

Oct. 1, 1968

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3,403,669

TOY CANNON WITH BARREL RECOIL MECHANISM

Filed Aug. 11, 1966

3 Sheets-Sheet 1

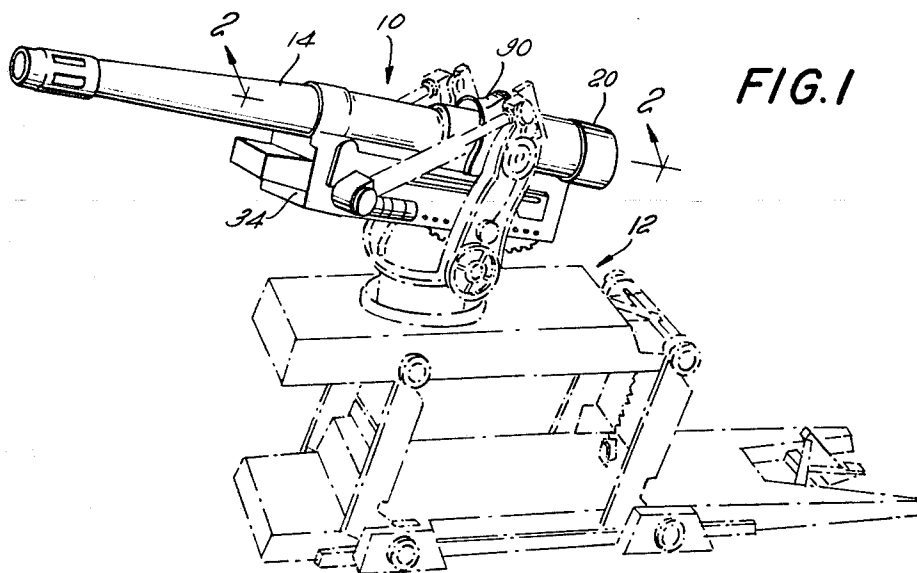


FIG. 1

