A paint ball gun has a first chamber, a second chamber, a percussion member in the first chamber, an aperture communicating the chambers, a valve in the second chamber, a rear plunger at an end of the second chamber, a firing member in the second chamber and connected to the percussion member, a handle with a trigger assembly therein, and a percussion device having a base with a chamber therein, an inlet and an outlet communicating the second chamber and the rear plunger with the chamber respectively. A guiding block and a rotator are received in the chamber. The guiding block has a first and a second tunnel communicated with the inlet and the outlet respectively. The rotator has a storage chamber therein and two bores. The rotator is rotated to selectively align the bores of the rotator to the first and second tunnels of the guiding block respectively.
PAINT BALL GUN WITH AUTOMATIC PERCUSSION CONTROLLER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to a paint ball gun, and more particularly to a paint ball gun with an automatic percussion controller.

[0003] 2. Description of the Related Art

[0004] Typically, conventional paint ball guns have mechanical percussion controller and electronic percussion controller, which a mechanical or an electronic trigger drives a firing member and a percussion member for projectile. FIG. 9 shows a mechanical paint ball gun 6, which a gun body 60 has an upper and a lower channels 61 and 62 and an aperture 601 between the rails 61 and 62. The gun body 60 further has an inlet portion 602 to issue high-pressure gas to the channels 61 and 62 and a feeding portion 603 to feed paint ball into the upper channel 61. A barrel 604 is mounted on the gun body 60 and communicated with the upper channel 61 and a percussion member 63 is received in the upper channel 61.

[0005] The gun body 60 is provided with a valve 64 in the lower channel 62 associated with the aperture 601. A rear plunger 65 is received in the lower channel 62 opposite to the valve 64 and a firing member 66 is also received in the lower channel 62 between the valve 64 and the rear plunger 65. The gun body 60 further has a hole 605 communicating the channels 61 and 62. The firing member 66 is connected to the percussion member 63 via a pin running through the hole 605.

[0006] The gun body 60 has a handle 68 adjacent to the lower channel 62, in which a trigger assembly 69 is provided associated with the firing member 66 to lock and release the firing member 66. A spring 661 is mounted between the firing member 66 and the rear plunger 65 to urge the percussion member 63 forward while the firing member 66 is released. In the meantime, the firing member 66 activates the valve 64 to issue high-pressure gas into the channels 61 and 62 to project the paint ball out via the barrel 604. A part of the gas flows through the valve 64 to return the firing member 66 to lock the firing member 66 by the trigger member 69 again.

[0007] The trigger assembly 69 of the paint ball gun has a tenon 691 to lock and release the firing member 66 and to move the percussion member 63 and activate the valve 64 while the firing member 66 is released. The tenon 691 must have a stronger strength so as to resist the force the spring 661 while the tenon 691 locks the firing member 66. It is a complex process to fabricate the tenon 691, which the raw material must be processed with thermal process and then be cut. The cost of the tenon 691 is higher and that increases the cost of the paint ball gun.

[0008] The gas issued into the paint ball gun must have a sufficient pressure to move the firing member 66 and compress the spring 661. The high-pressure gas might cause danger to user and damage the gun. The gun also has to provide a stronger structure to resist the pressure of the gas that increases the cost of the gun too.

[0009] FIG. 10 shows an electronic paint ball gun, which the pressure is lower than the mechanical paint ball gun. The structure of the electronic paint ball gun is similar to that of the mechanical paint ball gun, except that a spring 861 is mounted between a firing member 86 and a valve 84 so as to urge a firing member 86 against a rear plunger 85. The trigger assembly 89 has a hose 891 connected to the rear plunger 85 and a pressure controller 87. The trigger assembly 89 opens or closes the hose 891 by an electronic way to issue gas into a lower channel 82 via the hose 891 and the rear plunger 85 to move the firing member 86 forward and activate the valve 84. And then, the gas enters an upper channel 81 to press a percussion member 83 for projectile. After the paint ball has been projected out via a barrel 88, the trigger assembly 89 closes the hose 891 to stop the gas. As a result, the firing member 86 returns to the normal position by the spring 861 and the gas between the rear plunger and the firing member 86 is exhausted.

[0010] The electronic paint ball gun has the gas with lower pressure, but the pressure of the gas still might break the connector of the hose 891. That is why the pressure controller 87 is mounted prior to the hose 891 for reduction of the pressure of the gas, but the pressure controller 87 increases the cost of the electronic paint ball gun. The trigger assembly is provided with a relay 891 to control the time of opening and closing the hose 891. It is another element which increasing the cost of the gun.

[0011] The percussion controllers of the conventional paint ball guns have a same drawback of higher cost that needs to improve.

