

June 26, 1962

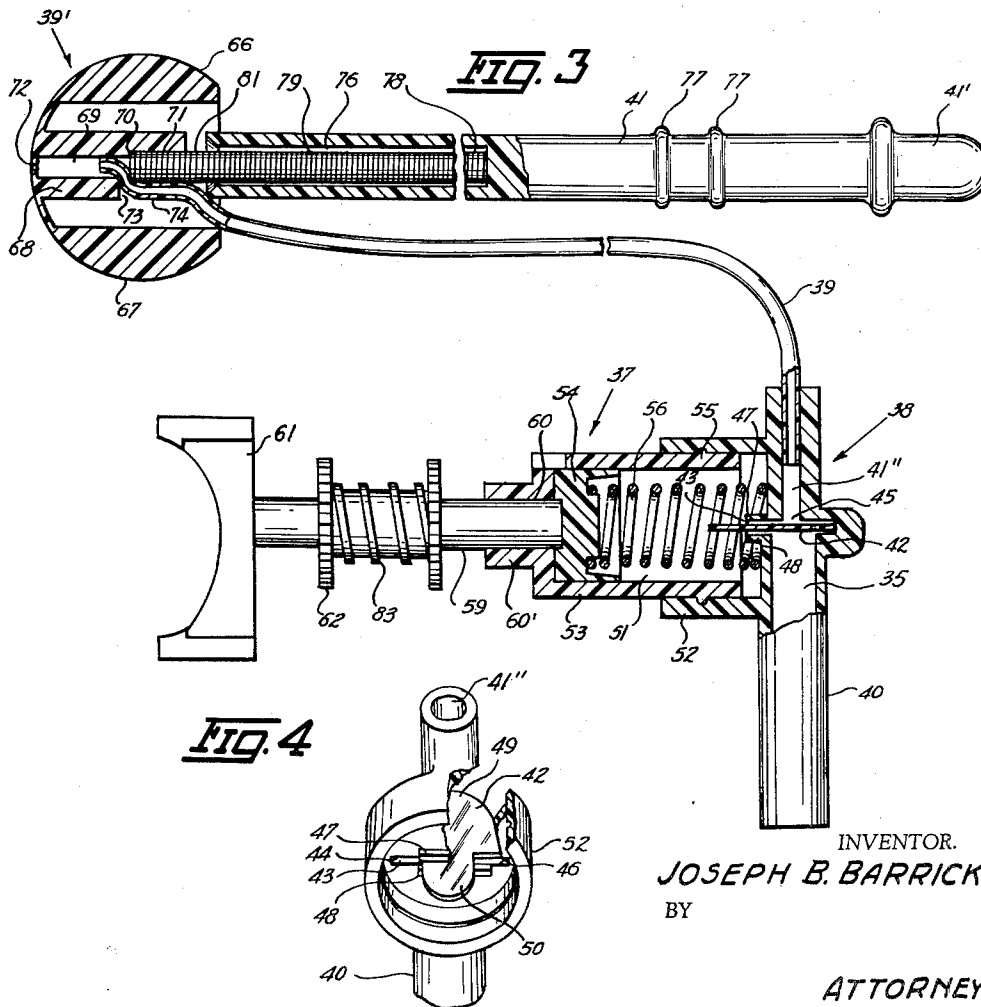
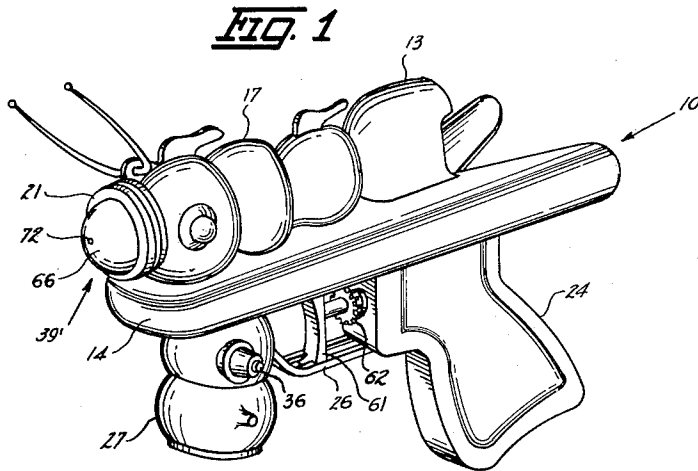
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TOY LIQUID EJECTING PISTOL

