

March 7, 1939.

E. S. SAVAGE

2,149,749

PROJECTILE

Filed Oct. 1, 1936

2 Sheets-Sheet 1

Fig. 1.

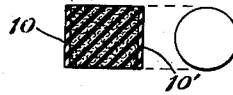


Fig. 2.

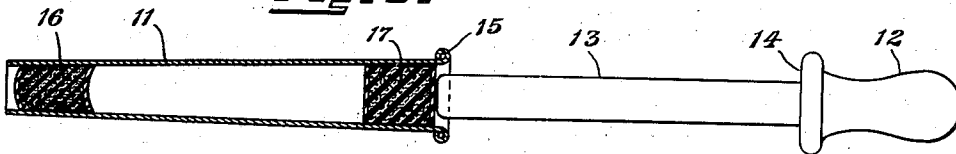


Fig. 3.

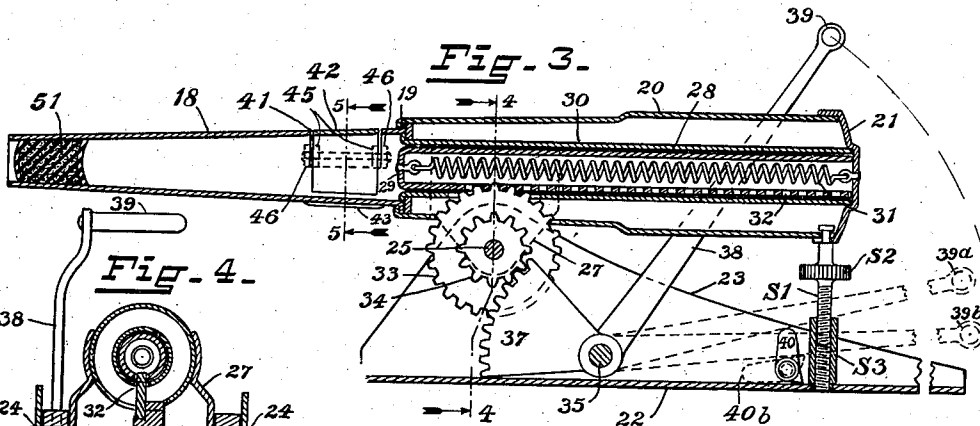


Fig. 4.

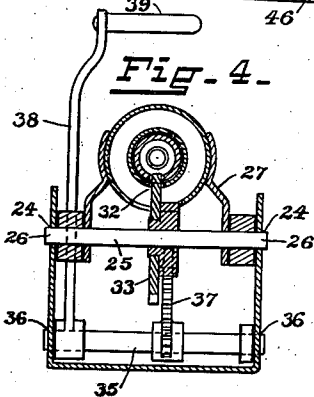


Fig. 5.

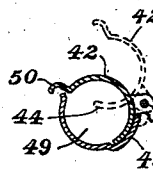


Fig. 6.

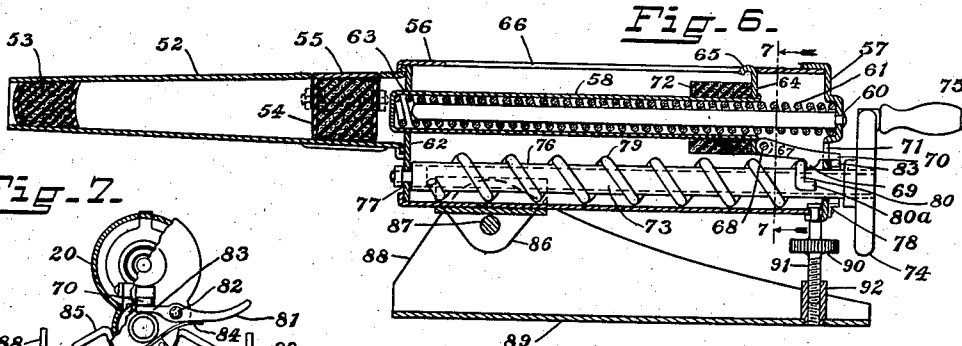
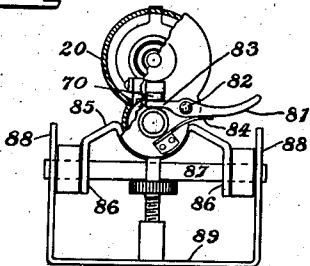


Fig. 7.



