliability of bullet feeding, as well as being capable of reproducing the operability of a real gun that can be taken down and for which maintenance of the feeder (including replacement of parts) can be easily performed by the user.

DISCLOSURE OF INVENTION

[0011] In order to accomplish the aforementioned object, the feeder for air gun of this invention and the air gun in which it is mounted employ the technology described below.

[0012] That is, the feeder for air gun of claim 1 of the invention comprises: a bullet-firing unit that comprises a piston unit and cylinder unit that is engaged with the piston unit so that it can slide, and that by way of compressed air that is generated by the back-and-forth motion of the piston unit fires bullets that are fed upward from a bullet-feed port that is located at the front of the piston unit and oriented in a direction that is orthogonal to the direction of the back-and-forth motion of the piston unit; and a nozzle unit that together with being located in the cylinder unit so that it is capable of back-and-forth motion over a specified distance so that it closes or opens the bullet-feed port, and so that it is capable of automatically moving back-and-forth from the opened state to the closed state of the bullet-feed port, is constructed so that in response to forward motion of the piston unit can be connected to the piston unit, and in response to backward motion of the piston unit can be disconnected from the piston unit; wherein in response to the forward motion of the

piston unit, the nozzle unit that is connected with the piston unit is moved the specified distance required to open the bullet-feed port, and with the stroke amount of the specified distance as a boundary, the nozzle unit is disconnected from the piston unit and automatically closes the bullet-feed port.

[0013] The feeder for air gun according to claim 2 of the invention is the feeder for air gun of claim 1 wherein the cylinder unit comprises: a cylindrical cylinder body, and a ring-shaped cylinder head that is located on the tip end section of the cylinder body, and in which a continuous hole having a specified diameter is formed through its center; and the nozzle unit comprises: a cylindrical nozzle body that together with being inserted in the continuous hole so that it can slide the specified distance, has a locking section located on its base section, and closes the bullet-feed port by the surface on the side of its tip-end section; and an elastic member having one end that engages with the cylinder head, and other end that engages with the nozzle body and presses the nozzle body in the forward direction; and where a concave section, in which the base-end section of the nozzle body is inserted, is formed on the end surface of the piston unit, and a locked section, which can be coupled with or released from the locking section, is formed inside the concave section.

[0014] The feeder for air gun according to claim 3 of the invention is the feeder for air gun of claim 2 wherein the piston unit comprises: a piston head, a piston body and a joint unit that together with bringing together the piston head and the piston body with a force that is greater than the force of the elastic member, and a force that is less than the coupling force between the locking section and locked section, connects them so that they can move through a stroke having a specified distance.

[0015] The feeder for air gun according to claim 1 of the invention, is the feeder for air gun of claim 2 or claim 3 comprising a hollow-shaft shaped chamber in which the tip-end section of the nozzle body is inserted, and in which the bullet-feed port is located part way along its length; wherein the chamber is fixed to and integrated with the cylinder head.

[0016] The air gun according to claim 5 of the invention is an air gun in which the feeder for air gun of any one of the claims 1 to 4 is mounted, and comprises a gun barrel side and a trigger side; wherein the bullet-firing unit comprises: a rack that is located on the side surface of the piston unit, and a piston spring that extends inside the piston unit and moves the piston unit forward; and together with at least the bullet-firing unit and the nozzle unit being mounted in the gun barrel so that they can be installed or removed, a trigger mechanism comprising a sector gear that engages with the rack is mounted on the trigger side, and is connected so that the gun barrel side and trigger side can be taken down.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is a front view and enlarged view of a section of an air gun that uses the feeder of an embodiment of the present invention.

Fig. 2 is a drawing explaining the series of operations of the feeder of an embodiment of the present invention.

Fig. 3 is a drawing explaining the taken down state of an air gun that uses the feeder of an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0018] In order to explain the present invention in more detail, the invention will be explained with reference to the supplied drawings. In the figures, A is an air gun, B is a feeder for the air gun, C is the gun barrel side of the air gun body, and D is the trigger side of the air gun body.

[0019] As shown in Fig. 1, the feeder for air gun B of this embodiment of the invention comprises: a bullet-firing unit 1, a nozzle unit 2, and chamber 3.

[0020] The bullet-firing unit 1 comprises: a cylinder unit 11 and a piston unit 12.

[0021] The cylinder unit 11 comprises: a cylinder body 101 and cylinder head 102.

