

Jan. 30, 1968

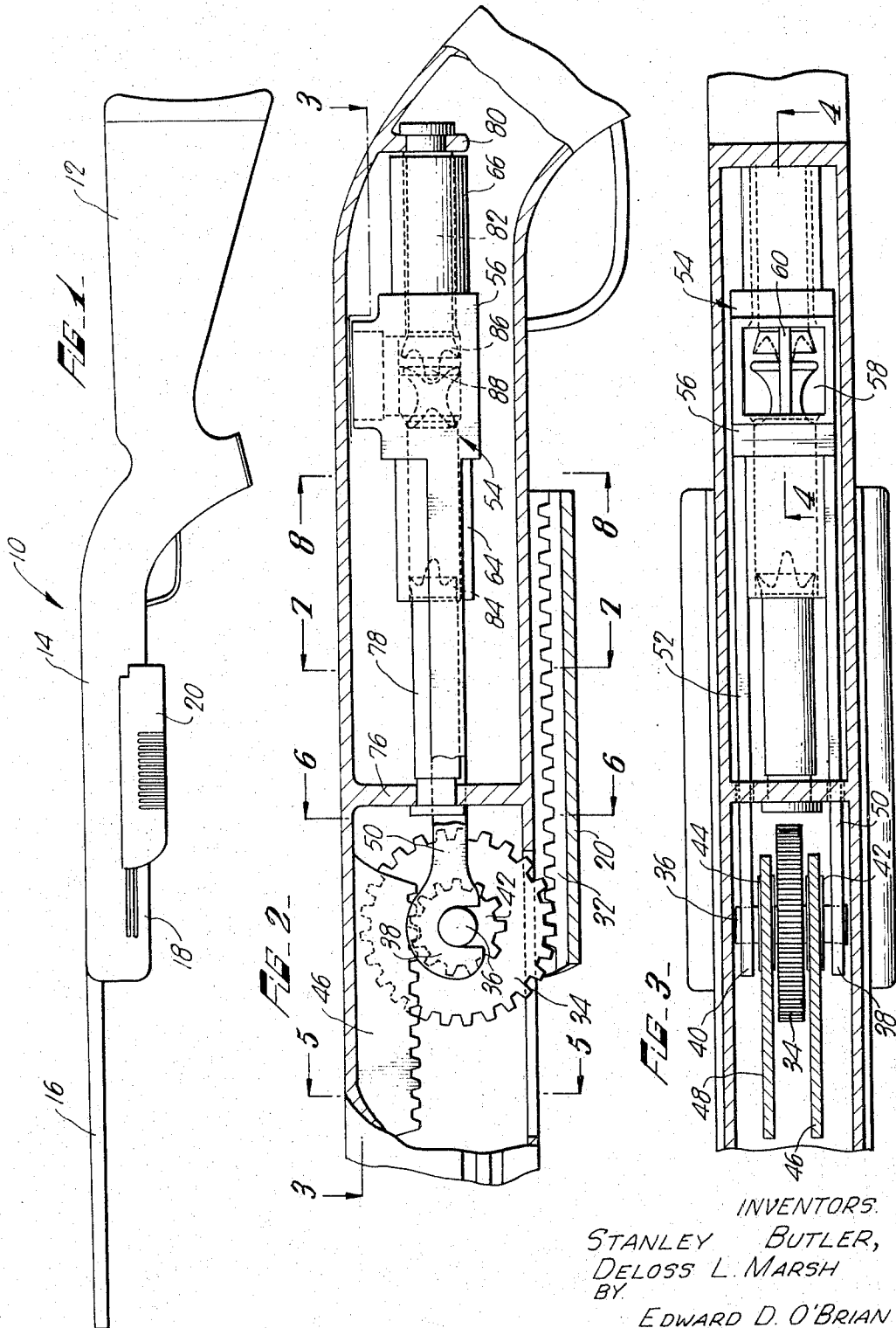
S. BUTLER ETAL

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RAPID FIRE POPGUN

Filed Oct. 18, 1965

2 Sheets-Sheet 1



INVENTORS:
STANLEY BUTLER,
DELOSS L. MARSH
BY

EDWARD D. O'BRIAN
ATTORNEY.

