ABSTRACT

A toy water gun with a housing and a water tank located thereon is provided. An electric pump located on the housing forces compressed air into the water tank to provide a motive force for releasing water under pressure from the water gun. The water tank includes an outlet connected via an avenue of release to a nozzle. A valve is located along the avenue of release and is connected to a trigger so that upon actuation of the trigger by a user, the valve is opened and water under pressure from within the tank travels through the avenue of release and the valve and exits the water gun through the nozzle.
BATTERY OPERATED WATER GUN WITH ELECTRONIC POWER METER

CROSS REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of U.S. provisional application No. 60/454,910 filed on Mar. 14, 2003, which is incorporates by reference as if fully set forth.

BACKGROUND

[0002] The present invention is directed to a toy water gun, and more particularly to a water gun having a water storage reservoir that is pressurized with compressed air. The pressurized water is selectively released from the reservoir through a nozzle in a narrow stream.

[0003] The water gun industry is competitive, and a number of pressurized guns have been successfully introduced to the market. The majority of these water guns use a hand pump connected to the gun that forces compressed air into the water tank. A trigger selectively releases the pressurized water. The trigger is connected to a pinch tube release mechanism or a cup valve that can be snapped open.

[0004] Further improvements upon these types of water guns have included pressurizing the water guns using a charging mechanism connected to a pressurized water source, such as a water spigot or garden hose. However, a problem with all of these known water guns is that their use is limited to older children or adults having sufficient strength to either hand pump the water gun in order to pressurize the tank or hold the water gun charging mechanism against the water system pressure so that they can be charged with pressurized water. This is often difficult if not impossible for small children and/or people with limited strength or dexterity.

SUMMARY

[0005] The present invention is directed to an air-pressurized water gun comprising a housing having a water tank mounted thereon; an air pump mounted on the housing and in fluid communication with the tank; a battery connected to the housing and in electrical communication with the pump; actuation means for providing power from the battery to the pump such that compressed air is transferred from the pump into the tank; and an avenue of release between the tank and a nozzle, with a selectively actuatable valve located along the avenue of release to allow the discharge of pressurized fluid from within the tank.

[0006] In the preferred embodiment, a pressure sensor is connected to the tank and senses the pressure within the tank. Preferably, an electronic visual indicator is provided to show a user the level of pressure within the tank. In the preferred embodiment, this is provided via a series of colored LED's, indicating a pressure charge level.

[0007] Preferably, a second actuator switch is provided on the water gun housing that activates the pump. Preferably, once the pump has been activated, it continues to run until a desired pressure level is built-up within the tank. The pump is then automatically turned off.

BRIEF DESCRIPTION OF THE DRAWING(S)

[0008] The invention will be more fully understood when viewed in conjunction with the attached drawings. In the drawings:

[0009] FIG. 1 is a right-side elevational view of a water gun in accordance with the present invention; and

[0010] FIG. 2 is a left-side elevational view shown with the housing partially broken away to illustrate the inner mechanisms of the water gun.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0011] Referring to FIG. 1, a water gun in accordance with the present invention is shown. The water gun 10 includes a housing 12 having a handle 14 that can be gripped by a user. A water tank 16 is connected to the housing and includes an external fill port 18 that is closed with a cap 20. A nozzle 22 is located at a front end of the housing 12 from which water is ejected. A trigger 24, located adjacent to the handle 14, is used to selectively release water from the water gun 10.

[0012] In contrast with the prior known water guns, the water gun 10 includes a powered air pump 30 mounted thereon. The pump 30 is preferably a piston or diaphragm pump driven via an electric motor (not separately shown). A battery pack 32 is connected to the housing, which holds batteries for providing power to the pump 30 below the handle 14 preferably below the handle 14 and arranged so that the weight of the batteries is distributed to maintain balance by being wider than the handle 14. A pump actuator switch 34 is also located on the housing 12 preferably adjacent to the handle 14. The pump actuator switch 34 turns the pump 30 on so that air is drawn from outside the water gun and pumped into the tank 16 such that water in the tank 16 is placed under pressure.

[0013] Preferably, a master on-off switch 14 is mounted to the housing 12, which can be used to cut off electric power to all of the water gun systems.

[0014] An electronic power meter 40 located on the housing includes a plurality of lights, preferably of different colored LED's, that show a pressure level within the tank 16. The lights 42 change colors with changes in pressure within the tank 16. In the preferred embodiment, upon actuation of the switch 34, power is provided to the pump 30, which continues to pump air into the tank 16 until a desired pressure limit is reached, preferably about 40 psi, whereby the pump is deactivated. The charge (pressure) level within the tank 16 is indicated as low by a red light 42, intermediate by a yellow light 42, and fully pressurized by a green light 42.

[0015] Pressing the trigger 24 ejects water from the tank 16 through the nozzle. The pump 30 can also be actuated while the trigger 24 is pressed so that the pressure in the tank 16 is depleted less rapidly.