[0022] The cylinder body 101 has a cylindrical shape in which a long hole 11a is formed in the middle section so that it is long in the lengthwise direction, where one end of the cylinder body 101 is open and the other end is closed.

[0023] The cylinder head 102 is ring shaped and has a continuous hole 11b in it having a specified diameter, and an O-ring 105 is mounted inside the middle of that continuous hole 11b so that it can guide and support a nozzle body 21 (described later) and maintain air leakage, and an O-ring 103 for maintaining air leakage is mounted around the cylinder head 102 on the inside of the open end of the cylinder body 101. Also, this cylinder head 102 is formed so that it is continuous with a ring-shaped seal member 104 embedded in the side surface on the end inside the cylinder body 101, and a stepped section 11c is formed around the opposite end surface in which a chamber 3 (described later) fits.

[0024] The piston unit 12 comprises: a piston head 121, piston ring 122, piston body 123, joint unit 124 and piston

spring 125, and is located inside the cylinder unit 11.

[0025] The piston head 121 has a piston groove 12a formed around its outer surface such that its front end is formed into a vertical shape and whose rear end is formed into a concave curved surface, and a concave fitting section 12b is formed in the center of the top surface. Also a second seal member 126 is embedded a— round the top surface so that it comes in contact with and forms a seal with the seal member 104 that is embedded in the cylinder head 102; and ventilation holes 12c that pass through the second seal member 126 and the vertical surface of the front end that forms the piston groove 12a are located at a plurality of locations so that they open up the base end of the piston groove 12a.

[0026] Moreover, the aforementioned concave fitting section 12b has a stepped section 12d that is formed in the entrance of the concave fitting section 12b so that the diameter of the stepped section 12d has a larger diameter than the entrance, and the stepped section 12d is continuous with a tapered section 12e whose diameter gradually increases toward the inside; and a concave section 12f having a specified diameter is formed in the bottom surface of the section whose diameter is greater than the entrance diameter. Moreover, an O-ring 127 is mounted inside the aforementioned stepped section 12d, and this O-ring 127 and the concave fitting section 12b form a locked section 12g.

[0027] The piston ring 122 is mounted inside the piston groove 12a and is an elastically transformable member, and it comes in rubbing contact with and presses against the inner wall of the cylinder body 101.

[0028] The piston body 123 is formed in cylindrical shape which has a bottom section formed on one end (left end in the figure) and is opening on the other end (right end in the figure), and a rack 12h having a specified number of teeth along the lengthwise direction from the opening end section is fixed to the cylindrical side surface, and this rack 12h is located so that it corresponds with the long hole 11a formed in the cylinder body 101. An engaging slide groove and convex section (not shown in the figure) are formed in the cylinder body 101 and piston body 123, and they restrict the piston body 123 from turning.

[0029] The joint section 124 comprises a slide pin 128 and piston-head spring 129.

[0030] The slide pin 128 is inserted into the center of the bottom of the piston body 123 so that it can slide a specified length, and the end section of the slide pin 128 is screwed into the center section of the rear surface of the piston head 121, and the head section of the slide pin 128 forms a flange shape.

[0031] The piston-head spring 129 is a compression spring that is a weaker than the engagement force between the locking section 21a and the locked section 12g, and harder (has a larger spring constant) than the nozzle spring 22 (described later), where one end comes in contact with the stepped surface of the head of the slide pin 128, and the other end comes in contact with the bottom section of the piston body 123, and it presses the piston head 121 so that it comes in contact with the piston body 123.

[0032] The piston spring 125 is a compression spring that extends between the bottom section of the piston body 123 and the closed bottom surface of the cylinder body 101, and it presses the piston body 123 so that it moves forward.

[0033] The nozzle unit 2 comprises a nozzle body 21 and nozzle spring 22 (elastic member).

[0034] The nozzle body 21 is a cylindrical body and is formed such that a locking section 21a, having a semispherical cross section and whose maximum diameter can be guided and supported by the concave section 12f formed inside the concave fitting section 12b of the piston head 121, is formed on the base end, and a pair of flange sections 21b that are separated by a specified space are arranged in the middle section, where the locking section 21a engages with the locked section 12g so that it can be released, and is arranged so that the continuous hole 11b in the cylinder head 102 is located within the pair of flange sections 21b. The engagement force between the locking section 21a and locked section 12g is larger than the force of the aforementioned piston-head spring 129 and nozzle spring 22 (described later).