Filed Jan. 8, 1960

2 Sheets-Sheet 1



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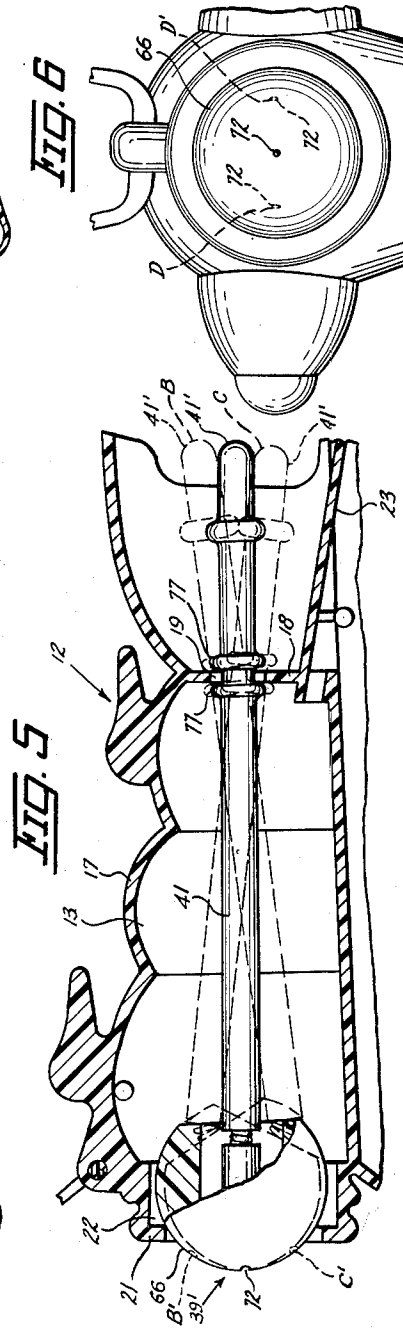
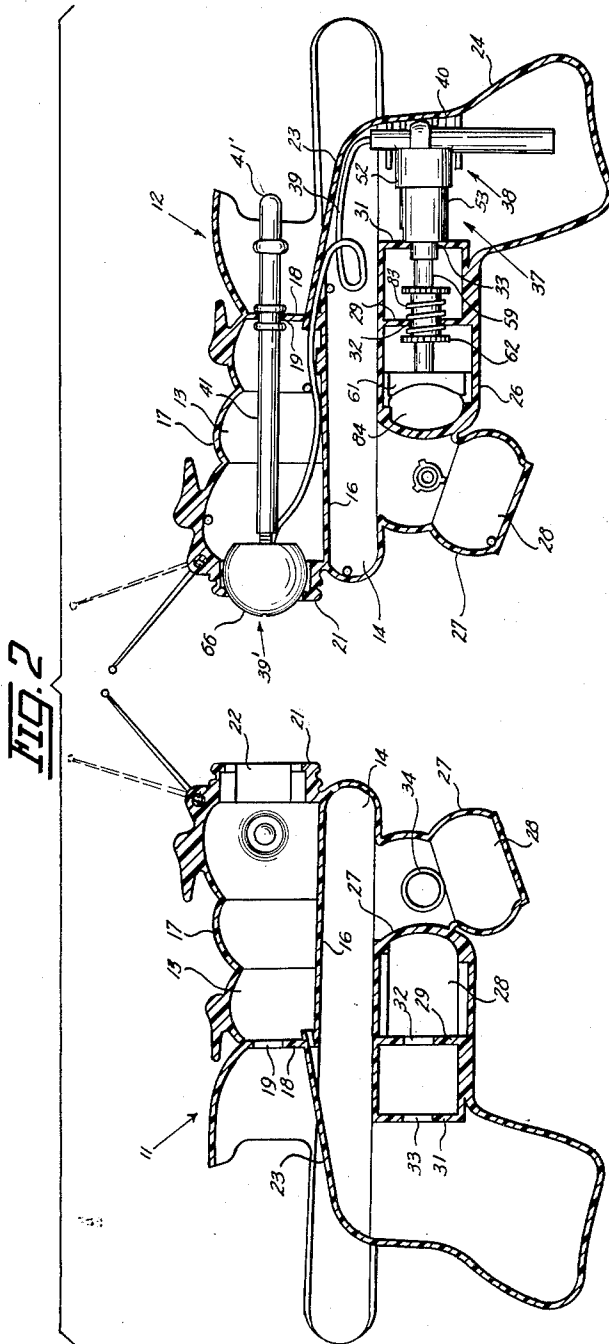
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TOY LIQUID EJECTING PISTOL