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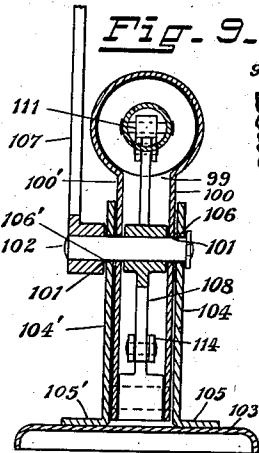
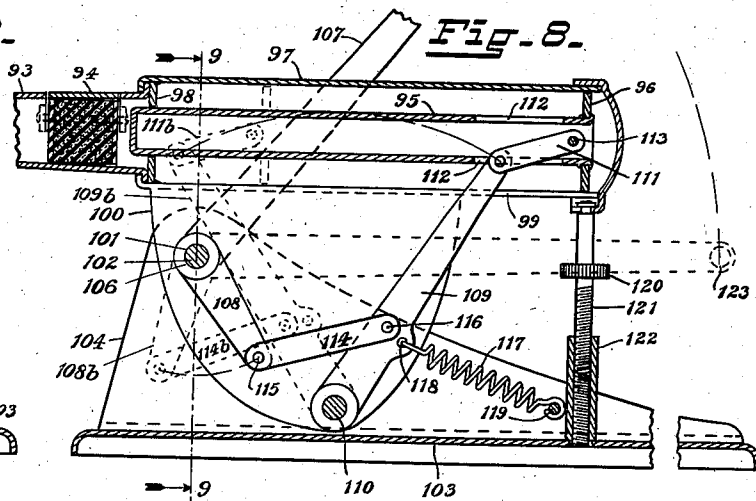
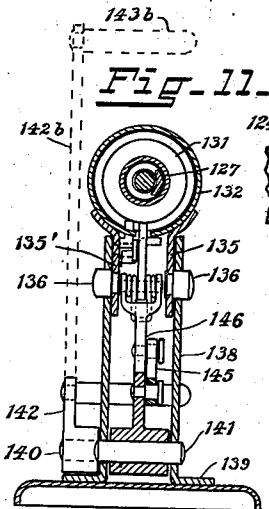
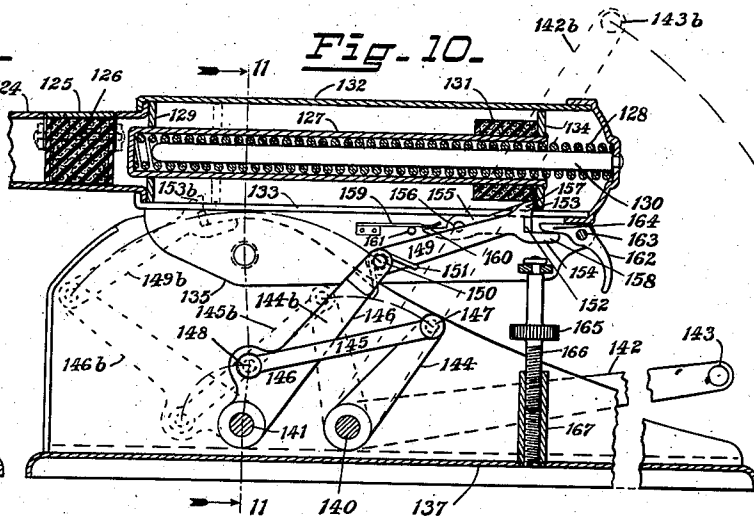
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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PROJECTILE

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Application October 1, 1936, Serial No. 103,492

8 Claims. (Cl. 273-106)

The present improvements are particularly applicable to air guns and projectiles for that type of gun employing a barrel having a muzzle diameter smaller than the breech diameter, and in which a plunger is used to force the projectile through the barrel to a position close to the muzzle, the projectile being subsequently discharged from the muzzle position by air pressure. The discharging air pressure may be produced by a piston or air pump but in this type of gun the air pressure is usually created by the action of forcing a second projectile toward the muzzle by means of a plunger, thus compressing the air between the two projectiles and causing the first projectile to be discharged with an accompanying loud report or "pop" sound. The second projectile then takes the place of the first in position to be discharged in like manner.

Guns operating on this principle have heretofore used projectiles cut from vegetables or fruit such as potatoes or apples, and it is customary with this type of gun to employ the breech end of the barrel as a cutter or a die by forcing it into a slice of the vegetable of proper thickness, thus leaving a slug of the vegetable inside the breech and in position to be pushed toward the muzzle by the plunger.

One object of the invention is to provide an air gun of the type described of simple, durable, and safe construction, designed to use an improved type of previously prepared projectile which projectile forms a part of this invention.

Another object of this invention is to provide a substantially indestructible projectile for use with an air gun, of this or any other suitable type, which can be discharged repeatedly from the gun, the projectile being composed of a compressible and elastic material, and having small frictional resistance against movement through the barrel.