[0035] The nozzle spring 22 is a compression spring whose spring constant is smaller than that of the piston-head spring 129 (softer than the piston-head spring 129), and it extends between the side surface of the continuous hole 11b in the cylinder head 102 and the front flange section 21b, and it presses the nozzle body 21 so that the tip end can move backward.

[0036] The chamber 3 is formed so that there is a small-diameter section 3a located in the hollow-shaft section where the continuous hole 11b is formed, and that has a specified reduced diameter so that it can guide and support the tip end of the nozzle body 21 through the continuous hole 11b, and the base end of the chamber 3 fits inside the stepped section 11c that is formed in the cylinder head 102. There is a bullet-feed port 3b formed in this small-diameter section 3a through which bullets E are supplied, and the side surface on the tip end of the aforementioned nozzle body 21 covers that bullet-feed port 3b so that it is closed off.

[0037] As described above, the integrated feeder for air gun B, is mounted inside the air gun A that comprises a gun barrel side C and trigger side D and can be taken down by way of a hinge section, as shown in Fig. 1 and Fig. 3.

[0038] In other words, the feeder for air gun B of this embodiment is inserted and mounted so that it is removable into the hole shaped packing section c1 of the feeder located in line with the gun barrel in the frame of the gun barrel side C so that the rack 12h faces downward.

[0039] On the other hand, a power-supply unit (not shown in the figure), an electric motor (not shown in the figure), a deceleration mechanism comprising a sector gear d1, a control unit (not shown in the figure), and a trigger unit comprising a trigger d2 are mounted in the trigger side D, and by pulling the trigger d2, power supplied from the power-supply unit

causes the electric motor to rotate, and that electric motor and deceleration mechanism connected to it operate, and the sector gear d1 that protrudes from the frame of the trigger side D rotates. Also, a removable magazine F, which is capable of progressively feeding bullets E by the force of a compression spring, is attached to the trigger side D.

[0040] In an air gun A that is constructed in this way, the trigger side D of the air gun body and gun barrel side C of the air gun body are connected so that the sector gear d1 engages with the rack 12h and so that the air gun can be taken down by way of a hinge unit a1. This air gun A has a locking unit a2 that is located in a position that faces the hinge unit a1, and the air gun A can be taken down by releasing this locking unit a2.

[0041] Next, the operation of the feeder for air gun B that is constructed in this way will be explained with reference to Fig. 1 and Fig. 2.

[0042] First, when the trigger d2 is pulled causing the sector gear d1 to rotate, the piston body 123 and piston head 121 are in contact and begin to be moved backward by way of the sector gear d1 and the rack 12h that it is meshed with. Reacting to this, the nozzle body 21 in which the nozzle spring 22, having a smaller spring constant than the piston-head spring 129, is located begins to be moved backward by the piston body 123 and piston head 121.

[0043] By this piston head 121 moving backward, the piston ring 122 that is mounted inside the piston groove 12a presses against the front vertical surface that forms that piston groove 12a and the inner wall of the cylinder 101 body and transforms into an elliptical shape, forming a space between the concave curved surface on the rear and the piston ring 122.

[0044] Also, by way of the ventilation holes 12c that are formed through the second seal material 126 located in the piston head 121 and the vertical surface on the front of the piston groove 12a, air behind the piston body 123 flows through the aforementioned space and ventilation holes 12c into the air chamber that is formed between the cylinder head 102 and piston head 121. When the piston head 121 moves forward, the piston ring 122 that is mounted inside the piston groove 12a presses against the concave curved surface in the rear and the inner wall of the cylinder body 101 to prevent the flow of air.

[0045] Next, by the nozzle body 21 moving backward, the tip end of the nozzle that was closed off in order to mount the bullet-feed port 3b moves backward to expose the bullet-feed port 3b, and at the same time as this, one bullet E that is pressed upward from the magazine F is fed into the chamber 3 (see (1) of Fig. 3).

[0046] Even though a bullet E is fed into this chamber 3, the piston body 123 continues to be moved backward by way of the sector gear d1 and the rack 12h that it is meshed with until the flange section 21b at the front of the nozzle body 21 comes in contact with the cylinder head 102.

[0047] When the flange section 21b comes in contact with the cylinder head 102, then the piston-head springs 129 begins to be compressed, and is compressed until it gives. The amount of time required until this piston-head spring 129 gives is the amount of time required to keep the tip end of the nozzle in the backward position and expose the bullet-feed port 3b so that the bullet E can be fed from the magazine F even when the feeding force becomes weak (see (2) in Fig. 3).