SUMMARY OF THE INVENTION

[0012] The primary objective of the present invention is to provide a paint ball gun, which the percussion controller pre-stores gas and issues it to the rear plunger for moving the firing member. The gun of the present invention has no tenon as the conventional mechanical paint ball gun has and the hoses are received in the gun body to increase the resistance of pressure thereof, so that the gun of the present invention also has no pressure controller. The present invention still provides a controller to replace the relay of the conventional gun. These improvements can reduce the cost of the paint ball gun of the present invention.

[0013] The secondary objective of the present invention is to provide a paint ball gun, which the percussion controller thereof is applied to both of the mechanical paint ball gun and the electronic paint ball gun.

[0014] According to the objectives of the present invention, a paint ball gun comprises a first chamber, a second chamber parallel to the first chamber, a barrel connected to the first chamber, a percussion member received in the first chamber for reciprocation, an aperture communicating the first chamber and the second chamber, a valve mounted in the second chamber and at an end of the aperture, a rear plunger at an end of the second chamber for reciprocation, a firing member received in the second chamber between the rear plunger and the valve and connected to the percussion member, a spring received in the second chamber between the firing member and the valve, a handle adjacent to the second chamber, in which a trigger assembly is provided, and a percussion device mounted where the second chamber is communicated with the rear plunger. The percussion
device has a base, which has a chamber therein, an inlet communicating the second chamber with the chamber and an outlet communicating the rear plunger with the chamber, and a guiding block and a rotator are received in the chamber of the base. The guiding block has a resting end rested on a resting end of the rotator and has a first tunnel with an end open at the resting end and an end communicated with the inlet and a second tunnel with an end open at the resting end and an end communicated with the outlet and the rotator has a storage chamber therein and a first bore and a second bore with ends open at the resting ends thereof and ends communicated with the storage chamber. The rotator is rotated by a driver to selectively align the first bore of the rotator to the first tunnel of the guiding block or align the second bore of the rotator to the second tunnel of the guiding block respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a sectional view of a first preferred embodiment of the present invention;

[0016] FIG. 2 is an exploded view of the percussion controller of the first preferred embodiment of the present invention;

[0017] FIG. 3 is a sectional view of the first preferred embodiment of the present invention, showing how the high-pressure gas enters the chamber;

[0018] FIG. 4 is a sectional view of the first preferred embodiment of the present invention, showing how the gas in the chamber moves the firing member;

[0019] FIG. 5 and FIG. 5A are sectional views of a second preferred embodiment of the present invention, showing the action of the rod;

[0020] FIG. 6 is an exploded view of the percussion controller of the second preferred embodiment of the present invention;

[0021] FIG. 7 is a sectional view of the second preferred embodiment of the present invention, showing the gas entering the first channel;

[0022] FIG. 7A is a sectional view of the second preferred embodiment of the present invention, showing the gas entering the chamber;

[0023] FIG. 8 is a sectional view of the second preferred embodiment of the present invention, showing the gas entering the second channel;

[0024] FIG. 8A is a sectional view of the second preferred embodiment of the present invention, showing the gas moving the firing member;

[0025] FIG. 9 is a sectional view of the conventional mechanical paint ball gun, and

[0026] FIG. 10 is a sectional view of the conventional electronic paint ball gun.

DETAILED DESCRIPTION OF THE INVENTION

[0027] As shown in FIGS. from FIG. 1 to FIG. 4, a paint ball gun 1 of the first preferred embodiment of the present invention has a percussion controller 2 mounted at a channel of high-pressure gas entering.

[0028] The paint ball gun 1 has a first chamber 11, in which a percussion member 14 is received, and a second chamber 12 communicated with the first chamber 11 via an aperture 112. A barrel 13 is mounted to the gun 1 communicated with the first chamber 11. A valve 15 is mounted in the second chamber 12 associated with the aperture 112. A gas source 5 is provided under the second chamber 12 to issue gas to the second chamber 12. In the second chamber 12, a rear plunger 16 is provided at a rear end thereof and a firing member 17 is provided between the valve 15 and the rear plunger 16. The firing member 17 is connected to the percussion member 14. A spring 171 is provided in the second chamber 12 between the firing member 17 and the valve 15. The firing member 17 is rested on the rear plunger 16 by the force of spring 171 in a normal condition. The percussion member 14 is located at a rear end of the first chamber 11 at the normal condition to open a feeding hole 111.

[0029] The gun 1 has a handle 18 beside the second chamber 12, in which a trigger assembly 19 is provided and is associated with the firing member 17. In the present preferred embodiment, it is an electronic trigger assembly 19, which has a trigger 191, an integral circuit (IC) 192, a battery 193 and a touch switch 194 connecting the IC 192 and the trigger 192. The IC is connected to the percussion device 2 to control it.

