PNEUMATIC TOY GUN FOR SHOOTING SOFT BALLS AND NOZZLE THEREFOR

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The pneumatic toy gun has a nozzle through which a soft ball travels. At one end of the nozzle there is an outlet from which the ball is expelled and at the other end there is an inlet for receipt of a stream of gas under pressure. Four or more fins are mounted within the tube and function to inhibit the use of the gun to fire balls having a diameter smaller than that of balls which are intended to be shot from the gun.
PNEUMATIC TOY GUN FOR SHOOTING SOFT BALLS AND NOZZLE THEREFORE

FIELD OF THE INVENTION

[0001] This invention relates to toy guns and more particularly to a pneumatic toy gun which shoots harmless balls from a gun of conventional design such as a paint ball gun. The toy gun is suitable for use in a game in which two or more players each have a toy gun and each is wearing a garment having an impact sensor or detector. When the impact detector or sensor is struck by a ball, it activates a display such as a light, score board and the like to record a hit.

[0002] The invention relates not only to a pneumatic toy gun but to an attachment which may be connected to other commercially available pneumatic toy guns to convert them to ones which shoot harmless balls.

BACKGROUND OF THE INVENTION

[0003] Games are well known in which players have various forms of guns for shooting each other with harmless solid objects, liquids or beams of light and for recording the number of hits for determining the winners of the games. Such games can cause disagreements among the players for various reasons such as whether a hit has occurred or where a hit took place. For example, if the only way in which a hit is detected is whether the hit is seen by the person who shoots the gun that causes the hit or by the person who feels the hit, then disagreements about whether there was or was not a hit or where a hit occurred are bound to occur. Such disagreements can spoil a game that was otherwise enjoyed by the players.

[0004] Toy guns have been designed to detect a hit in such a way that there can be no dispute about whether it occurred or not. A paint ball gun for example shoots balls which rupture on impact and spray paint over the area where the impact takes place. The presence of the paint cannot be denied nor can its location. Questions about who was hit and by whom are answered quickly and with little or no arguments. However, the consequences of a hit by a paint ball are not pleasant. The pain can permanently stain the players' clothing, enter his eyes or mouth and be very uncomfortable if it flows down his sleeves or down his neck and under his shirt.

SUMMARY OF THE INVENTION

[0005] I have invented a toy gun which shoots harmless balls from a gun of conventional design such as a paint ball gun or from a gun which is specifically designed for the purpose. The ball is composed of soft foam rubber or like soft material so that it does no harm to the person who is hit by it. The toy gun may be composed of a gun of conventional design such as a paint ball gun in which a nozzle of my design is substituted for the barrel of the paint ball gun. The toy gun may be used in a game in which the players each has one such gun and each wears a garment with an impact detector or sensor. When a ball hits the impact detector or sensor, the hit is displayed in such a way that there can be no dispute about whether it occurred or not. Finally, there is no trace of the hit on the person who was hit, the only evidence of it is on the display.

[0006] Briefly, the toy gun of my invention has a nozzle provided with an outlet defined by an annular wall. The outlet is adapted to receive an impellable ball having a flexible outer wall and a diameter slightly greater than that of the outlet such that the ball sealingly engages the annular wall when pressed into contact with it. The toy gun has a conduit through which compressed gas flows. The conduit extends to an inlet of the nozzle. The inlet has a diameter less than that of the outlet. A valve controls the flow of compressed gas through the conduit. A trigger causes the valve to open with resulting flow of compressed gas to the nozzle for causing ball to be impelled from the outlet. At least one fin is disposed within the nozzle for both spacing a smaller ball than the impellable ball apart from the inlet and for diverting a substantial portion of compressed gas issuing from the inlet away from the smaller ball.

DESCRIPTION OF THE DRAWINGS

[0007] The invention is described with reference to the accompanying drawings in which:

[0008] FIG. 1 is an elevation of a known paint ball gun;

[0009] FIG. 2 is an elevation of the paint ball gun of FIG. 1 in which the nozzle of the invention has been substituted for the barrel of the gun;

[0010] FIG. 3 is an elevation of the nozzle from a side;

[0011] FIG. 4 is an elevation of the nozzle from an end;

[0012] FIG. 5 is a perspective view of the nozzle;

[0013] FIG. 6 is a section of the nozzle;

[0014] FIG. 7 is an elevation of a conventional sponge rubber ball;

[0015] FIG. 8 is an elevation of the ball in conjunction of the nozzle of the invention; and

[0016] FIGS. 9 and 10 are elevations of two embodiments of the rest of the invention.

[0017] Like reference characters refer to like parts throughout the description of the drawings.

DESCRIPTION OF PREFERRED EMBODIMENT

[0018] With reference to FIG. 1, a toy gun, generally 10, is used to shoot paint balls and is typical of such guns. The toy gun is not the subject of the present invention. Paint balls are stored in a magazine (not illustrated) and are fed into the breech formed in the housing 14 of the gun through a feed tube 16. A passageway is formed in the housing which extends from the breech to the bore of the barrel 18. The barrel is removably attached to the housing by threads on its outer wall which mate with threads formed on the wall which defines the passageway in the housing.