[0048] After the piston-head spring 129 has been compressed until it gives, the locking section 21a formed at the base of the nozzle body 21 passes over the O-ring 127 mounted in the stepped section 12d, which separates the locking section 21a from the locked section 12g. Also, the nozzle body 21 is automatically moved forward by the force of the nozzle spring 22 until the flange section 21b located at the rear of the nozzle body 21 comes in contact with the cylinder head 102, and the tip end of the nozzle closes the bullet-feed port 3b.

[0049] At the same time as this, the piston head 121 comes into contact with the piston body 123 by the force of the piston-head spring 129, and the piston body 123 is moved backward by the sector gear d1 and the rack 12h that it is meshed with until it reaches the rear end.

[0050] Next, when the section of the section gear d1 with no teeth is positioned on the tooth surface of the rack 12h and meshing is released, the piston unit 12 is quickly moved forward by the force of the compressed piston-head spring 125 and generates compressed air. This generated compressed air is injected into the chamber 3 by the nozzle body 21, and the fed bullet E is fired through the barrel toward the outside (see (3) in Fig. 3).

[0051] Also, as the piston unit 12 is moving forward, the O-ring 127 that is mounted inside the stepped section 12d is pressed backward by the locking section 21a of the nozzle body 21 that protrudes forward from the piston unit 12 along the tapered surface formed continuous with the stepped section 12d and is fastened by passing over it, then the locking section 21a is guided and supported so that it returns to the initial position in the concave section 12f formed inside the bottom surface of the piston head 121.

[0052] In the case of the continual-firing mode, the series of operations described above are repeated while the trigger d2 is pulled.

[0053] As described above, the feeder for air gun B of this embodiment has very little operation loss because the operation of the mechanism related to feeding bullets opens and closes the bullet-feed port 3b by just the same back-and-forth motion as the piston. Therefore, it is possible to conserve energy of the drive power supply. Also, durability of the mechanism is improved, and it is possible to efficiently increase the time that the bullet-feed port 3b is open within a limited space, thus improving the reliability of feeding bullets, and the feeder can also be mounted easily, even in an

air gun A whose external appearance is patterned after a real gun.

[0054] Moreover, when maintenance (including parts replacement) is performed and practice of the feeder B is taken down, the lock unit a2 described above is released. Particularly, in the case of performing parts replacement of the feeder B, replacement can be performed easily by removing the feeder B from the feeder packing section c1.

[0055] A feeder for air gun and air gun of an embodiment of the invention are explained above, however, the embodiment explained above is only an example of a preferred embodiment of the invention, and the invention is not limited by that embodiment. The present invention can undergo various changes within the scope and range of the invention.

Industrial Applicability

[0056] The feeder for air gun according to claim 1 and claim 2 of the invention is constructed so that a nozzle, which can be connected to or disconnected from the piston unit and that reacts to the operation of the piston unit, is located in the cylinder of the bullet-firing unit so that its dynamic vector is oriented in the same direction of the firing unit, and so that the bullet-feed port is closed and opened and there is very little operation loss when feeding bullets. Therefore, together with improving the durability of the mechanisms, it is possible to conserve energy of the drive power supply.

[0057] With the feeder for air gun according to claim 3 of the invention, the piston head and piston body are held by the joint section, by a force greater than the force of the elastic member, and by a force less than the engagement force between the locking section and the locked section, and are pressed together so that they are connected, and so that they can move through a stroke of a specified length, and after the piston head and piston body begin to move through the stroke of a specified length from the rear position of the nozzle body that is moved that specified length in reaction to the piston unit, it is possible to efficiently increase the amount of time that the bullet-feed port is open within a limited space. Therefore, regardless of the number of bullets that are loaded inside the magazine, bullets are constantly fed stably without feeding errors, so it is possible to mount the feeder in an air gun having a desired external appearance.

[0058] With the feeder for air gun according to claim 4 of the invention, by integrating the hollow chamber in which the bullet-feed port is located such that the feeder is completely capable of being assembled, it is possible to improve the work of assembling the air gun, and the assembled air gun can be repaired by simply replacing parts.

[0059] With the air gun according to claim 5 of the invention, by connecting the gun barrel side of the air gun body in which the feeder is mounted and the trigger side of the air gun body so that the air gun can be taken down, it is possible to reproduce the operability of a real gun that can be taken down, and it is possible for the user to perform maintenance of the feeder (including parts replacement) easily.