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3 Claims. (Cl. 222-79)

This invention relates generally to toy pistols or water guns for ejecting water or other fluid under pressure and in particular to a pistol of this type having an adjustable nozzle unit which is manually movable to provide for the ejection of water in a selected direction from the pistol.

Water pistols generally include a barrel and a hand grip, with a stationary nozzle in the forward end or muzzle of the barrel adapted to eject liquid axially of the barrel, in response to the actuation of a hand operated piston-type pump carried in the hand grip and suitably connected with the nozzle and a water reservoir formed in the hand grip. The fluid discharge is thus always in the same direction and the duration and length of the discharge is set by the capacity of the pump and the stroke of its piston.

An object of this invention is to provide an improved toy water pistol.

A further object of this invention is to provide a toy water pistol wherein a muzzle supported nozzle unit having a discharge opening, is manually revolved by a control projected rearwardly from the barrel to vary the discharge of fluid from the opening in a plurality of directions inclined relative to the axis of the barrel.

Another object of this invention is to provide a toy water pistol wherein a nozzle unit is adjustable to direct a discharge of fluid in a direction different from the direction in which the muzzle of the pistol is pointed.

A further object of this invention is to provide a toy water pistol having a piston operated type pump wherein the piston stroke is adjustable to vary the length of the water stream ejected by the pistol.

Yet another object of this invention is to provide a toy water pistol having a piston operated type pump in which a diaphragm valve member is utilized to control the intake of water to and the discharge of water from, the pump.

Still a further object of this invention is to provide a toy water pistol of a simple construction, efficient in operation, and provided with a reserve water reservoir to give a prolonged continuous operation.

These and other objects and features of this invention will become readily apparent upon reference to the following description, when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of one embodiment of the toy water pistol of this invention;

FIG. 2 is a composite view in side elevation of the two halves of the pistol shell, showing their interiors and with components of the pistol arranged therein;

FIG. 3 is an enlarged detail elevation view, with some parts broken away and other parts shown in section, illustrating the pump unit and nozzle assembly of the pistol of this invention;

FIG. 4 is an enlarged, perspective view of a portion of the pump unit, with some parts broken away and others shown in section for purposes of clarity;

FIG. 5 is an enlarged detail side elevational view of the interior of one shell half, showing the nozzle unit and a control therefor in changed positions, with some parts broken away and others shown in section for the purpose of clarity; and

FIG. 6 is an enlarged, fragmentary front elevational view of the muzzle supported nozzle unit, showing the

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discharge opening therein in transversely moved positions.

Referring now to the drawings, the toy water pistol of this invention includes a hollow shell or body member, indicated generally at 10 in FIG. 1, comprised of two substantially identical halves 11 and 12 (FIG. 2). From FIG. 1, it is seen that the pistol 10 has the general appearance of a bug, such as a beetle or other like bug.