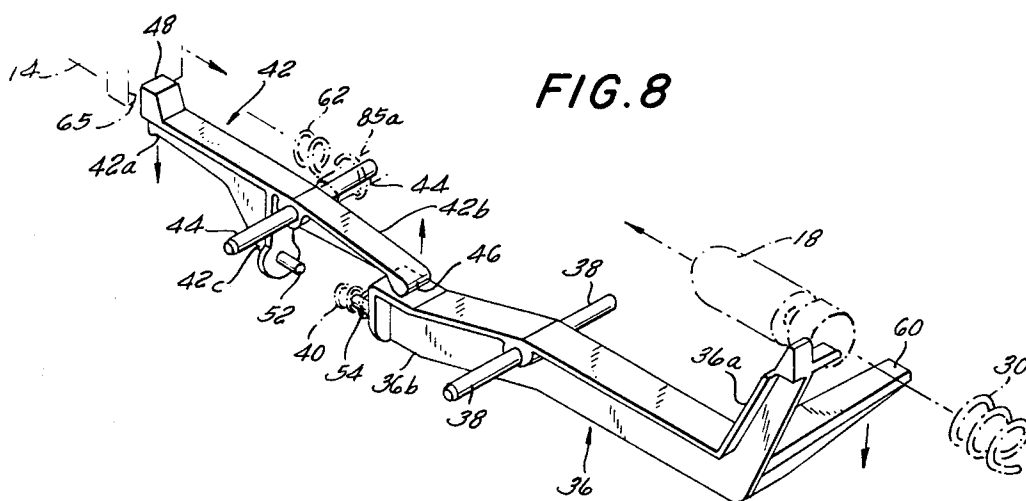


FIG. 8

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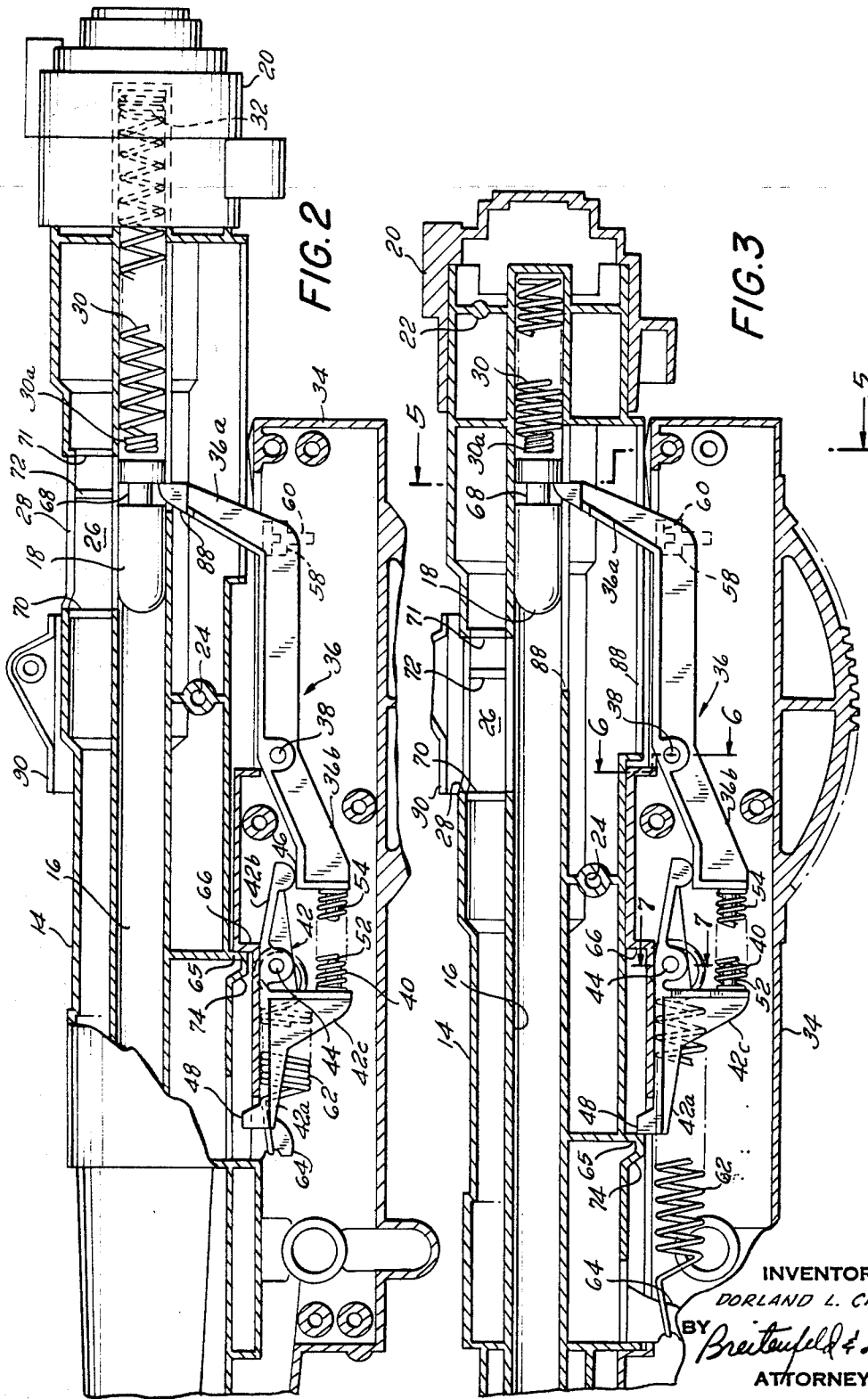
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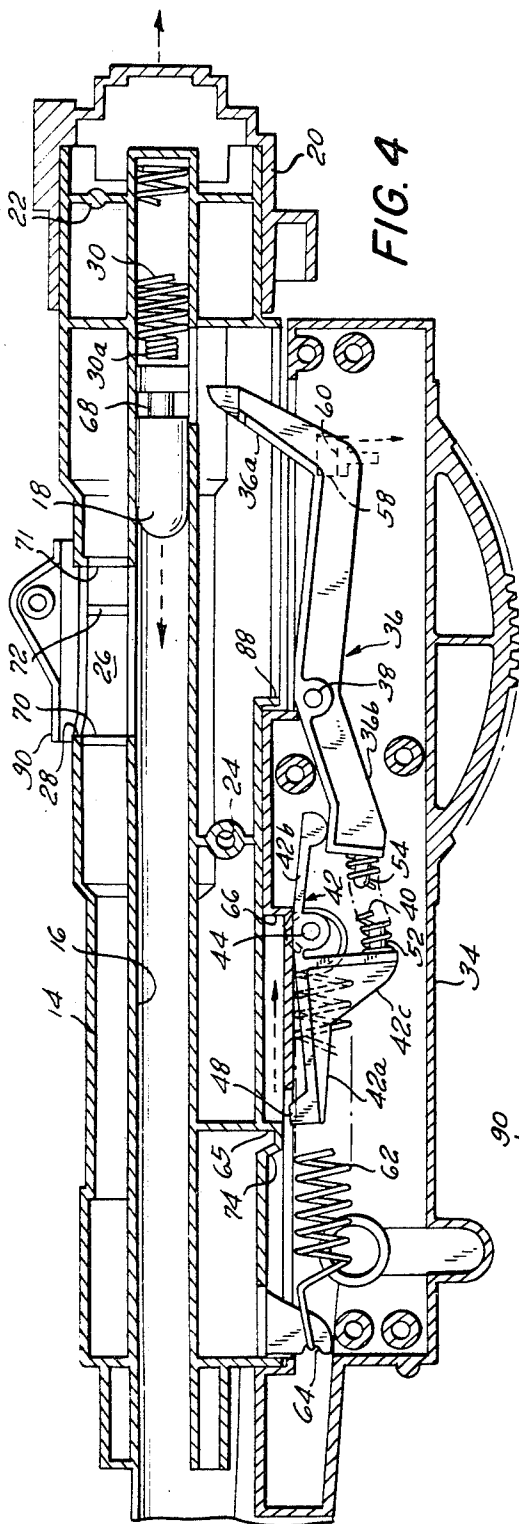