Another object of the invention is to provide a projectile having the above mentioned characteristics which, while occupying a position within the muzzle of the gun will act as an air seal and will retain such position against increasing air pressure until the air pressure is sufficiently high so that the resulting discharge of the projectile will produce a loud report and high projectile velocity.

Another object of the invention is to provide a projectile which may be discharged at high velocity from an air gun of suitable type and which cannot cause bodily injury to a person who may be hit by the projectile.

Another object of the invention is to provide the air gun with simple breech loading means and

simple plunger actuating means for rapidly forcing the projectile through the barrel to a point adjacent the muzzle.

Another object of the invention is to provide an air gun having suitable means for supporting the gun on a surface and having manual means for operating the gun so constructed that the operating force applied will tend to hold the gun in its firing position and avoiding any tendency to disturb the gun when it is being fired.

Another object of the invention is to provide an air gun of this type with a spring actuated plunger, easily operated manual means for retracting the plunger and compressing the spring, and effective means for retaining the plunger and spring in the cocked position.

A further object of the invention is to provide for the gun a simple and safe breech loading means.

With these and other objects in view the invention resides in certain improvements and combination of parts, all as will be hereinafter more fully described, representative embodiments of which are shown in the accompanying drawings, in which—

Fig. 1 is a longitudinal sectional view and end projection of a projectile designed for use in conjunction with the air gun.

Fig. 2 is a longitudinal section of a simple gun barrel showing the improved projectiles in position for firing, and a hand operated plunger shown in side elevation.

Fig. 3 is a longitudinal sectional view of a lever operated air gun, constructed in the form of a cannon, with plunger actuating gears shown in side elevation. This view shows the gun in position for firing, with the plunger retracted previous to being reloaded with a projectile in the breech.

Fig. 4 is a sectional view of the cannon shown in Fig. 3 taken on the line 4-4 of Fig. 3, looking in the direction indicated by the arrows.

Fig. 5 is a sectional view of the breech loading chamber taken on the line 5-5 of Fig. 3, showing the safety breech shutter used in the embodiment illustrated in Figs. 3 and 4, and also used in the modifications illustrated in Figs. 6 to 11.

Fig. 6 is a longitudinal sectional view of a toy cannon, embodying a modification of the invention, which is provided with a spring operated plunger and screw means for retracting the plunger. This view shows the gun loaded and in position for firing.

Fig. 7 is a rear end elevation of the cannon shown in Fig. 6 with a part in section on the line

7—7 of Fig. 6. In this view the hand operating wheel is removed.

Fig. 8 is a longitudinal sectional view of a modified form of air gun, also constructed to simulate a cannon, in which the plunger is lever operated. In this view the front portion of the barrel is broken away and lever parts are shown in side elevation.

Fig. 9 is a sectional view of the cannon shown in Fig. 8 taken on line 9—9 of Fig. 8.

Fig. 10 is a longitudinal sectional view of an air gun, constructed to simulate a cannon, having a spring actuated plunger and lever means for retracting the plunger and compressing the spring.

Fig. 11 is a sectional view of the gun shown in Fig. 10 taken on line 11—11 of Fig. 10.

The same reference numerals throughout the several views indicate the same parts.

Referring first to the improved form of projectile designed to be used with the air gun, Fig. 1 illustrates the preferred embodiment of this projectile. The projectile is here shown as comprising a sponge rubber body, the sponge rubber possessing the desired characteristics of softness, compressibility and maximum elasticity. The preferred form is cylindrical, as shown, and the ends are provided with impervious flexible rubber surfaces 10, 10', which serve to prevent loss of air pressure through the porous sponge rubber when the gun is fired. This impervious surface also furnishes a suitable contact surface for the gun plunger when the projectile is being forced through the barrel. Untreated sponge rubber has a high frictional characteristic which renders its use as a projectile in this type of gun unsatisfactory because of the excessive pressure required to force such a projectile through the gun barrel. I have provided means for eliminating this objectionable friction which consists in impregnating the pores of the sponge rubber with a lubricating material. The whole projectile may be so impregnated or only the portions near the surface may contain the lubricant. The lubricant may be in any effective form such as a liquid, grease or powder, preference being given to those lubricants which will not injure rubber and which will remain effective for a long time due to low evaporation characteristics. Glycerine has proved to be a satisfactory lubricant for this purpose, a small amount absorbed in the pores of the sponge rubber is very effective and remains effective indefinitely. The glycerine has no injurious effects on rubber but is beneficial in that it serves to prevent the rubber from becoming hard with age. Paraffine is also a very satisfactory lubricant for this purpose.

It is understood that this improvement in projectiles is not limited to the use of sponge rubber as described in the foregoing but applies to the use of other compressible and elastic materials, including elastic fibrous materials, which will function in a similar manner. Materials having low frictional characteristics against a smooth surface would not require a lubricant.