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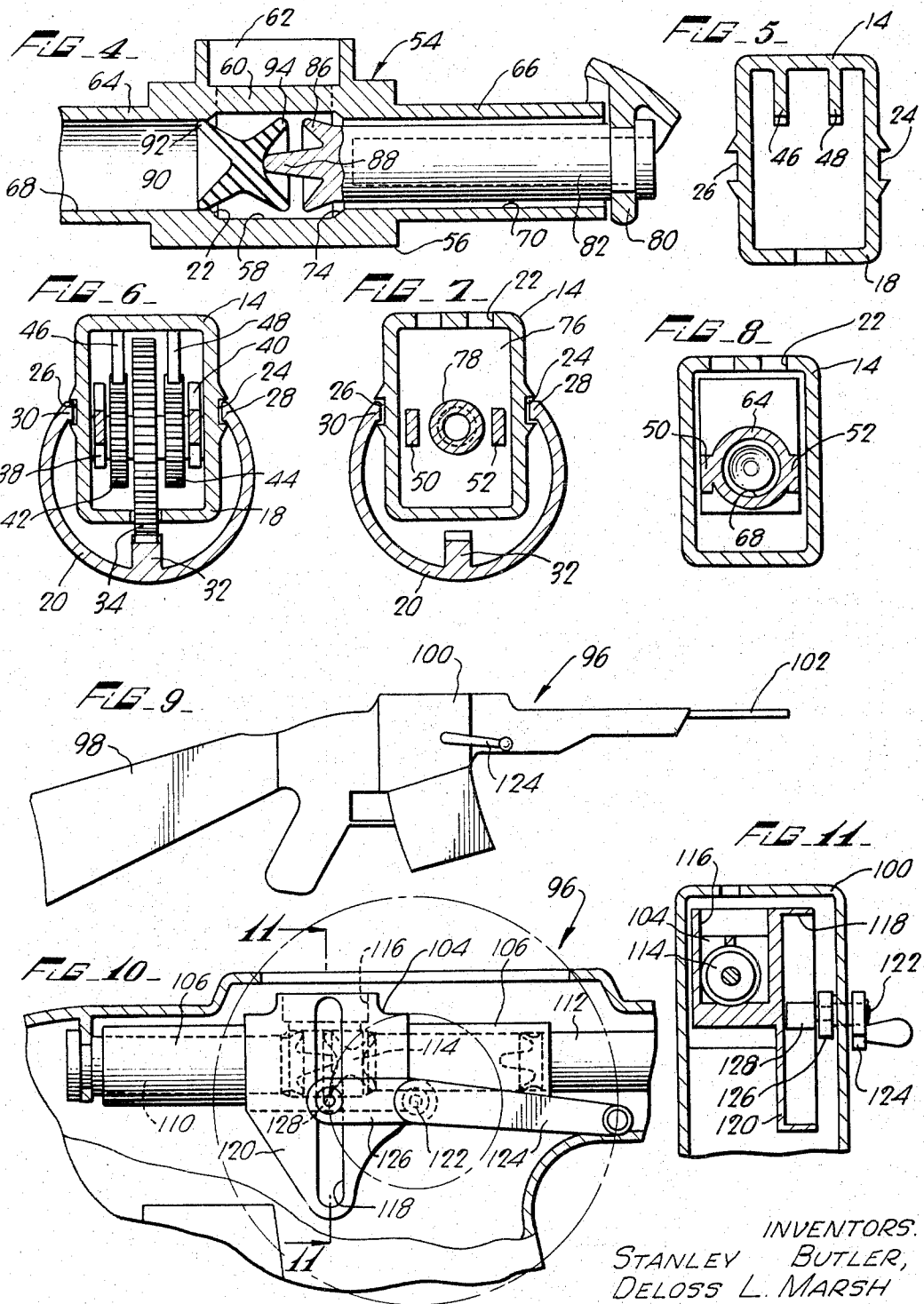
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STANLEY BUTLER,
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ATTORNEY.

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RAPID FIRE POPGUN

Stanley Butler, 16076 Penn Ave., San Lorenzo, Calif.
94580, and De Loss L. Marsh, 212 Revere Ave., Hay-
ward, Calif. 94544

Filed Oct. 18, 1965, Ser. No. 496,953

7 Claims. (Cl. 46-174)

This invention is directed to a rapid fire popgun, and particularly to a popgun which simulates, on a reduced size, a regular firearm both as to physical appearance and sound.