[0030] In the present preferred embodiment, the percussion device 2 is mounted at an end of the second chamber 12 opposite to the rear plunger 161. The gun 1 has a channel 161 between the second chamber 12 and parallel to the second chamber 12. The channel 161 has an end connected to the rear plunger 16 and a check valve 162 is provided in the channel 161 beside the rear plunger 16. The channel 161 has an opposite end connected to the percussion controller 2.

[0031] The percussion controller 2 has a base 21 with a chamber 211 therein. The gun 1 has an inlet 212 connecting the chamber 211 and the percussion controller 2 and an outlet 213. A guiding block 22 and a rotator 23 is received in the chamber 211, wherein the guiding block 22 and the rotator 23 each have a resting end 221 and 231 attached on each other. The guiding block 22 has a first tunnel 212 with an end communicated with the inlet 212 and the other end open at the resting end 221, at which an O ring 224 is mounted. The guiding block 22 further has a second tunnel 223 with an end communicated with the outlet 213 and the other end open at the resting end 231. The rotator 23 has a storage chamber 232, a first bore 233 and a second bore 234. Both of the first and second bores 233 and 234 are open at the resting end 231 and an O ring is mounted on the resting end 231 associated with the second bore 234. The first bore 233 of the rotator 23 is aligned to the first tunnel 222 of the guiding block 22 at the normal condition.

[0032] A driver 24 is provided to rotate the rotator 23 to selectively align the first and second bore 233 and 234 to the first tunnel 222 or the second tunnel 223. In the present preferred embodiment, for the electronic trigger assembly 19, the driver 23 is a servomotor or a stepper motor so as to rotate the rotator 24 clockwise and counterclockwise via the IC 192 of the trigger assembly 19.

[0033] As shown in FIG. 3 and FIG. 4, while the gas source 5 issues gas into the second chamber 12, a part of the gas flows into the storage chamber 232 of the rotator 23 via
the inlet 212 of the base 21, the first tunnel 222 of the guiding block 22 and the first bore 233 of the rotator 23. And then, the trigger assembly 19 is pulled to rotate the rotator 23 by the driver 23 so as to move the first bore 233 of the rotator 23 off the first tunnel 222 of the guiding block 222, such that the bores 233 and 234 are closed to keep the gas in the storage chamber 232. While the rotator 23 is rotated to align the second bore 234 to the outlet 223 of the guiding block 222, the gas in the storage chamber 232 flows to the rear plunger 16 via the channel 161 to move the firing member 17 forward to activate the valve 15. The gas also enters the first chamber 11 via the aperture 112 to project a paint ball received in the first chamber 11 out via the barrel 13. The spring 171 returns the firing member 17 and the gas between the rear plunger 16 and the firing member 86 is exhausted via the check valve 164.

As shown in FIG. 5 to FIG. 8A, the second preferred embodiment of the present invention provides a paint ball gun 1 having a percussion controller 3 mounted in a handle 18 thereof. A mechanical trigger assembly 41 has a trigger 411. The gun 1 has a first chamber 12, a first channel 162 and a second channel 163, wherein the first channel connects the second chamber 12 and the percussion controller 3 and the second channel 163 connects a rear plunger 16 and the percussion controller 3. A check valve 164 is mounted in the second channel 163 beside the percussion controller 3.

The percussion controller 3 has a base 31 with a chamber 311 therein and an inlet 312 and an outlet 313 at opposite sides of the chamber 311. The inlet 312 connects the chamber 311 and the first channel 162 and the outlet connects the chamber 311 and the second channel 163. A guiding block 32 and a rotator 33 are received in the chamber 311. The guiding block 32 and the rotator 33 each have a resting end 321 and 331 rested on each other. The guiding block 32 has a first tunnel 322 with an end communicating with the inlet 312 and the other end open at the resting end 321. An O ring 324 is mounted at the end of the first tunnel 322 on the resting end 321 of the guiding block 32. The guiding block 32 has a second tunnel 323 with an end communicated with the outlet 313 and the other end open at the resting end 321. The rotator 33 has a storage chamber 332, a first bore 333 and a second bore 334, wherein both of the bores 333 and 334 have ends open at the resting end 331 and ends communicated with the storage chamber 332. An O ring is mounted at the end of the second bore 334 on the resting end 331 of the rotator 33. The first bore 333 of the rotator 33 is communicated with the first channel 322 of the guiding block 32 in a normal condition.