Drawings

[0060] Figs. 1 to 4

Reference Codes

[0061]

A	Air gun
a1	Hinge section
a2	Lock unit
B	Feeder for air gun
C	Gun barrel side
D	Trigger side
d1	Sector gear
d2	Trigger
F	Magazine
E	Bullet
1	Bullet firing unit
11	Cylinder
101	Cylinder body
102	Cylinder head
11b	Continuous hole
12	Piston unit
121	Piston head
12g	Locked section
123	Piston body

124 Joint section
12h Rack
128 Slide pin
129 Piston-head spring
2 Nozzle unit
21 Nozzle body
21a Locking section
22 Nozzle spring
3 Chamber
3b Bullet feed port

Claims

1. A feeder for air gun comprising:

a bullet-firing means having a piston unit and cylinder unit that is engaged with the piston unit so that it can slide, and that by way of compressed air that is generated by the back-and-forth motion of the piston unit fires bullets that are fed upward from a bullet-feed port that is located at the front of the piston unit and oriented in a direction that is orthogonal to the direction of back-and-forth motion of the piston unit; and
a nozzle means that together with being located in said cylinder unit so that it is capable of back-and-forth motion over a specified distance so that it closes or opens said bullet-feed port, and so that it is capable of automatically moving back-and-forth from the opened state to the closed state of the bullet-feed port, is constructed so that in response to forward motion of the piston unit can be connected to the piston unit, and in response to backward motion of the piston unit can be disconnected from the piston unit; wherein
in response to the forward motion of said piston unit, said nozzle means that is connected with the piston unit is moved said specified distance to open said bullet-feed port, and with the stroke amount of said specified distance as a boundary, the nozzle means is disconnected from the piston unit and automatically closes said bullet-feed port.

2. The feeder for air gun according to claim 1 wherein said cylinder unit comprises: a cylindrical cylinder body, and a ring-shaped cylinder head that is located on the tip end section of the cylinder body, and in which a continuous hole having a specified diameter is formed through its center; and
said nozzle means comprises: a cylindrical nozzle body that together with being inserted in said continuous hole so that it can slide said specified distance, has a locking section located on its base section, and closes said bullet-feed port by the surface on the side of its tip-end section; and an elastic member having one end that engages with said cylinder head, and other end that engages with said nozzle body and presses said nozzle body in the forward direction; wherein
a concave section, in which the base-end section of said nozzle body is inserted, is formed on the end surface of said piston unit, and a locked section, which can be engaged with or released from said locking section, is formed inside the concave section.