In the manufacture of toys, one of the most important considerations is the resemblance of the toy to the full sized, functional device which the toy simulates. In many fields, the toy industry has been very effective in creating accurate simulation of the full sized, functional device. However, in the field of guns, the proper simulation of the sound of discharge of a full sized firearm has not been accomplished. Instead, caps have been used in some toys. Caps are consumed upon detonation and do not produce a realistic sound. In other structures ratchet assemblies produce a sound which is far from realistic. In still further toy guns, the discharge of compressed air is intended to create a realistic sound. However, in these prior devices, proper simulation has not been obtained.

Accordingly, it is an object of this invention to produce a rapid fire popgun which simulates the full sized, functional firearm both in external appearance and in sound.

It is a further object of this invention to produce a rapid fire popgun which makes repeated realistic popping sounds upon the actuation thereof, and such sound production is managed easily by the toy user.

It is a further object of this invention to provide a popgun which is inexpensive of manufacture, so that it can be widely enjoyed by juvenile toy users, sturdy of construction so that difficulties are unlikely to appear, and easy of use so that it may be readily enjoyed by the toy user.

Other objects and advantages of this invention will become apparent from a study of the following portion of this specification, the claims and the attached drawings in which:

FIG. 1 is a side elevational view of the preferred embodiment of the rapid fire popgun of this invention;

FIG. 2 is an enlarged, partial elevational section of a portion of the popgun shown in FIG. 1;

FIG. 3 is a section taken generally along the line 3-3 of FIG. 2;

FIG. 4 is a further enlarged, partial elevational section of a portion of the mechanism shown in FIG. 2;

FIG. 5 is a section taken generally along the line 5-5 of FIG. 2;

FIG. 6 is a section taken generally along the line 6-6 of FIG. 2;

FIG. 7 is a section taken generally along the line 7-7 of FIG. 2;

FIG. 8 is a section taken generally along the line 8-8 of FIG. 2;

FIG. 9 is a side elevational view of a further embodiment of the rapid fire popgun of this invention;

FIG. 10 is an enlarged, partial vertical section of the rapid fire popgun of FIG. 9; and

FIG. 11 is a section generally taken along the line 11-11 of FIG. 10.

As an aid to understanding this invention it can be stated in essentially summary form that it is directed to a rapid fire popgun. The popgun of this invention has an exterior configuration which resembles that of full-sized, functional guns. However, the popgun of this invention is preferably of reduced scale, while retaining realistic

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details. Furthermore, the rapid fire popgun of this invention contains a sound making mechanism which is operated by a realistic part of the structure of the popgun. The sound making mechanism is capable of repeatedly producing sounds upon actuation of the mechanism. In the preferred embodiment of this invention, the sound making mechanism is actuated by a slide on the forearm of a shotgun-like gun. Thus, the popgun in the preferred embodiment resembles a pump type shotgun. Upon reciprocation of the forearm slide, a sliding member reciprocates within this sound making mechanism. This sound making mechanism comprises two cylinders with an enlarged bore therebetween. Positioned within the enlarged bore is a shuttle seal. This shuttle seal is alternately thrust into the cylinders. Pistons are relatively stationarily mounted within the sound making mechanism within the gun. The pistons are positioned so that the cylinders slide thereon and the cylinders also serve as guide means for sliding member. As the sliding member reciprocates on the pistons, air is compressed between the head of the piston and the shuttle seal inserted in that bore. As the compressed air reaches a certain pressure, the shuttle seal pops out. The discharge of compressed air into a sounding chamber creates a realistic pop of the gun. At the end of the stroke in that direction, the piston acts upon the shuttle seal to thrust it into the opposite cylinder. Thus, with motion of the sliding member in the opposite direction, air is compressed in the opposite cylinder and the shuttle seal pops out of that cylinder. Continued reciprocation causes continued popping. In the preferred embodiment of this gun, reciprocation is caused by the slider on the forearm. In another embodiment, reciprocation is caused by the turning of a crank.

This invention will be understood in greater detail by reference to the following portion of this specification, wherein the drawings are described. Referring now to FIG. 1, the preferred embodiment of the rapid fire popgun of this invention is generally indicated at 10. The exterior configuration of the popgun 10 is such that it resembles a pump-type shotgun. Accordingly, the gun 10 has a stock 12, receiver 14 and barrel 16. The receiver extends forward under barrel 16 to support the barrel 16 and forms a forearm 18. Slider 20 is mounted on this forearm.