[0016] FIG. 2 shows the inner mechanisms of the water gun 10 in detail. The air pump 30 is connected to the tank 16 via a first passageway 52 connected to a pressurizing inlet 54 on the water tank 16. The water tank 16 includes an outlet 56 connected to a second passageway 58 to the nozzle 22. A manually actuable valve 60 is located along the passageway 58. The valve 60 includes an actuator rod 62 connected via a linkage 64 to the trigger 24. The trigger 24 selectively opens the valve 60 so that pressurized water from within the tank 16 is discharged through the second passageway 58 and out the nozzle 22. The valve 60 is preferably a ball valve. However, other suitable types of valves may be used.
In order to pressurize the tank 16, the pump 30 is actuated by first turning the master switch 14 to “on.” The master switch 14 is connected in series with the batteries 33 located within the battery compartment 32 and the electrical systems in the water gun 10. With the master switch 14 in the on position, upon actuating the lever 34, a pump actuation switch 70 turns on the power to the pump 30 and the electronic power meter 40. The pump 30, which is preferably a small electric motor driven pump, draws air from outside the tank 16 and pressurizes the tank 16 via the first passageway 52. Preferably, a pressure sensor 72 is connected to the passageway 52 or is otherwise in full communication with the tank 16 in order to sense the pressure within the tank 16. The sensor 72 may be a mechanically actuated diaphragm or an electronic pressure transducer that senses the pressure within the tank 16. Based upon the pressure, different lights 42 on the electronic power meter 40 are lit in order to indicate the pressure level within the tank between various states indicating unchanged, half-charged and fully charged. Preferably, a check valve 74 located between the pump 30 and the tank 16 somewhere along the passageway 52 to prevent a backflow of water from within the tank 16 to the pump 30.

Upon actuation of the switch 70, the pump 30 continues to run until a maximum pressure is reached. This pressure is sensed by the pressure sensor 72 or an internal sensor within the pump 30 so that the tank 16 is not over pressurized.

Once the water within the tank 16 is pressurized with air from the pump 30 to a maximum pressure level, the pump 30 stops and the electronic power meter 40 indicates that a fully charged state has been reached, preferably by showing a green light. Manually pulling the trigger 24 opens the valve 60 such that pressurized water within the tank 16 is allowed to flow through the second passageway 58 and out through the nozzle 22.

The water gun 10 is advantageous because manual pumping or holding the water gun against a high pressure water source is not required; these are often difficult for smaller children and those with impaired strength and/or dexterity. Thus, the water gun 10 can be used by children of most ages or by others with impaired strength and/or dexterity, which often makes it difficult to use and enjoy the known air-pressurized water guns.

While the present invention has been described in a preferred embodiment, the invention is not limited to the specific embodiment described, which should be considered as merely exemplary. Further modifications and extensions of the present invention may be developed, and all such modifications are deemed to be within the scope of the present invention as defined by the appended claims.

What is claimed is:

1. An air-pressurized water gun comprising:
   a housing having a water tank mounted thereon;
   an air pump mounted on the housing and in fluid communication with the tank;
   a battery connected to the housing and in electrical communication with the pump;
   actuation means for providing power from the battery to the pump such that compressed air is transferred from the pump into the tank; and
   an avenue of release between the tank and a nozzle, with a selectively actuable valve located along the avenue of release to allow the discharge of pressurized fluid from within the tank.

2. The water gun of claim 1, further comprising a manually operable trigger attached to the housing that actuates the selectively actuable valve.

3. The water gun of claim 2, further comprising a linkage that connects the trigger to the selectively actuable valve, wherein when the trigger is moved in a first direction, the trigger moves the linkage in a first trigger direction that opens the selectively actuable valve.

4. The water gun of claim 3, wherein when the trigger is moved in a second direction, the trigger moves the linkage in a second trigger direction that closes the manually actuable valve.

5. The water gun of claim 1, wherein the actuation means is a switch operated by a trigger attached to the housing.

6. The water gun of claim 1, further comprising a pressure sensor that measures pressure within the tank.

7. The water gun of claim 6, wherein when the pressure within the tank reaches a predetermined level, the air pump is deactivated.

8. The water gun of claim 6, further comprising a pressure meter attached to the housing that indicates pressure within the tank.

9. The water gun of claim 8, wherein the pressure meter indicates pressure within the tank using multi-colored light emitting diodes.

10. The water gun of claim 8, wherein the pressure meter indicates pressure within the tank using multiple light emitting diodes wherein an increased number of lighted diodes indicate more pressure in the tank.

11. The water gun of claim 1, further comprising a manually operated master switch having an on state that allows the pump to operate and an off state that prevents the pump from operating.

12. The water gun of claim 1, further comprising a battery holder attached to the housing that holds the batteries, the battery holder being located below, and being wider than, a handle attached to the housing.

13. An air pressurized water gun comprising:
   a housing having a tank for containing a fluid mounted thereon; and
   a pressure meter that indicates a relative pressure within the tank.

14. The water gun of claim 13, wherein the pressure meter comprises multicolored light emitting diodes, and different combinations of colors indicate the relative pressure within the tank.

15. The water gun of claim 13, wherein the pressure meter comprises a plurality of light emitting diodes wherein the number of light emitting diodes illuminated corresponds to the pressure within the tank.

16. An air pressurized water gun comprising:
   a tank attached to a housing, the tank having i) a first outlet in fluid communication with a first passage that is also in fluid communication with a nozzle; and ii) a
second outlet in fluid communication with a second passage that is also in communication with a pump; the pump being activatable by electricity from a battery contained within the housing, and when activated, the pump draws ambient air and pumps said air into the tank through the second passage; and a valve in the second passage that is selectively openable to release fluid from the tank through the valve and through the nozzle.

17. The water gun of claim 16, wherein the valve is opened when a trigger connected to the valve is moved.
18. The water gun of claim 16, further comprising a pressure sensor that measures pressure within the tank.
19. The water gun of claim 18, further comprising a pressure meter attached to the housing that indicates pressure within the tank.

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