To clearly illustrate the action of this improved projectile in a gun of the type described I have shown in Fig. 2 the most elementary form of such a gun associated with the improved projectiles in position for firing. The form of gun shown in this figure is not novel but improvement resides in its use in conjunction with the improved type of projectile described herein. The barrel here shown is considerably smaller at the muzzle end than at the breech end. The projectile is sized

to fit freely in the breech but to fit closely in the barrel at a point slightly forward of the breech. This permits the projectile to function as a highly efficient air compressing piston when it is forced forward during the firing stroke of the plunger.

In use the tapered barrel 11 is held in one hand and the handle 12 of the plunger 13 is grasped in the other hand. A projectile is first inserted in the large end, or breech of the barrel, the projectile is then forced through the barrel by means of the plunger until movement is stopped by the shoulder 14 of the handle striking the end of the barrel at 15. The length of the plunger is such that the projectile will stop within the muzzle in the position shown at 16, in which position it is considerably compressed due to the smaller diameter of the barrel at this point, being so compressed the projectile then provides an effective air seal for the muzzle end of the barrel. After withdrawing the plunger a second projectile 17 is inserted in the breech this projectile is forced forwardly quickly by means of the plunger and the rising air pressure produced between the two projectiles, as the second projectile approaches the first, will cause the discharge of the first projectile, the second projectile then taking its place within the muzzle. The sudden release of the compressed air, as the first projectile leaves the barrel, causes a loud report or "pop" sound which is very desirable in a toy gun. The first projectile, or another, may be again placed in the breech and the gun fired as before.

It should be noted that when the second projectile is being forced forward by the plunger the rising air pressure against the rear end of the first projectile has a tendency to compress that end of the projectile resulting in increasing the expansive force of the first projectile against the gun barrel. This expansive force is a factor tending to hold the projectile in position in the barrel until the air pressure has increased sufficiently to produce the desired loud report and high velocity when the projectile is finally discharged.

The barrels shown in the several views of the drawings are formed with a bore having a uniform taper from breech to muzzle. Any one of the guns however will operate satisfactorily with a barrel having a uniform bore throughout its major length and provided with a contracted or tapered bore near the muzzle smaller in diameter than the remainder of the barrel. With such a barrel a slightly enlarged bore at the breech is desirable to facilitate loading.

In the embodiment of my invention illustrated in Figs. 3 and 4 the air gun is constructed to simulate a cannon. The barrel 18 is provided with an annular flange 19 at its breech end by means of which it is clamped to the forward end of the shell or housing 20 which housing simulates in shape the explosion chamber of a cannon. The cap 21 closes the rear end of the housing and simulates a cannon breech in external appearance. A sheet metal base member 22 is formed with two upturned side plates 23 shaped to resemble a cannon base. Perforations in the sides 23 at 24 furnish bearings for the shaft 25 the ends 26 of which serve as cannon trunnions. The housing 20 is supported on the shaft 25 by means of the sheet metal bearing members 27 which are preferably attached to the housing by spot welding.

A guide tube 30 is supported at each end cen-

trally within the housing 19 in axial alignment with the barrel 17. The plunger 28 comprises a sheet metal tube preferably closed at the front end and open at the rear end and is fitted to slide freely in the guide tube 30. A light tension spring 31 is positioned within the plunger, one end of the spring being attached to the front end of the plunger, the other end of the spring being attached to the cap 21. A series of equally spaced perforations 32 positioned in line longitudinally along the lower side of the plunger 28 form, in effect, a rack carried by the plunger. A spur gear 33 turns on the shaft 25 and meshes with the rack 32. A smaller gear 34 is fastened to and turns with the gear 33. A shaft 35 turns freely in bearings 36 formed by perforations in the sheet metal side plates 23 and a gear segment 37 is fast on the shaft 35 and meshes with the gear 34. The shaft 35 and gear segment 37 are turned through a limited angle by means of the lever 38 which is fast on the shaft, the upper end of the lever being provided with a handle 39. Downward movement of the lever 38 is limited by the pivotally mounted stop 40 which normally occupies the vertical position shown in the drawings, in which position of said stop the lever 38 will be stopped in its downward movement when the handle reaches the dotted position 39a. The stop 40 may be turned to the horizontal dotted position 40b in which position movement of the lever 38 will be stopped with the handle in the dotted position 39b.

The screw S1 with the knurled wheel S2 is adjustable in the threaded post S3 which provide means for adjusting the angular elevation of the gun about its trunnions 26.