Referring more particularly to FIGS. 5 through 8, the receiver 14 is of generally rectangular configuration. Opening 22 in the top of receiver 14 permits the escape of air, and thus permits the escape of the realistic popping sound created by the sound making mechanism. Guide slots 24 and 26 are formed on the sides of receiver 14, and extend generally longitudinally thereof. Slider 20, as is seen in FIGS. 6 and 7, is partially cylindrical in external configuration and terminates at its upper edges in guides 28 and 30 which respectively engage within guide slots 26 and 28. Thus, the slider 20 is constructed to reciprocating axial motion along the receiver 14. Rack 32 is formed interiorly of slider 20 and is positioned along the length thereof. Rack 32 carries teeth thereon to drive the sound-making mechanism.

Gear 34 is fixed on shaft 36 which is in turn journaled in bearings 38 and 40. Also mounted on and fixed to shaft 36 are gears 42 and 44. Gears 42 and 44 are respectively in engagement with racks 46 and 48. Racks 46 and 48 are integrally formed and extend downwardly from the top of receiver 14. This is especially well seen in FIGS. 5 and 6.

From this construction it is clear that as the slider 20 is manually reciprocated along guide slots 24 and 26, such causes rotation of gear 34. However, gear 34 is fixed to gears 42 and 44, and these are in turn in engagement with racks 46 and 48 which are relatively stationary within receiver 14. Thus, shaft 36 operates along a path

beneath the racks. However, the rate of longitudinal motion of shaft 36 along the length of the gun 10, within receiver 14, is at a slower rate than the rate of motion of slider 20. Thus, the racks and gearing serve to provide speed reduction and force multiplication. Furthermore, such reciprocation causes relatively low speed and comparatively high force reciprocation of bearings 38 and 40 along the linear path within receiver 14.

Bearings 38 and 40 are respectively formed in connecting rods 50 and 52. The connecting rods are integrally formed with or attached to sliding member 54. Sliding member 54 comprises a central section 56 which has, as is best shown in FIG. 4, a central bore 58. Bore 58 is substantially hemicylindrical, and is open at its top except for reinforcing in guide bar 60. This construction will leave substantially the entire top of bore 58 open, as is seen in FIG. 3. Also formed in central section 56 is sounding chamber 62. Sounding chamber 62 is of such size and location as to produce, in conjunction with the correct type of discharge of air, a very realistic pop. As is seen, sounding chamber 62 is open at the top and is in substantially full communication with bore 58.

Cylinders 64 and 66 are integrally formed with a central section 56 as part of the sliding member 54. Cylinders 64 and 66 have cylindrical bores 68 and 70 which are in communication with the central bore 58. The central bore 58 is larger than the diameter of bores 68 and 70, and smooth juncture is made by frusto-conical sections 72 and 74.

Wall 76 is provided in receiver 14 to support piston 78. Similarly, wall 80 is provided in receiver 14 to support piston 82. Pistons 78 and 82 are of identical construction and are positioned axially within the receiver. The pistons are directed toward each other and respectively carry piston seals 84 and 86 which sealingly engage within bores 68 and 70. As is seen in FIG. 2, the walls 76 and 80 are spaced an appropriate distance apart, in conjunction with the length of pistons 78 and 82, and the length of cylinders 64 and 66 so that when one of the piston seals is adjacent the outer end of its cylinder bore, the other piston seal is within the center bore 58. As is seen in FIGS. 2, 3 and 4, each of the piston seals 84 and 86 has a nose 88 which projects beyond the seal edge.

Shuttle seal 90, see FIG. 4, is positioned within bore 58. Shuttle seal 90 is of elastomeric material and has seal lips 92 and 94. These seal lips are respectively arranged for engagement with bores 68 and 70. As is seen in FIG. 4, as the sliding member 54 is moved toward its most rearward position, the nose 88 on piston 82 engages within the concavity at the rear of shuttle seal 90 and thrusts shuttle seal 90 into bore 68 so that seal lip 92 engages therein. Thus, as the sliding member 54 moves forward, air is compressed between piston seal 84 and shuttle seal 90. Compression builds up and the pressure in the compressed air side of shuttle seal 90 expands the seal lip 92 into firm engagement with bore 68. As sliding member 54 nears its forwardmost terminal position, air pressure builds up to a point forward of shuttle seal 90 to where the shuttle seal blows out into bore 58. This causes discharge of compressed air into bore 58 and thence into sounding chamber 62. This produces a realistic pop of the popgun of this invention. Motion of the sliding member 54 is caused by manual actuation of slider 20, in the manner previously described. When sliding member 54 approaches its forwardmost position, the nose 88 on piston 78 engages within shuttle seal 90 and thrusts it into bore 70 so that seal lip 94 engages in and seals within bore 70. Thus, rearward motion of slider 20 causes rearward motion of sliding member 54 with the consequent compression of air between piston seal 86 and seal lip 94. Again, as the sliding member 54 approaches its rearward position, compression of air causes the shuttle seal 90 to blow out and create another realistic pop. Final motion of sliding member 54 to its rearwardmost terminal position moves it to the position of FIG. 4 wherein nose