Each shell half 11 and 12 (FIG. 2) is divided generally into an upper portion which shall be termed the barrel 13 and a lower portion which shall be termed the water reservoir or compartment 14. A fluid-tight seal is provided between the barrel 13 and the water compartment 14 by an intermediate wall 16, the walls 16 of the halves 11 and 12 being in mating engagement on assembly of the half sections 11 and 12. Describing the body member 10 as assembled (FIGS. 1 and 2) the barrel 13 is further defined by an irregular top wall 17, a rear wall 18 having a circular opening 19 formed therein, and a muzzle 21 at the front thereof. A circular socket-type opening 22 is formed in the muzzle 21.

The water compartment 14 (FIG. 2), in addition to the intermediate wall 16, is further defined by a wall 23 defining a hand grip 24 (FIG. 1) for the pistol, a trigger wall 26, and an irregular barrel-shaped wall 27 defining an auxiliary water reservoir 28. A pair of longitudinally spaced, vertically extended walls 29 and 31 having axially aligned circular openings 32 and 33 are formed within the water compartment 14, for a purpose hereinafter defined. A fill opening 34 (FIG. 2) formed in the shell half section 11, is closed by a plug 36 (FIG. 1).

Arranged within the hand grip portion 24 and in the water compartment 14 is a pump unit 37 (FIG. 2) which is operated by a trigger-actuated, adjustable piston 54 for delivering water through a conduit 39 to a nozzle unit 39'. The latter is revolvably mounted in the socket opening 22 of the muzzle 21, and revolved or moved by an elongated control or operating member 41 mounted in and extended longitudinally of the barrel 13 and having an actuator portion 41' projected externally of the barrel 13 through the rear wall opening 19.

The pump unit 37 (FIGS. 3 and 4) includes a valve unit 38 having a body member 40 formed with a large intake passage or bore 35 and a discharge passage 41' of smaller bore axially aligned with the intake bore 35. The passages 35 and 41' at their junction 45 are separated by a circular diaphragm valve 42 inserted through a rectangular slot 43 formed in the body member 40 normal to the axes of the passages at the junction 45. The side walls 44 and 46 of the slot 43 terminate, respectively, in protruding lips 47 and 48 with the diaphragm 42 being insertable into the slot 43 between the lips 47 and 48 and across the passages 35 and 41' at the junction 45.

As best shown in FIG. 4 the diaphragm 42 is of a flat irregular shape formed with a substantially semi-circular main section 49 and a tongue section 50. In assembly the main section 49 extends across the passages 35 and 41' at their junction 45, so that the tongue section 50 projects outwardly from between the lips 47 and 48, and into a cylinder chamber 51 formed by a circular sleeve 52 and a cylinder 53. The sleeve 52 is integral with and projects at a right angle from the elongated body member 40 and is positioned about the cylinder end 55 in a fluid-tight snap fit therewith. As a result the diaphragm valve 42 lies in the axial plane of the cylinder 53. A piston 54 for the cylinder 53 is biased away from the cylinder end 55 by a coil spring 56 located within the cylinder 53 and arranged in compression between the piston 54 and the body member 40 at the recess or slot 43. It is seen therefore that the slot 43 constitutes a fluid connection between the cylinder chamber 51 and the passages 35 and 41'. The lips 47 and 48 on the side

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walls 44 and 46, respectively, of the slot 43 center the spring 56 at the cylinder end 55. It will also be seen that the spring 56 is engageable with the diaphragm valve section 49 whereby to maintain the diaphragm within the slot 43.

The piston 54 is engageable with a rod 59 (FIG. 3) extended through an opening 60 formed in the closed end 60' of the cylinder 53. A trigger 61 is mounted on the projected end of the rod 59 which carries an adjusting knob 62 having external threads 63 and located between the trigger 61 and the cylinder end 60', for a purpose to be later described.