Force applied to the lever handle 39 moving it downward will cause the gear segment 37 to turn upward, rotating the gears 34 and 33 and thus causing forward movement of the plunger 28. Release of the handle 39 will permit the spring 31 to retract the plunger 28, reversing the motion of the gears and segment and returning the lever arm 38 to its upper position. The downward movement of the lever 38 to fire the gun is particularly advantageous due to the fact that considerable force will be applied to the lever handle 39 when the gun is fired and the downward direction of this force does not tend to tip the gun over or disturb its position but tends to hold the gun in position. With this object in view the supporting surface of the base 22 is made of sufficient width and is extended rearwardly to a point where the base will be below the handle 39 in any position of said handle.

For loading the gun an aperture 41 is provided in the barrel at the breech, said aperture being preferably located on the upper side of the barrel. The gun would operate satisfactorily if this aperture were simply an opening of sufficient size for inserting a projectile in proper position in the breech chamber. There would however be an element of danger in that a person might insert a finger into the breech loading aperture and at the same time the lever 38 might accidentally be forced down thus moving the plunger forward and causing injury to the finger. To eliminate this hazard the breech opening 41 is provided with a sheet metal shutter 42, a cross section of which, taken on line 5-5 of Fig. 3, is shown in Fig. 5. This shutter preferably conforms to the tubular shape of the barrel when said shutter is closed as shown in Figs. 3 and 5. A slight enlargement of the barrel at 43 permits the lower portion 44 of the shutter to lie within

the barrel when the shutter is closed. The shutter is provided with two projecting ears 45 which, with the ears 46 which project from the barrel, and the pin 47, form a hinge on which the shutter turns. A prong 48 on one ear of the shutter hinge provides a stop to make contact with the barrel and so to limit the opening movement of the shutter at the dotted position 42b. In the open position of the shutter, as shown in Fig. 5 at 42b, the lower portion 44 forms an obstructing member occupying a position in front of the plunger and so preventing any possible movement of the plunger forward into the loading chamber 49. The prong 50 projects outwardly from the shutter when said shutter is closed and forms a convenient handle for opening the shutter. In the open position the semi-cylindrical shape of the shutter forms a convenient loading receptacle for the projectile which is carried down thereby into the breech chamber 20 when the shutter is closed.

To load and fire the gun, the shutter 42 is opened, a projectile is placed in the shutter receptacle, the shutter closed, the handle 39 is pressed down until the lever 38 strikes the stop 40, said stop occupying the vertical position shown in the drawings, the plunger will have moved forward forcing the projectile toward the muzzle to the position shown at 51. The handle 39 is then released and moves upward to its upper position. The breech chamber is again loaded with another projectile as before, the handle 39 is again forced down, preferably with a quick motion, forcing the second projectile forward which compresses the air between the two projectiles, discharging the first projectile with an accompanying loud report, the second projectile being left in the position formerly occupied by the first at 51. The gun may be fired as often as desired using the same projectiles repeatedly. Obviously, after each firing of the gun, a projectile remains in the muzzle. If it is desired to remove this projectile after the gun has been used, this may be done by first turning the stop 40 down to the horizontal position 40b and then forcing the handle 39 down to the lower position 39b, thus causing the plunger to move forward far enough to eject the remaining projectile from the barrel.

Figs. 6 and 7 illustrate another modification of the invention which is also constructed in the form of a cannon. In this construction the plunger is actuated by a stiff spring during the forward stroke and means are provided to easily retract the plunger and compress the spring.

The tapered barrel 51 is shown with two projectiles 52 and 53 in position for firing. The barrel 51 and shutter 55 are identical to those shown in Figs. 3 and 4 and function in the same way. The barrel is supported on the front end of the housing 56 which housing encloses most of the operating parts of the gun and a cap 57 closes the rear end of the housing.

The plunger 58 is guided to move axially in line with the barrel 52 and comprises a sheet metal tube closed at the front end and open at the rear end. A rod 59 is riveted at the rear end 60 to the housing cap 57 and is positioned axially in line with the barrel. This rod 59 serves as a guide for the compression spring 61, which fits loosely thereon, the spring also fits freely within the tubular plunger 58. A plate 62 fits tightly within the front end of the housing 56 and is provided with a hole 63 forming a bearing and front guide through which the plunger 58 moves. The rear

of the plunger 58 rides on the spring 61 and is guided thereby.