[0019] A gas cylinder 20 containing carbon dioxide or air under pressure is attached to the bottom of the handle 22 of the toy gun. Gas from the cylinder flows through a hose 24 to an elbow 26 at the bottom of a hand grip 28 and from there flows through a tube in the hand grip to a compressed gas chamber 30 for holding the volume of gas necessary for each firing of the gun.

[0020] When the trigger 32 of the gun is pulled, one paint ball in the breech of the gun is driven by the compressed gas through the passageway in the housing and through barrel 18 and discharges through the open end of the barrel.

[0021] In FIG. 2, the barrel of the gun has been removed by unwinding it from housing 14 of the toy gun and has been replaced by the nozzle 40 of the invention. The nozzle is illustrated in more detail in FIGS. 3 to 6. With reference first to FIGS. 3, 5 and 6, the nozzle has a hollow cylindrical wall 44 which is open at an outlet 46 and is partially closed at the other end 48 by an annular end wall 48a. Attached to the end wall is a cylindrical connector 50 having a longitudinal axis which is coaxial with the longitudinal axis of the cylindrical wall of the nozzle. The two axes are identified as 50-50.
The diameter of the inlet 51 and the inside passageway 52 of the connector is smaller than that of the inner passageway 54 of the cylindrical wall. The two passageways 52, 54 are in fluid-flow communication with each other. The outer wall 56 of the connector is threaded for mating with the threads of the housing. The latter threads serve to connect the barrel of the gun to the housing.

With reference to FIGS. 4 and 6, mounted within the cylindrical wall of the nozzle is a number of fins or prongs 60. The fins extend radially outward from the annular wall 62 which defines the inside passageway 52 of connector 50. Each fin is integral with end wall 48 of the nozzle and has an inner edge 66 which converges with like edges of the remaining fins. The outer edges 68 of the fins narrow toward their downstream ends. Each fin is spaced apart from the adjacent fins throughout its length.

The fins are constructed and oriented such as to cause a laminar flow of pressurized gas through the nozzle. The fins have however another purpose which is to inhibit a toy gun equipped with the nozzle from being used to fire balls which are smaller than those intended to be shot from the gun. For example paint balls which are smaller than the intended balls travel only a short distance when shot from the gun. To this end, the inside edges of the fins converge as indicated above so that a paint ball cannot be pushed into the passageway 52 of the connector and fired from there. If a paint ball is pushed against the downstream ends 70 of the fins in order to harness the force of pressurized gas flowing straight downstream from the connector, a substantial proportion of the pressurized gas will flow not against the ball but radially outwardly through the space between the fins and a relatively little of the gas will flow against the ball. The fins accordingly function to divert compressed gas issuing from the connector away from a small ball and not against it.

With reference to FIGS. 7 and 8, ball 74 which the toy gun is designed to shoot when equipped with the nozzle of the invention is about the size of a golf ball. Foam rubber balls having a diameter of about 5 cm. are suitable and are widely available. If such balls are used, the diameter of the inner passageway or bore 54 of the nozzle should be about 4.7 cm.

The ball is sometimes referred to below and throughout the claims as an "impellable ball" since it is impelled by compressed air from the nozzle of the toy gun. The ball should be composed of light weight, soft material. The core of the ball need not be soft but preferably is since harder material tends to weigh more than soft material and acts to slow the speed of the ball. Softness and light weight are preferred attributes of the ball since the purpose of the game which is played with the toy gun and ball involves shooting balls at players. Obviously the game will not be enjoyable if players are hurt or injured by the balls.

With reference to FIG. 8, loading of the ball involves pushing it inward into the fully open end or outlet 46 of the nozzle in order to sealingly engage the ball to the outlet. The diameter of the annular wall which defines the outlet should be slightly less than the diameter of the ball so that the ball will stay put in the nozzle when it is pushed against it. The ball should remain attached to the nozzle no matter how the toy gun is held and should only disengage from the outlet out when the ball is subjected to a blast of compressed gas.

With reference to FIG. 9, a vest 80 is adapted to be worn over the chest of a player of the game played with the toy gun of the invention. The vest is equipped with a conventional impact detector 82, a belt 84 for holding the vest to the body of the player, lights 86a, b in the shoulder areas of the vest, a pouch 88 for extra gas cylinders of CO2 or air and a pouch 90 for batteries and a radio transmitter.

A more simplified vest is illustrated in FIG. 10. In that drawing, vest 92 provided with lights 94a, b, an impact sensor 96, pouches 98 for balls and a belt 100 to which the pouches for balls are attached. However, pouches for batteries, radio transmitter and gas cylinders are dispensed with in vest 92.

When the impact indicators are struck by a ball, they activate lights 86a, b and 94a, b on the vests and also, with respect to vest 80, a display (not illustrated) remote from the vest. The display indicates the number of hits and also the identity of the player whose ball struck impact indicator 82. The display can also be on vest 80 itself or on a scoreboard.