The nozzle unit 39' (FIG. 3) includes a dome-shaped member 66 having a smooth outer surface 67 and a hollow interior with the exception of a tubular fluid passage member 68. The member 68 is formed with passages 69 and 71 of different diameters to form a shoulder 70, and with the passage 69 terminating in a discharge opening 72 open to the exterior surface 67 of the member 66. A slot 73 formed in the side wall of the tubular member 68 receives the delivery or outlet end 74 of the supply conduit 39.

As best appears in FIG. 2, in the assembly of the pistol, the nozzle body member 66 is positioned within the muzzle socket 22 so as to be revolvably movable within the muzzle, whereby to move the nozzle discharge opening 72 in directions transversely of the barrel 17. This movement of the body member is accomplished by means including the operating member 41 (FIG. 3) having a bore 76 at its forward end and a pair of longitudinally spaced integrally formed beads or collars 77 spaced from its rear end or actuator portion 41'. The member 41, prior to the placing together of the pistol half sections 11 and 12, is extended longitudinally within the barrel 17 with that portion thereof located between the collars 77, positioned within the barrel rear wall 18 (FIG. 2). As a result the member 41 is maintained against longitudinal movement by the engagement of the collars 77 with opposite sides of the rear wall 18 while being supported for tiltable movement on the rear wall at the opening 19.

Inserted within the bore 76 of the operating member 41 is one end 78 of a closely wound coil spring 79 (FIG. 3). The other end 81 of the spring 79 is insertable within the bore 71 of the tubular member 68 whereby to constitute a flexible connection between the member 66 and the operating member 41. In assembly the end 74 of the flexible conduit 39 is initially inserted within the bore 69 of the tubular member 68, at the slot 73 after which the spring end 81 is inserted within the bore 71 to a position against the conduit 39 limited by the shoulder 70. As a result the conduit 39 is frictionally held in engagement with the members 66 by the spring 79.

As shown in FIG. 5 the operating member 41 is illustrated in full lines when in a position providing for the ejection of fluid from the discharge opening 72 in a direction axially of the barrel 17. On movement of the operating member 41 to its dotted line position indicated at B, the discharge opening 72 is moved to a corresponding position B', whereby the fluid is discharged upwardly and forwardly relative to the barrel 17. Likewise when the operating member is moved to its dotted line position C, the opening 72 is moved to a position C' providing for the discharge of fluid forwardly and downwardly relative to the axis of the barrel 17. It will be seen that due to the flexible connection 79 the discharge opening 72 is moved transversely of the barrel 17, in the same direction as the rear end or actuator portion 41' of the operating member 41.

Referring to FIG. 6 the discharge opening 72 is shown in changed positions D and D' providing for the discharge of fluid forwardly and laterally relative to the axis of the barrel 17. It will be understood that these changed positions are obtained by merely moving the actuator portion 41' sidewise, relative to its up and down movements illustrated in FIG. 5.

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As previously mentioned the piston rod 59 of the pump unit 37 is provided with an externally threaded adjustable knob 62 (FIG. 3). The threads 83 of the knob 62 are in meshing engagement with the side wall of the opening 32 (FIG. 2) in the wall 29. Thus rotation of the knob 62 of the piston rod 59 limits the action movement of the trigger 61, whereby to vary the effective stroke of the piston 54. This variation in the stroke of the piston 54 provides for a variation in the length of the fluid discharge from the nozzle opening 72.

The trigger is slidably supported (FIG. 1) between the walls 29 and 31, with a finger opening being provided between the trigger 61 and the reserve reservoir wall 27. On pulling or depressing of the trigger 61, the piston 54 is moved against the action of the spring 56 whereby water from the cylinder compartment 51 is discharged through the fluid connection 43, to one side of the diaphragm valve 42 and through the passage 41'', conduit 39, and passage 69 for ejection from the nozzle opening 72. During this action the passage 35 is closed by the valve 42.