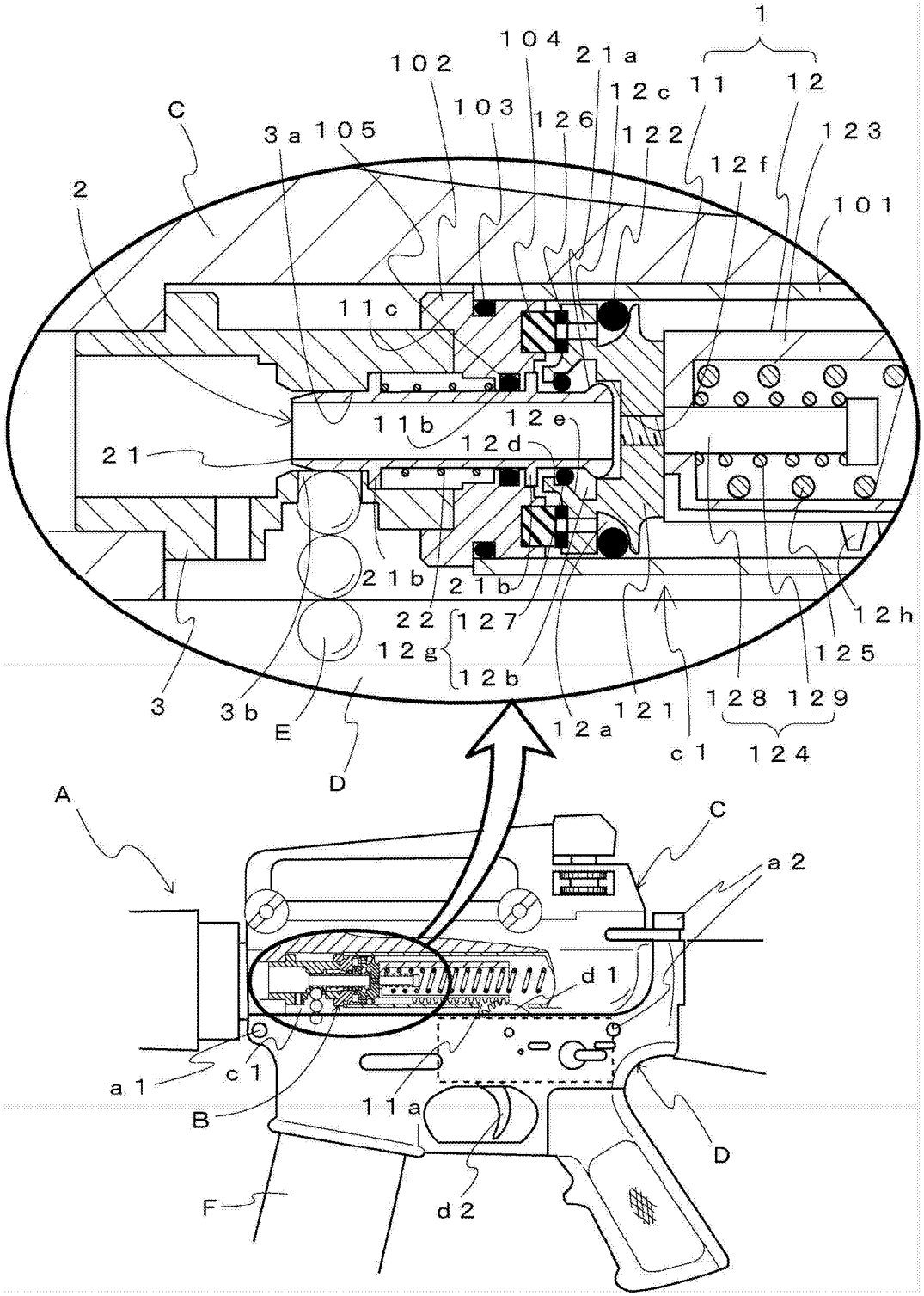
3. The feeder for air gun according to claim 2 wherein said piston unit comprises: a piston head, a piston body and a joint unit that together with bringing together said piston head and said piston body with a force that is greater than the force of said elastic member, and a force that is less than the engagement force between said locking section and locked section, connects them so that they can move through a stroke having a specified distance.

4. The feeder for air gun according to claim 2 or claim 3 comprising a hollow-shaft shaped chamber in which the tip-end section of said nozzle body is inserted, and in which said bullet-feed port is located part way along its length; wherein said chamber is fixed to and integrated with said cylinder head.