FIG. 4

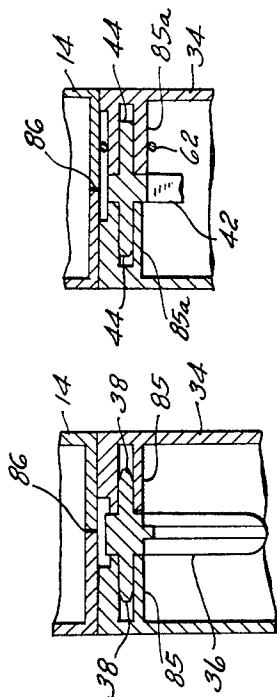


FIG. 7

FIG. 6

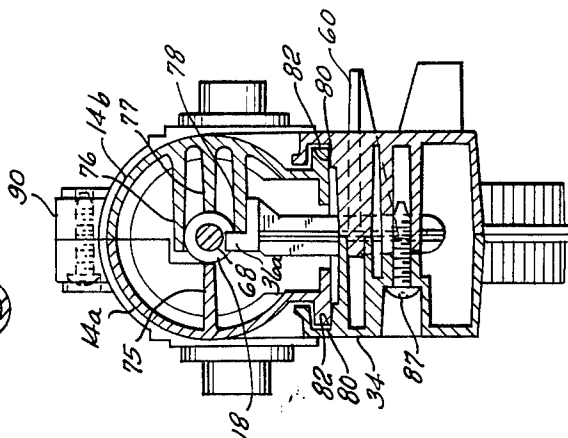


FIG. 5

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TOY CANNON WITH BARREL RECOIL MECHANISM

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Filed Aug. 11, 1966, Ser. No. 571,843

12 Claims. (Cl. 124—29)

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This invention relates to a toy cannon and particularly to a toy cannon capable of firing a bullet-like object while simulating the recoil action of a real artillery piece.

Real artillery pieces are usually provided with recoil mechanisms whereby the gun barrel recoils from the reaction force of the launched projectile. Consequently, firing of the projectile and recoil of the gun barrel are initiated simultaneously. The present invention relates to a toy gun capable of simulating a real artillery piece of the aforementioned type.

Accordingly, it is an object of the present invention to provide a toy gun which is capable of firing a bullet-like object while simultaneously simulating the recoil action of a real artillery piece.

Another object is to provide a toy gun in which firing of a bullet-like object and recoiling of a gun may be simultaneously initiated.

A further object is to provide a toy gun having a firing and recoiling mechanism which is easily cocked for firing.

An additional object is to provide a toy gun having a gun barrel slidable on a base support to simulate recoiling action of a real artillery piece as a bullet-like object is fired therefrom.