On release of the trigger 61 the piston is moved toward the cylinder end 60' by the spring 56 whereby liquid from the water compartment 14 is drawn through the passage 35, and fluid connection 43 into the cylinder compartment 51. During this action the valve is forced against and across the passage 41'', the movement of the valve to alternately open and close the passages 41'' and 35 being the result of the difference in pressures exerted on the opposite sides thereof at the junction 45 of the passages 41'' and 35, with this pressure differential being effected by the difference in the diameters of the passage 41'' and the nozzle discharge opening 72 relative to the diameter of the passage 35.

In the operation of the pistol with the hand grip 24 held in the palm of the hand and the index finger within the finger opening 84, the thumb may be used to manipulate the actuator portion 41' of the operating member 41. As a result successive "shots" may be made, each of which is in a different direction although the pistol is maintained pointed in the same direction, with ease and without observance whereby to increase the entertainment value of the pistol. Due to the resilient nature of the spring connection 79, it will be readily appreciated that upon removal of the thumb from the actuator portion 41', the operating member 41 and the nozzle unit 39' will resume their normal positions (FIG. 5) for discharging fluid axially of the barrel 17. Further when water from the hand grip and longitudinal portions of the water compartment 14 has been exhausted, it is only necessary to tip the barrel 17 upwardly to supply additional water to the hand grip from the reserve reservoir 28.

Although the invention has been described and illustrated with respect to a preferred embodiment thereof it is to be understood that it is not to be so limited since changes can be made therein within the scope of the invention as defined by the appended claims.

I claim:

1. A toy liquid ejecting pistol having a barrel with a muzzle and a hand grip, a nozzle unit in said muzzle including a body member having a liquid discharge opening therein, means supporting said body member in said muzzle for movement of said discharge opening in directions transversely of said barrel, an operating member for moving said body member in said transverse directions located within and disposed in a normal position extended longitudinally of said barrel wherein said discharge opening extends axially of said barrel, resilient means connecting the forward end portion of said operating member with said body member and biasing said operating member toward said normal position, said operating member having a manually operated actuator portion projected rearwardly from said barrel, means supporting said operating member in said barrel for relative move-

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ment of the end portions thereof in opposite directions transversely of said barrel, and a pump unit in said hand grip having an outlet portion liquid connected with said nozzle unit discharge opening.

2. A liquid ejecting toy pistonl having a barrel with a muzzle and a hand grip, a nozzle unit having a discharge opening therein, means movably supporting said unit in said muzzle for up and down and sidewise movements relative to said barrel whereby to vary the directional flow of liquid discharged from said nozzle opening, means for moving said nozzle unit including an operating member located within and extended longitudinally of said barrel, said operating member having a manually actuated rear end portion projected rearwardly from said barrel, means connecting the forward end of said operating member with said nozzle unit, means supporting said operating member for relative movement of the ends thereof in opposite directions transversely of said barrel, with said connecting means providing for the movement of said nozzle unit in the same direction as said rear end portion, and a pump unit in said hand grip having an outlet fluid connected with the discharge opening in said nozzle unit.

3. A liquid ejecting toy pistol having a barrel with a muzzle and a hand grip, a nozzle unit in said muzzle having a discharge opening, a pump unit in said hand grip including an expansible cylindrical chamber, a closure means for one end of said chamber having an elongated portion spaced from said one end of said chamber and extended transversely thereof, said portion having a longi-

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tudinally extended passage means therein, with said passage means being formed of two sections, one of which sections is of a reduced diameter relative to the other section, a fluid connection of a substantially rectangular shape in transverse cross section at the junction of said two passage sections and in fluid registration with said one end of said chamber, said fluid connection extended normal to the axis of said passage means, a diaphragm valve positioned within said fluid connection and extended across said two passage sections at the junction thereof so as to lie in the axial plane of said chamber, said diaphragm valve movable longitudinally of said passage means and within said fluid connections so as to alternately open and close said passage sections to said chamber, a trigger member on said hand grip manually movable to operate said pump unit, means fluid connecting the passage section of reduced diameter with said nozzle unit, and means providing for the fluid connection of the other passage section with a fluid reservoir in said hand grip.

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