88 on piston 82 thrusts shuttle seal 90 into sealing engagement with bore 68. Thus, this action can be continuously repeated by reciprocation of slider 20.

Referring now to FIGS. 9 through 11, another embodiment of the rapid fire popgun of this invention is generally indicated at 96. The popgun 96 again has an exterior configuration resembling a full size, functional repeating gun. It also has a stock 98, receiver 100 and barrel 102. Within the receiver 100 the sound-making mechanism is identical to that described with respect to the popgun 10. Accordingly, the sound-making mechanism includes a sliding member 104 which has cylinders 106 and 108 engaging over pistons 110 and 112. These pistons co-act with shuttle seal 114, within its enlarged bore, and sounding chamber 116 to produce repeated popping by reciprocation of sliding member 104.

The primary difference between the popgun 10 and the popgun 96 is the manner in which reciprocation of sliding member 104 is produced. Sliding member 104 is formed with a vertically oriented slot 118 formed in web 120 which is preferably integrally formed as a part of sliding member 104.

Shaft 122 is rotatably mounted in the side wall of receiver 100. Exteriorly of side wall 100 shaft 122 carries crank 124. This crank is adapted to be manually engaged to cause the rotation of shaft 122 on its axis. Interiorly of the side wall of receiver 100, shaft 122 carries crank arm 126 which in turn carries crank pin 128. Crank pin 128 is in engagement with slot 118. Thus, manual rotation of crank 124 causes rotation of crank pin 128 about the axis of shaft 122. This rotation in turn causes engagement of crank pin 128 on one side or the other of slot 118 to reciprocally drive sliding member 104 from its forwardmost to its rearwardmost position within receiver 100. Thus, popping sounds are continually repeated in the same manner as described with respect to the gun 10.

This invention having been described in its preferred embodiment, it is clear that it is susceptible to numerous modifications and changes within the scope of this invention and without the exercise of the inventive faculty. Accordingly the scope of this invention is defined by the scope of the following claims.

We claim:

1. A rapid fire popgun, said rapid fire popgun comprising a toy gun-like structure having a sound producing mechanism therein, said sound producing mechanism comprising:

a sliding member, said sliding member having first and second axially aligned cylinders, said first and second cylinders being separated by an enlarged bore, a shuttle seal positioned in said enlarged bore, said shuttle seal being alternatively engageable with said first and second cylinders;

first and second pistons mounted in said popgun, said first and second pistons being respectively positioned within said first and second cylinders, said first and second pistons each having a piston-cylinder seal thereon, said sliding member being movable with respect to said pistons so that said first piston is adapted to thrust said shuttle seal into said second cylinder.

2. The rapid fire popgun of claim 1 wherein a sounding chamber is positioned on said sliding member and is in communication with said enlarged bore.

3. The rapid fire popgun of claim 1 wherein said shuttle seal has first engagement means directed toward said first cylinder and second engagement means directed toward said second cylinder, said first piston being adapted to engage said first engagement means to thrust said shuttle seal into said second cylinder.

4. The rapid fire popgun of claim 3 wherein said enlarged bore is smoothly connected with each of said first and second cylinders.

5. The rapid fire popgun of claim 4 wherein externally operable drive structure is connected to said sliding mem-

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ber so that actuation of said drive structure reciprocates said sliding member.

6. The rapid fire popgun of claim 5 wherein said drive structure comprises a slider, said slider being connected through racks and gearing to said sliding member so that reciprocation of said slider causes reciprocation of said sliding member.

7. The rapid fire popgun of claim 5 wherein said drive structure comprises a crank, said crank being positioned so as to be manually engageable, a crank pin connected to said crank, a slot in said sliding member, said crank

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pin being engaged in said slot so that rotation of said crank causes reciprocation of said sliding member.

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LOUIS G. MANCENE, *Primary Examiner.*

R. F. CUTTING, *Assistant Examiner.*

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