The aforesaid objects, and other objects and features of the invention which will appear as the description of the particular physical embodiment selected to illustrate the invention progresses, are achieved in the illustrated embodiment by slidably mounting a gun barrel on a base support, providing expandable means capable of ejecting a bullet-like object from the barrel and biasing means capable of sliding the barrel on the base support, and actuating said means through an actuating mechanism to simultaneously release the expandable and biasing means whereby the gun barrel recoils as the bullet is fired.

For a better understanding of the present invention, reference should be had to the accompanying drawings, wherein like numerals of reference indicate similar parts throughout the several views and wherein:

FIGURE 1 is a perspective view of a toy gun illustrating one embodiment of the present invention;

FIGURE 2 is a side and partial sectional view taken generally along the line 2—2 of FIGURE 1 showing the parts in a released position, i.e., in a position before the firing and recoil mechanism is cocked;

FIGURE 3 is a view similar to FIGURE 2 but showing the parts in a cocked position;

FIGURE 4 is a view similar to FIGURES 2 and 3 showing the position of the parts just after the trigger has been actuated, the bullet now being free to fire and the barrel free to recoil;

FIGURE 5 is a sectional view taken along the line 5—5 of FIGURE 3;

FIGURES 6 and 7 are fragmentary sectional views taken along the lines 6—6 and 7—7, respectively, of FIGURE 3; and

FIGURE 8 is a perspective view of parts of the actuating mechanism showing the directions of movement of the parts when the trigger is actuated.

Referring to the drawings, FIGURE 1 shows a toy gun 10 illustrating the invention. To enhance its appeal, the toy gun may have external embellishments designed

to simulate an actual artillery piece and accordingly, may be mounted on a platform or carrier 12 as shown in broken lines in FIGURE 1. The platform 12 is shown for the sake of orientation.

The toy gun 10 comprises a gun barrel 14 which may be designed to have an external appearance simulating a real artillery piece. Within the barrel 14 are means defining a bore 16 for receiving a bullet-like object or toy bullet 18 and for guiding the latter as it is fired. For ease of construction and assembly, the barrel 14 may be made in two halves 14a and 14b (FIGURE 5) adapted to be mated along a generally vertical and diametrical plane. A cup-like member 20 may be fitted over the rear end of the two mated barrel halves 14a, 14b while suitable studs (one is shown, for example, at 22 in FIGURE 3) in one barrel half 14a may fit into aligned openings (not shown) in the other barrel half 14b. The two halves 14b, 14a may be held together by screws or other fasteners (not shown) received in suitable openings (one is shown for example, at 24 in FIGURE 3).

The bullet 18 is adapted to be inserted into the bore 16 through an opening 28 in the gun barrel 14 leading to a vertical loading channel 26, the bullet 18 being manually placed in the opening 28 and being allowed to fall by gravity into the bore 16, i.e., into the position shown in FIGURE 2. An expandable means such as a coil spring 30 is disposed in the rear end of the bore 16 and is adapted to be compressed and released, as will be described in detail, to fire or eject the bullet 18 from the bore 16. One end of the spring 30 (the right end in FIGURE 2) is secured to the gun barrel 14, for example, by slipping one or more of its end coils over a transverse flange 32 (FIGURE 2) extending inwardly into the bore 16. The spring 30 is thereby held in place and prevented from being ejected when the bullet 18 is fired.

The gun barrel 14 is slidably mounted on a base support or housing 34, the latter remaining stationary during firing while the barrel 14 slides rearwardly thereon to simulate the recoil action of a real artillery piece.

The means or actuating mechanism for effecting the aforementioned firing and recoil action is contained, for the most part, in the base 34. This mechanism comprises a trigger arm 36 pivotally supported in the housing 34 by means of pivot pins 38 which project laterally from the arm 36 (see FIGURES 2, 3, 4, 6, and 8). The trigger arm 36 has one leg 36a having an end which is adapted to extend up into the bore 16 of gun barrel 14 and another leg 36b adapted to be operatively engaged by a resilient means in the form of a spring 40 and by a pawl 42. The pawl 42 is pivotally supported in the housing 34 by means of pivot pins 44 which project laterally from the pawl 42 (see FIGURES 2, 3, 4, 7, and 8), and has a rear section 42b in contact with the trigger arm leg 36b at a location indicated by the numeral 46. The front section 42a of the pawl 42 has a projection 48 adapted to engage a stop 65 (see FIGURE 3, for example) on the gun barrel 14 as will be further described. The pawl 42 has a lower projecting section 42c from which a rearwardly extending stud 52 projects. The trigger arm 36 also has a lower projecting portion from which a stud 54 projects forwardly, the two studs 52 and 54 being generally in alignment with one another to receive and support the aforementioned spring 40.