A sheet metal plate 64 forming a flange is fitted tightly to the rear end of the plunger 58 and is provided with a curved finger 65 which extends upwardly from the upper center of the plate, the curved end of the finger fitting freely in a guide slot 66, which slot extends longitudinally along the upper center line of the housing 56. The finger 65 serves the double purpose of providing a visible indicator showing the position of the plunger at all times and also providing means to retain the plate 64 against rotation about the axis of the plunger. A latch member 67 has hinged connection at 68 to the lower rear portion of the plate 64 and travels longitudinally therewith. A hook 69 formed on the lower edge of the latch 67 is adapted to normally contact the rearward side of the screw thread 79. The latch member 67 is also provided with a finger portion 70 extending rearwardly therefrom and, in the cocked position shown in the drawings, projects through a slot 71 in the cap 57. An elastic shock absorbing bumper member 72, preferably cylindrical in form, encircles the rear portion of the plunger 58 and in contact with the plate 64. This shock absorbing member may be composed of any suitable elastic material and is here shown as composed of sponge rubber which has proved most satisfactory for this purpose.

Manually operable means for retracting the plunger after the gun has been fired is provided by the screw member 73, the hand wheel 74 and handle 75. The screw member 73 is here shown as comprising a tubular body portion 76 mounted to rotate about its axis in parallel alignment with the axis of the plunger 58, and turning on bearings 77 and 78 formed in the front plate 62 and cap member 57 respectively. The threaded portion 79 of the screw member comprises a wire coil which closely fits the body 76 and is preferably soldered thereto. The rear end of the wire forming the screw thread 79 is bent to form a short circular segment 80 which provides a land for the hook 69 when the plunger is fully retracted, eliminating any tendency for the pressure of the hook 69 against the segment 80 to cause rotation of the screw. The extreme end of the wire is bent sharply at right angles to the circular segment as shown at 80a forming a stop to make contact with the side of the hook 69 and prevent further rotation of the screw 73 after such contact is made.

A trigger member 81 is pivoted to turn freely on a pin 82, said pin being riveted to the cap 57. This trigger member is provided with a finger 83 which projects horizontally under the latch finger 70 and is normally held in position by the trigger spring 84.

A sheet metal saddle 85, with perforated depending ear portions 86, is attached to the under portion of the housing 56 preferably by spot-welding and provides pivotal supporting means for the barrel and housing on the horizontal shaft 87, which shaft is carried by bearings in the vertical side plates 88 of the base 89, the ends of the shaft 87 serving as trunnions for the cannon.

The same means for adjusting the angular elevation of the gun barrel is employed here as in the previously described embodiment of the invention and consists of the knurled wheel 90 on the screw 91 which screw is adjustable in the internally threaded post 92.

To operate the gun, assuming first that the plunger is in the released or forward position in

the barrel, the hand wheel 74 is turned clockwise as seen from the rear, the hook 69 of the latch 67, lying of its own weight against the screw, will be caught by the revolving screw thread 79 and will function as a threaded nut, causing the plunger to be drawn backwardly and compressing the spring 61. Turning of the hand wheel is stopped when the operator observes that the finger 65 has reached the end of the slot 66 or when further movement is prevented by the stop 80 striking the side of the hook 69. A projectile is then placed in the breech chamber by means of the shutter as previously described in connection with Figs. 3 and 5. The trigger 81 is then pulled down which raises the latch 67 and releases the hook 69 from engagement with the screw thread 79. The released plunger is then forced forward by the spring 61 so quickly that the latch 67 does not have time to fall into engagement with the screw until the plunger is stopped at the end of its stroke by impact of the bumper 72 against the end plate 62. Notwithstanding the high speed of the plunger the restricted diameter of the muzzle will retain the projectile as shown at 53. The hand wheel is again rotated to retract the plunger to the cocked position, another projectile is loaded into the breech chamber and the gun is then ready to be fired by pulling the trigger. When the gun is fired, the plunger and two projectiles in the barrel function as in the other embodiments of the invention already described.

Figs. 8 and 9 illustrate another modification of the invention, constructed to simulate a cannon, and also employing a manually operated lever to actuate the plunger similar to the gun illustrated in Figs. 3 and 4. Here a lever and link connection between the manually operated lever and the plunger is provided instead of the geared connection employed in the former gun.

The barrel 93, shown broken away in Fig. 8, and the shutter 94 are identical to those described in the foregoing and illustrated in Figs. 3 and 5. The plunger 95 comprises a hollow tube closed at its front end and carries at its rear end an annular flange 96 which is seamed tightly thereon. The outside of said flange 96 fits freely within the cylindrical sheet metal housing 97 and serves to guide the rear end of the plunger in its longitudinal movement therein. The front end of the plunger 95 fits freely in the flat ring 98 which is fast in the housing 97, said ring serving as a guide for the plunger as it moves there-through.