A driver 34 is provided to rotate the rotator 33 to selectively align the first and second bores 333 and 334 to the first channel 322 and the second channel 323 of the guiding block 32. In the present preferred embodiment, for the mechanical trigger assembly 41, the drive 34 has a gear 341, a rack 342 and a linkage 343. The gear 341 is mounted on the rotator 33 opposite to the resting end 331. The base 31 has a hole 314, in which the rack 342 is inserted so as to be meshed with the gear 341. The linkage 343 has opposite ends thereof pivoted on the rack 342 and the trigger 411 of the trigger assembly 41 respectively. While the trigger 411 is pulled, the rack 342 is reciprocated via the linkage 343 to rotate the gear 341, so that the rotator 33 is driven for rotation clockwise and counterclockwise.

As shown in FIG. 7 to FIG. 8A, after the gas source 5 issues gas to the second chamber 12, a part of the gas flows through the first channel 162, the inlet 312 of the base 31, the first tunnel 322 of the guiding block 32 and the first bore 333 of the rotator 33 and enters the storage chamber 332 for storage. And then, the trigger 411 of the trigger assembly 41 is pulled to rotate the rotator 33 via the driver 34 so as to move the first bore 333 of the rotator 33 off the first channel 322 of the guiding block 322 and to align the second bore 334 of the rotator 33 to outlet 323 of the guiding block 32. In this condition, the gas in the storage chamber 332 flows to the second channel 163 of the rear plunger 16 to move the firing member 17 forward and activate the valve 15 for projectile.

The present invention provides the paint ball gun pre-storing gas therein and issuing the gas to the rear plunger to move the firing member. The present invention has no tenon in the gun as the conventional mechanical paint ball gun has. The paint ball gun of the present invention has the channels, which connects the second chamber and the rear block, in the gun body that the channels have more resistance to issue the high-pressure gas without the pressure controller. The percussion device of the present invention replaces the relay of the conventional paint ball gun. All of the figures of the present invention introduce the advantage of reducing the cost thereof.

The percussion device of the present invention is applied to both of the mechanical and electronic paint ball gun.

What is claimed is:

1. A paint ball gun, comprising a first chamber, a second chamber parallel to the first chamber, a barrel connected to the first chamber, a percussion member received in the first chamber for reciprocation, an aperture communicating the first chamber and the second chamber, a valve mounted in the second chamber and at an end of the aperture, a rear plunger at an end of the second chamber for reciprocation, a firing member received in the second chamber between the rear plunger and the valve and connected to the percussion member, a spring received in the second chamber between the firing member and the valve, a handle adjacent to the second chamber, in which a trigger assembly is provided, and a percussion device mounted where the second chamber is communicated with the rear plunger;

wherein the percussion device has a base, which has a chamber therein, an inlet communicating the second chamber with the chamber and an outlet communicating the rear plunger with the chamber, and a guiding block and a rotator are received in the chamber of the base;

wherein the guiding block has a resting end rested on a resting end of the rotator and has a first tunnel with an end open at the resting end and an end communicated with the inlet and a second tunnel with an end open at the resting end and an end communicated with the outlet and the rotator has a storage chamber therein and a first bore and a second bore with ends open at the resting ends thereof and ends communicated with the storage chamber, whereby the rotator is rotated by a driver to selectively align the first bore of the rotator to...
the first tunnel of the guiding block or align the second bore of the rotator to the second tunnel of the guiding block respectively.

2. The paint ball gun as defined in claim 1, wherein the percussion device has two O rings, one of which is rested on the resting end of the guiding block and on the end of the first tunnel and the other of which is rested on the resting end of the rotator and on the end of the second bore.

3. The paint ball gun as defined in claim 1, wherein the percussion is arranged at the end of the second chamber with the rear plunger and the paint ball gun has a channel parallel to the second chamber connecting the rear plunger and the outlet of the base and a check valve mounted in the channel beside the rear plunger and the driver is mounted on an end of the rotator opposite to the resting end thereof.

4. The paint ball gun as defined in claim 3, wherein the driver is a servomotor to be controlled by the trigger assembly.

5. The paint ball gun as defined in claim 1, wherein the percussion device is mounted in the handle and the paint ball gun has a first channel and a second channel parallel to the second chamber, wherein the first channel has opposite ends connected to the second chamber and the inlet of the base of the percussion device respectively and the second channel has opposite ends connected to the rear plunger and the outlet of the base of the percussion device respectively, in which a check valve is provided beside the rear plunger, and the driver is mounted on an end of the rotator opposite to the resting end thereof.

6. The paint ball gun as defined in claim 5, wherein the driver has a gear fixed on the rotator, a rack running through a hole of the base and meshed with the gear and a linkage with ends pivoted on the rack and a trigger of the trigger assembly respectively.

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