The spring 40 is of such a length that it will be compressed when the mechanism is assembled as shown in FIGURES 2 to 4. It will be evident, therefore, that the compressed spring 40 will tend to maintain the trigger arm 36 and pawl 42 in the position shown in FIGURES 2 and 3 wherein the end of trigger arm leg 36a extends up into the bore 16 of barrel 14 and the projection 48 of

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the forward section 42a of pawl 42 extends upwardly into the path of movement of the stop 65 of barrel 14.

In this regard it should be pointed out that a stop is provided to prevent the trigger arm 36 from rotating, under the bias of spring 40, any further in a counterclockwise direction than that shown in FIGURES 2 and 3. Accordingly, the stop may be provided between an opening 58 in the side of the housing 34 and a lateral finger 60 (see FIGURES 5 and 8) extending from the side of trigger arm 36 through the opening 58. As best shown in FIGURE 5, the lateral finger 60 passes beyond the side of the housing 34 where it may easily be manually manipulated to release or trigger the firing of the bullet 18 as will be described. For the time being, however, it will be evident that the lateral finger 60 (herein often sometimes referred to as the trigger) rests against the top edge of opening 58 (FIGURES 2 and 3) to serve as a stop to prevent any further counterclockwise rotation of trigger arm 36, under the bias of spring 40, than that shown in FIGURES 2 and 3. Alternatively, other stop arrangements may be employed. It will also be evident that the pawl 42 is prevented from clockwise rotation, under the bias of spring 40, further than that shown in FIGURES 2 and 3 because the rear section 42b of pawl 42 contacts the trigger arm leg 36a at 46, as previously described, to prevent any such further clockwise rotation. Accordingly, the trigger arm 36 and pawl 42 tend to reside in the positions shown in FIGURE 2 or FIGURE 3 unless acted on by outside forces.

The actuating mechanism further comprises a biasing means in the form of a recoil spring 62 which is operable to bias the gun barrel 14 rearwardly (i.e. to the right in FIGURE 2) relative to the housing 34 and more specifically, to the position shown in FIGURE 2. To this end the recoil spring 62 has one end looped about a lug 64 extending downwardly from the gun barrel 14 and the other end looped about a portion of the housing 34, for example, about the housing boss 85a (see FIGURE 8 for example) which pivotally supports the pawl 42 as will further be described. In the assembled position of FIGURE 2, the recoil spring 62 biases the gun barrel 14 rearwardly (to the right), further rearward movement being prevented by the abutting relationship between stops 65 and 66 (see FIGURE 2) on the gun barrel 14 and housing 34, respectively.

The operation of the toy cannon is as follows. Starting from the released position shown in FIGURE 2, a bullet 18 is passed into the bore 16 via the opening 28 and loading channel 26 in gun barrel 14. The bullet 18 has an annular groove 68 which is adapted to receive the upper end of leg 36a of trigger arm 36 as shown in FIGURES 2 and 3. In order to ensure that the bullet 18 will drop into proper position in the bore 16 so that the end of the trigger arm leg 36a will be received in the bullet groove 68, suitable guide means may be provided in the loading channel 26. This may consist of flanges 70 and 71 on the ends of the loading channel 26 to guide the ends of the bullet 18 into position as it is being loaded or side guides 72 (only one being shown) adapted to be received in the bullet groove 68 to guide the latter during loading. The guide means, of course, do not extend into the bore 16 and do not interfere with the firing of the bullet from the bore 16 after loading.

With the bullet 18 loaded in the bore 16 and the parts in the released position shown in FIGURE 2, the next step is to manually slide the barrel 14 forwardly (i.e. to the right) as shown in the drawings relative to the housing 34 until the parts assume the cocked position shown in FIGURE 3. As the mechanism is being cocked, a lower slanted wall 74 (see FIGURE 2, for example), on the gun barrel 14 will engage and slide past the projection 48 of pawl 42, thereby momentarily rotating the pawl 42 counterclockwise slightly and moving the pawl projection 48 out of the path of travel of the stop 65 until the

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stop 65 on the gun barrel 14 moves past the projection 48 on pawl 42. The pawl then returns to its initial position, shown in FIGURE 3, to thereby engage stop 65 and hold the gun barrel 14 in the cocked position of FIGURE 3 against the force or recoil spring 62. In this regard, it is to be noted that the spring 40 biases the pawl 42 in a clockwise direction, the aforesaid momentary counterclockwise rotation being effected by further compression of spring 40 without effecting the pivotal position of trigger arm 36.