The sheet metal housing 97 is formed as an incomplete cylinder with an opening or slot 99 along its lower side. At the edges of this slot the sheet metal is bent downward to form two parallel vertically positioned supporting plates 100. Oppositely positioned holes at 101 provide bearings for the shaft 102, which shaft functions both as a driving shaft and cannon trunnions. The gun base comprises a base plate 103 and the vertical side plates 104 and 104', said side plates being attached to the base plate by means of flanges 105 and 105' which are preferably spot welded to the base plate. Oppositely positioned holes 106 and 106' in the side plates provide supporting bearings for the shaft 102 and serve as trunnion bearings. The shaft 102 carries the manually operable lever 107 which is fast thereon and a lever arm 108 is also fast on the shaft 102 and positioned centrally between the plates 100 and 100'. A lever 109 is journaled at its lower end to oscillate freely about the pin 110 which pin fits tightly in holes in the plates 100 and 100'. The upper

end of the lever 109 is connected to the plunger 95 by means of the link 111. The plunger wall is slotted at 112 above and below the link 111 to permit angular oscillation of the link above and below the horizontal about the pin 113 by means of which the link is attached to the plunger 95. The slots 112 also provide clearance for the upper end of the lever 109 to pass up through the plunger when the lever, link and plunger move forward.

A link 114 connects the lower end of the lever arm 108 to the lever 109 by means of the pins 115 and 116 respectively. A tension spring 117 is attached at one end to the lever 109 at 118 and at the other end to a stationary pin 119 carried by the base. The function of the spring is to return the lever 109 and other connected parts to the normal position, shown in the drawings, after the operating lever 107 has been moved down.

As in the previously described guns, adjustment for angular elevation of the gun is provided by the knurled wheel 120, the screw 121 and the internally threaded post 122.

When the lever 107 is forced down to its lower position by means of the handle 123, shown dotted only in its lower position, the lever 108 will be caused to move to the dotted position 108b, the link 114 moves to the dotted position 114b, the lever 109 moves to the dotted position 109b and the link 111 to the dotted position 111b, the plunger 95 then occupies its forward position. Upon release of the handle 123 the spring 117 will return the lever 109 and other connected parts to their normal position.

In operation the projectiles are loaded into the barrel and, with the plunger, function the same as in the gun shown in Figs. 3, 4 and 5 previously described. While no adjustable stop means for the lever movement is shown in the drawings, such as the stop 40 of Fig. 3, it is contemplated that such a stop means may be applied to this type of construction if so desired, thus providing similar means for mechanically clearing the barrel of projectiles after the gun has been used.

Figs. 10 and 11 illustrate a further modification of the invention, also simulating a cannon, which employs a spring actuated plunger and lever mechanism for retracting the plunger to the firing or cocked position, which is the position shown in the drawings.

The barrel 124, shown broken away in Fig. 10, and the shutter 125 are identical to those described in the foregoing and illustrated in Figs. 3, 5 and 6, and with the improved type of projectiles already described, one of which is shown in the breech chamber at 126, and a plunger, these parts function in the manner already described. The construction and function of the plunger 127, the spring 128, the guide ring 129, the guide rod 130 and the shock absorbing bumper 131, are similar to the equivalent parts shown in Figs. 6 and 7.

The sheet metal housing 132 is shaped to form a cylinder in which the two adjacent edges do not quite meet, leaving a narrow longitudinal slot 133 along the lower side of the housing. The annular ring 134 is fitted tightly to the rear end of the plunger and serves as a guide therefor sliding freely in the housing 132. Two downwardly extending flange plates 135 and 135' are positioned opposite and parallel to each other and are attached to the housing by means of curved flanges preferably spot welded thereto. Two opposite outwardly extending pins 136 are riveted to the flange plates 135 and 135' and serve as cannon trunnions.

The cannon base comprises the base plate 137 and the two opposite and parallel vertical side plates 138 which are fastened to the base plate by means of flanges 139 preferably spot welded to the base plate. Oppositely positioned holes in the side plates form bearings for the drive shaft 140 and similar holes support the bearing pin 141. The operating lever 142 is fast on one end of the shaft 140 and is provided with a handle 143 at its outer end. The lever 144 is also fast on the shaft 140. A link 145 drivingly connects the upper end of the lever 144 to the lever 146 at pins 147 and 148 respectively. A dog 149 is pivoted on the pin 150 between prongs formed on the upper end of the lever 146. A spring 151 encircles the pin 150, one part of the spring bearing against the lever 146 and another part against the dog 149, said spring being initially tensioned so as to impart a constant upward turning force to the dog about the pin 150. A lug 152 projects laterally from a point adjacent the rear end of the dog 149 and provides a stop to contact the lower side of the housing 132 to limit turning movement of the dog upwardly. A tooth 153, carried by the rear end of the dog 149, projects upwardly through the slot 133 and is provided to contact the lower forward face of the flange 134. A finger 154, also carried by the rear end of the dog, projects rearwardly therefrom.