The scoreboard is preferably separate from vest 80 and is activated by radio signals from the radio transmitter which in turn is activated by impact indicator 82. The scoreboard accordingly indicates the number of hits on vest 80 and the source of each hit. The scoreboard can also have a timer for recording the time when the hits occurred and for timing the length of each game.

There are a number of impact indicators which are suitable for detecting and communicating hits on a vest. U.S. Pat. No. 5,692,607 to Ramsay et al., U.S. Pat. No. 5,757,579 to Ayres and U.S. Pat. No. 4,440,400 to Neuberger all describe impact indicators which are suitable for this purpose.

It will be understood, of course, that modifications can be made in the nozzle and vests of the invention without departing from the scope and purview of the invention as defined in the appended claims.

1 claim:

1. A pneumatic toy gun including: a nozzle having an outlet defined by an annular wall, said outlet being adapted to receive an impellable ball having a flexible outer wall and a diameter slightly greater than that of said outlet such that said impellable ball sealingly engages said annular wall when pressed into contact therewith; a conduit through which compressed gas flows, said conduit extending to an inlet of said nozzle, said inlet having a diameter less than that of said outlet; a valve for controlling the flow of compressed gas through said conduit; a trigger for causing said valve to open with resulting flow of said compressed gas to said nozzle for causing said impellable ball to be impelled from said outlet; and at least one fin disposed within said nozzle for both spacing a smaller ball than said impellable ball apart from said inlet and for diverting a substantial portion of compressed air issuing from said inlet away from said smaller ball.

2. The pneumatic toy gun of claim 1 further including a chamber for compressed gas, said conduit extending from said chamber to said nozzle.

3. The pneumatic toy gun of claim 1 wherein said one fin and a plurality of other like fins are arrayed around said inlet and converge downstream of said compressed gas flow within said nozzle, said fins terminating short of said outlet and remaining spaced apart from each other throughout their lengths such that a portion of compressed air issuing from said inlet flows between said fins.

4. The combination of claim 1 further including a vest adapted to be worn by a player of game played with said pneumatic toy gun, said vest being equipped with an impact detector.
5. The combination of claim 4 further including at least one light which illuminates when said impact detector detects an impact thereon by said impellable ball.

6. In combination, a pneumatic toy gun and an impellable ball, said pneumatic toy gun including: a nozzle having an outlet defined by an annular wall, said outlet being adapted to receive said impellable ball, said impellable ball having a flexible outer wall and a diameter slightly greater than that of said outlet such that said impellable ball sealingly engages said annular wall when pressed into contact therewith; a conduit through which compressed gas flows, said conduit extending to an inlet of said nozzle, said inlet having a diameter less than that of said outlet; a valve for controlling the flow of compressed gas through said conduit; a trigger for causing said valve to open with resulting flow of said compressed gas to said nozzle for causing said impellable ball to be impelled from said outlet; and at least one fin disposed within said nozzle for both spacing a smaller ball than said impellable ball apart from said inlet and for diverting a substantial portion of compressed air issuing from said inlet away from said smaller ball.

7. The pneumatic toy gun of claim 6 further including a chamber for compressed gas, said conduit extending from said chamber to said nozzle.

8. The pneumatic toy gun of claim 6 wherein said one fin and a plurality of other like fins are arrayed around said inlet and converge downstream of said compressed gas flow within said nozzle, said fins terminating short of said outlet and remaining spaced apart from each other throughout their lengths such that a portion of compressed air issuing from said inlet flows between said fins.

9. The combination of claim 6 further including a vest adapted to be worn by a player of game played with said pneumatic toy gun, said vest being equipped with an impact detector.

10. The combination of claim 9 further including at least one light which illuminates when said impact detector detects an impact thereon by said impellable ball.

11. For use in conjunction with a pneumatic toy gun, a nozzle comprising: an outlet defined by an annular wall, said outlet being adapted to receive an impellable ball having a flexible outer wall and a diameter slightly greater than that of said outlet such that said impellable ball sealingly engages said annular wall when pressed into contact therewith; an inlet through which compressed gas enters said nozzle; and at least one fin disposed within said nozzle for both spacing a smaller ball than said impellable ball apart from said inlet and for diverting a substantial portion of compressed air issuing from said inlet away from said smaller ball.

12. The pneumatic toy gun of claim 11 further including a chamber for compressed gas, said conduit extending from said chamber to said nozzle.

13. The pneumatic toy gun of claim 11 wherein said one fin and a plurality of other like fins are arrayed around said inlet and converge downstream of said compressed gas flow within said nozzle, said fins terminating short of said outlet and remaining spaced apart from each other throughout their lengths such that a portion of compressed air issuing from said inlet flows between said fins.

14. The combination of claim 11 further including a vest adapted to be worn by a player of game played with said pneumatic toy gun, said vest being equipped with an impact detector.

15. The combination of claim 14 further including at least one light which illuminates when said impact detector detects an impact thereon by said impellable ball.

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