As the gun barrel 14 is being cocked, the recoil spring 62 is stretched from the position of FIGURE 2 to that of FIGURE 3. Also the firing spring 30 is compressed from the FIGURE 2 to the FIGURE 3 position because the bullet 18, being prevented from moving relative to the housing 34 by the engagement of the trigger arm leg 36a in groove 68 of bullet 18, slides rearwardly in the bore 16 as the barrel 14 is slid forwardly relative to housing 34.

The gun, cocked as shown in FIGURE 3, is now ready to be fired. As previously indicated, firing is initiated by depressing the lateral finger or trigger 60 to thereby effect slight clockwise rotation of trigger arm 36 about the axis of its pivot pins 38. This slight clockwise rotation will, of course, displace the end of trigger arm leg 36a from the groove 68, thereby releasing the bullet 18 so that the compressed spring 30 may be rapidly expanded to forcibly expel the bullet from the bore 16. It will be evident from the drawings that the aforementioned clockwise rotation of trigger arm 36 will cause counterclockwise rotation of pawl 42 (due to the contact therebetween at 46, previously described) to thereby move the pawl projection 48 below the level of the stop 65 on gun barrel 14. Consequently, the pawl and stop 65 become disengaged, and the tensioned recoil spring 62 is permitted to rapidly contact to quickly draw the gun barrel 14 rearwardly relative to the housing 34.

From the above description it will be apparent that the springs 30 and 62 are released simultaneously so that the bullet 18 is fired simultaneously with the rearward movement of the barrel 14 relative to the housing 34 to thereby produce an action which simulates, quite realistically, the simultaneous firing and gun barrel recoil of an actual artillery piece. After firing of the bullet, recoiling of the gun barrel, and releasing of the trigger 60, the parts and operating mechanism will have returned to the position shown in FIGURE 2 wherein the gun is ready to be loaded again. This, of course, occurs because the spring 40, as previously mentioned, normally biases the parts to the position shown in FIGURE 2.

Turning to some constructional aspects of the illustrated embodiment, it will be observed that the bore 16 in the gun barrel 14, instead of being formed of a cylindrical surface, may be defined by the projections 75, 76, 77, 78, best shown in FIGURE 5, which contact, support, and guide the bullet 18 at four locations spaced ninety degrees from each other. It will also be observed in FIGURE 5 that suitable channels 80 may be provided in the housing 34 to receive flanges 82 extending from the gun barrel 14 thereby functioning to support and guide the gun barrel 14 on the housing 34 during the relative sliding movement therebetween. As shown in FIGURE 6, the lateral pins 38 of trigger arm 36 are received in cylindrical passages within bosses 85 extending integrally from both side walls of the housing 34, the aforesaid arrangement providing the pivotal support for the trigger arm 36. As in the case of the gun barrel 14, the housing 34 is initially made in two halves and mated along a vertical plane as indicated, for example, at 86 in FIGURE 6 and is held together by fasteners such as the screw 87 of FIGURE 5. This arrangement, of course, facilitates assembly of the operating mechanism as will be evidenced, for example, by the fact that as the two halves of the housing 34 are mated, the two pivot pins 38 on the trigger arm 36 may be guided into the cylindrical passages in the

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bosses 85 on the housing halves. As will be evident from FIGURE 7, the pivot support for the pawl 42 is arranged similar to that of the trigger arm 36. Pivot pins 44 of pawl 42 are accommodated within hollow bosses 85a integral with the housing 34.

Since the trigger arm leg 36a extends up into the gun barrel 14, an elongated slot 88 is provided in the lower rear portion of the gun barrel 14 so that the latter is free to slide back and forth without interfering with the trigger arm leg 36a. If desired, the firing spring 30 may be provided with a forward end section 30a of smaller diameter coils than the rest of the spring to ensure good contact with the bullet 18.

In the illustrated embodiment a collar 90 extends from the housing 34 to encircle the barrel 14. The longitudinal length of the collar 90 may be the same as, or slightly longer than, the longitudinal length of the loading opening 28 previously described. The collar 90 is arranged so that it is forward of the loading opening 28 when the gun is in its released position (FIGURE 2). However, when the gun is cocked (FIGURE 3), the loading opening 28 moves within the collar 90 so that the latter covers the opening and precludes any inadvertent attempt to load a bullet into the cocked gun.