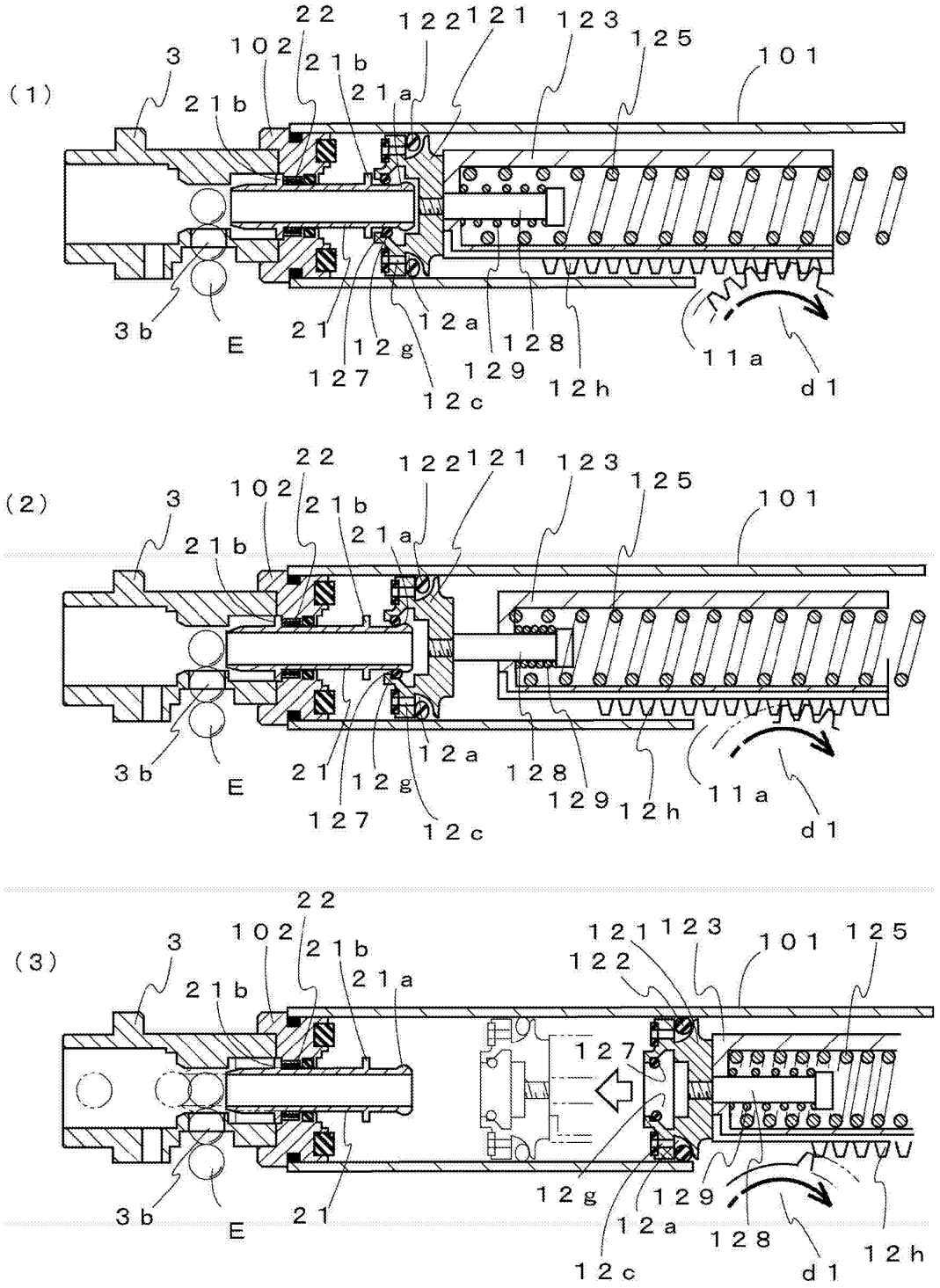
5. An air gun in which the feeder for air gun of any one of the claims 1 to 4 is mounted, and comprising a gun barrel side of the air gun body and a trigger side of the air gun body; wherein
said bullet-firing means comprises: a rack that is located on the side surface of said piston unit, and a piston spring that extends inside said piston unit and moves the piston unit forward; and
together with at least said bullet-firing means and said nozzle means being mounted in said gun barrel side so that they can be installed or removed, a trigger mechanism comprising a sector gear that engages with said rack is mounted in said trigger side; wherein

said gun barrel side and trigger side are connected so that they can be taken down.