The gun barrel, gun housing, and bullets may be made of suitable plastic while the trigger arm and pawl may be die cast of suitable metal.

From the above description it will be evident that there has been disclosed a toy gun operable to fire a bullet from the bore of a gun barrel and simultaneously effect rearward movement of the gun barrel relative to a base support or housing on which the gun barrel is mounted to thereby effect simulation of the firing and resulting recoil action of a real artillery piece.

While the invention has been described, disclosed, and illustrated in terms of a preferred embodiment, the scope of the invention should not be deemed to be limited by the precise embodiment herein described and illustrated since other embodiments or modifications are intended to be reserved as they fall within the claims hereto appended.

What is claimed is:

1. A toy cannon comprising a gun barrel slidably mounted on a base support, expandable means in said gun barrel for ejecting a bullet-like object therefrom, biasing means operatively connecting said gun barrel to said base support, and an actuating means operative to effect actuation of said expandable means and said biasing means thereby to provide ejection of the bullet-like object from the gun barrel as the latter is slid rearwardly on the base support by the biasing means to simulate a recoiling action.

2. A toy cannon according to claim 1 wherein said actuating means comprises a trigger arm element adapted to be manually manipulated to effect simultaneous actuation of said expandable means and said biasing means.

3. A toy cannon according to claim 1 wherein said expandable means comprises a firing spring disposed in the gun barrel, and said actuating means comprises a pivotally mounted trigger arm having a position wherein said trigger arm is operable to cause compression of said firing spring when the barrel is slid forwardly on the base support to a cocked position.

4. A toy cannon according to claim 1 wherein said biasing means comprises a recoil spring, and said actuating means comprises a pivotally mounted pawl element having a position wherein it engages said gun barrel to hold the latter in a forward cocked position against the force of said recoil spring.

5. A toy cannon according to claim 1 wherein said actuating means comprises a trigger arm pivotally

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mounted on said base support, said trigger arm having a latched position wherein a part of the trigger arm extends into the gun barrel where it is adapted to be accommodated in a groove in the bullet-like object to hold the bullet-like object in a fixed position relative to the base support when the gun barrel is slid forwardly on said base support toward a cocked position.

6. A toy cannon according to claim 5 wherein said actuating means comprises a pawl element pivotally supported on said base support and having a latched position wherein it extends into the path of travel of the gun barrel where it is operable to hold the gun barrel in a forward cocked position opposing the force of said biasing means.

7. A toy cannon according to claim 6 wherein said actuating means further comprises a spring between said trigger arm and said pawl element normally biasing each of said trigger arm and pawl element into its latched position.

8. A toy cannon according to claim 6 wherein said trigger arm and pawl element have contacting parts such that pivotal movement of said trigger arm from its latched position effects pivotal movement of said pawl from its latched position thereby producing simultaneous release of the expandable means to fire the bullet-like object and release of the biasing means to effect rearward movement of the gun barrel relative to the base support.

9. A toy cannon according to claim 1 wherein said gun barrel has means defining a loading channel extending transversely of the gun barrel, the last said means comprising guide parts to guide the bullet-like object into a predetermined loaded position in the gun barrel.

10. A toy cannon according to claim 9 wherein said base support is provided with a collar-like part extending about the gun barrel, said collar-like part being arranged to cover said loading channel when the barrel is in its cocked position to prevent any inadvertent attempt to place a bullet-like object in the loading channel after the actuating mechanism has been cocked for firing.

11. A toy cannon according to claim 1 wherein said actuating means comprises a pair of members pivotally mounted on said base support, one of said members being operable to effect actuation of said expandable means, the other of said members being operable to effect actuation of said biasing means, and interconnecting means providing an operational relationship between said two members so that when one of said members is pivoted in one direction, the other will be pivoted in an opposite direction thereby to effect simultaneous actuation of said expandable means and said biasing means.

12. A toy cannon according to claim 11 wherein said interconnecting means comprises a spring which biases the pair of members in opposite directions and which is adapted to be compressed so that said other member may be pivoted slightly without effecting pivotal movement of said one member thereby allowing the gun barrel to be slid on the base support to a cocked position.

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