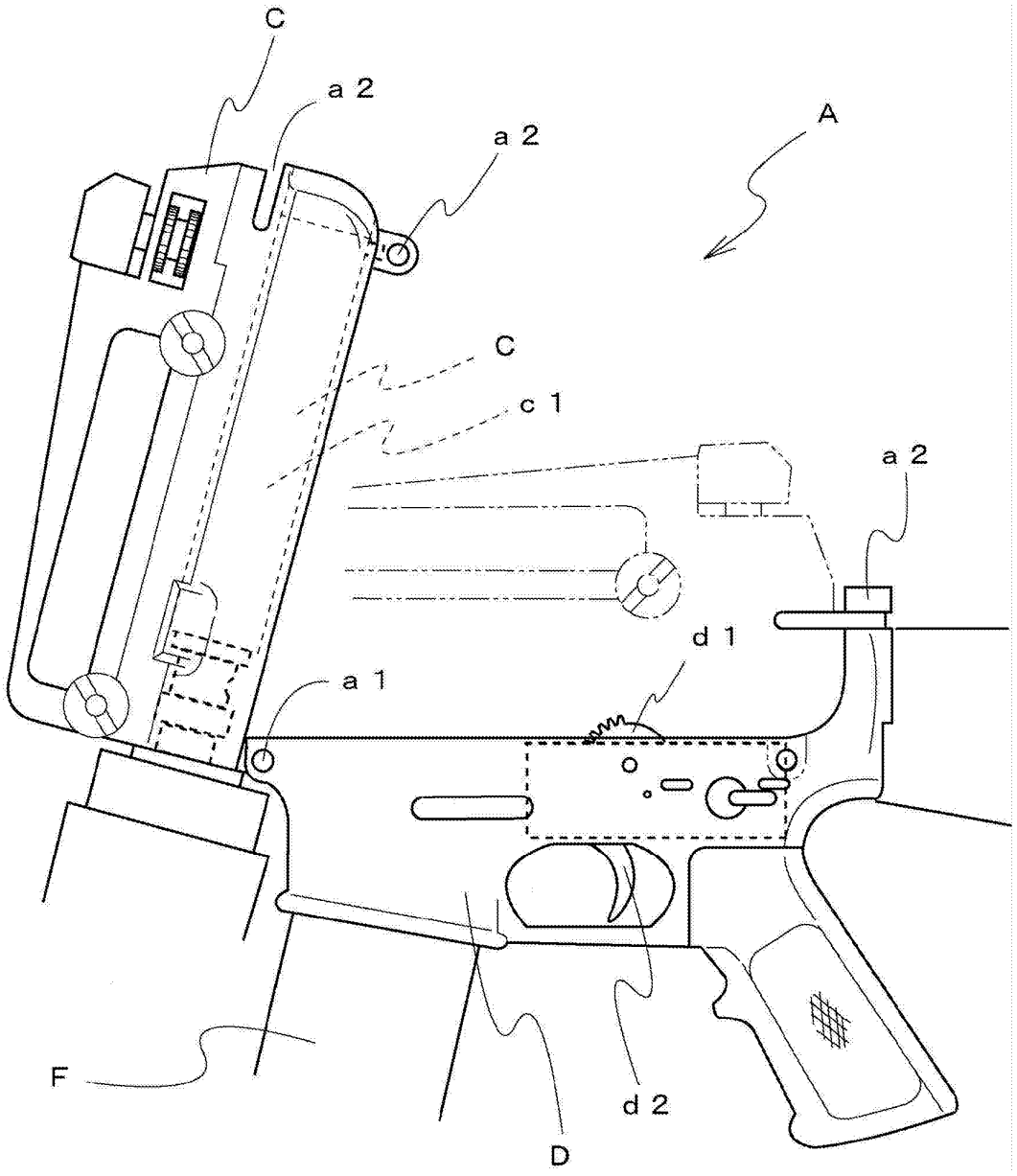
1


1
104
21a
102
12c
11
12
C
103
126
122
123
3a 105
12f
2
101
11c
11b
12e
12d
21
21b
21b
22
127
12h
12g
125
12b
3
3b
E
D
121
128 129
12a
c1
124
A
C
a2
d1
a1
c1
B
11a
D
F
d2

2


(1)
3
102
22
21b
21a
122
121
123
125
101
21b
3b
E
21
127
12g
12c
12a
129
128
12h
11a
d1
(2)
3
102
22
21b
21a
122
121
123
125
101
21b
3b
E
21
127
12g
12c
12a
128
129
12h
11a
d1
(3)
3
102
22
21b
21a
121
123
122
101
125
21b
127
3b
E
21
12g
12a
129
128
12h
12c
d1

3



Reference Codes

A Air gun

a1 Hinge section

a2 Lock unit

B Feeder for air gun

C Gun barrel side

D Trigger side

d1 Sector gear

d2 Trigger

F Magazine

E Bullet

1 Bullet firing unit

11 Cylinder

101 Cylinder body

102 Cylinder head

11b Continuous hole

12 Piston unit

121 Piston head

12g Locked section

123 Piston body

124 Joint section

12h Rack

128 Slide pin

129 Piston-head spring

2 Nozzle unit

21 Nozzle body

21a Locking section

22 Nozzle spring

3 Chamber

3b Bullet feed port

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/16224

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] F41B7/08, 11/14

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)
Int.Cl[7] F41B7/00-11/34

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

Jitsuyo Shinan Koho	1926-1996	Toroku Jitsuyo Shinan Koho	1994-2004
Kokai Jitsuyo Shinan Koho	1971-2004	Jitsuyo Shinan Toroku Koho	1996-2004

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 Y	JP 2002-168594 A (Kabushiki Kaisha KSC), 14 June, 2002 (14.06.02), Full text; all drawings (Family: none)	1,2,4 3,5
X Y	JP 6-235597 A (Kabushiki Kaisha Tokyo Marui), 23 August, 1994 (23.08.94), Full text; all drawings (Family: none)	1,2,4 3,5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 81952/1990(Laid-open No. 41990/1992) (Kabushiki Kaisha Tokyo Marui), 09 April, 1992 (09.04.92), Fig. 2 (Family: none)	5

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 January, 2004 (30.01.04)	10 February, 2004 (10.02.04)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)