A catch member 155 is pivoted on a pin 156 which pin is riveted to and projects inwardly from the flange 135'. Said catch 155 carries at its rear end a tooth 157 and finger 158 similar in shape to the tooth 153 and finger 154 on the dog 149. The catch 155 is normally held in the horizontal position shown in the drawings, by a spring 159 attached to the flange 135', which spring contacts the shoulder 160 forming a part of the catch member 155. A stop pin 161 limits downward movement of the spring.

A trigger member 162 is pivoted on the pin 163 and carries a forwardly projecting finger 164, which finger is of sufficient width horizontally to overlap both the fingers 154 and 158 of the dog 149 and catch 155 respectively. The trigger member is normally held in the position shown, either by spring means or by weight of the rear portion of the trigger member.

Adjustment for angular elevation of the gun is provided by the knurled wheel 165, the screw 166 and the internally threaded post 167.

When the parts are in the cocked position, which is the position shown in Fig. 10, the catch member 155 functions as retaining means, the tooth 157 engaging the lower edge of the guide ring 134, to prevent forward movement of the plunger 127. The tooth 153 of the dog 149 is also in contact with the guide ring 134 as shown, due to the weight of the actuating levers, but said tooth 153 performs no function while in this cocked position.

Assuming the parts to be in the cocked position as shown, the act of pulling the trigger 162 causes the finger 164 to move down, forcing the fingers 154 and 158 down, drawing the teeth 153 and 157 down, and thus releasing the plunger 127, and permitting the spring 128 to drive the plunger forward until it is stopped by contact of the shock absorbing bumper 131 against the plate 129. To again cock the gun the lever 142 is raised to the upper position, shown dotted in the drawings, with the handle at 143b. This movement of the lever 142 moves the other connected parts to the dotted positions shown at 144b, 145b, 146b, 147b, and 153b. When the handle 143 is again

forced down, the tooth 153 moving rearwardly catches against the flange 134 and its further rearward movement forces the plunger 127 rearwardly, until the flange 134 passes over the catch tooth 157 which snaps up and again catches against the flange as shown when the handle 143 is released.

The use of a lever to be manually operated in a downward direction toward the supporting surface, as employed in three modifications of this invention here shown, is highly advantageous due to its simplicity, ease of operation and the stability of the gun when being so operated. A necessary feature of this construction to insure the desired stability, without fastening the base to the supporting surface, lies in the proper relative positioning of the operating means and the supporting means. The supporting surface of the base, or supporting means, is so located in reference to the direction of the applied force which operates the gun, that there is no tendency to disturb the position of the gun while being operated. To this end the invention provides that the applied force be directed toward points within or close to some part of the base area of the supporting means, said base area constituting the area included in a plane geometrical figure bounded by peripheral lines joining the points of contact of the supporting means with the supporting surface. For example, if the supporting means were a tripod the base area would constitute the area of a triangle bounded by the three straight lines joining the tripod feet.

Obviously other means than a lever arm for applying the actuating force downwardly may be employed without departing from the scope of the invention, and obviously any suitable type of supporting means may be employed for the gun, as for instance some suitable form of wheeled carriage.

While I have illustrated and described herein four cannon type of guns designed to employ my improved type of projectile, and fulfil the objects primarily stated, it is to be understood that it is not intended to confine the invention to the particular embodiments herein shown, since it may be embodied in various other forms which may obviously include simulations of a rifle, a shot gun, a pistol, or the like, all coming within the scope of the invention.

What I claim as my invention and desire to secure by Letters Patent is:

1. A projectile for use in an air gun of the type in which one projectile is positioned within the bore of the gun near the muzzle thereof and in which a second projectile is moved through the bore toward the muzzle to act as a piston to compress air to cause discharge of the first

projectile from the muzzle, said projectile comprising an elastic compressible body of porous cellular material having open pores on that surface of the body contacting with the walls of the bore of the gun and having a substantially non-porous flexible wall disposed transversely of said bore.

2. A projectile for use in an air gun of the type in which one projectile is positioned within the bore of the gun near the muzzle thereof and in which a second projectile is moved through the bore toward the muzzle to act as a piston to compress air to cause discharge of the first projectile from the muzzle, said projectile comprising an elastic compressible body of porous cellular material having open pores on that surface of the body contacting with the walls of the bore of the gun and having a substantially non-porous flexible wall disposed transversely of said bore and a lubricant impregnated in the pores of said cellular material.

3. As a new article of manufacture, a projectile for use in a toy gun, said projectile comprising an approximately cylindrical body of highly resilient compressible porous cellular material having pores opening on at least the major part of the cylindrical surface of the body and having a substantially non-porous wall extending substantially across at least one end of said body.

4. As a new article of manufacture, a projectile for use in a toy gun, said projectile comprising an approximately cylindrical body of highly resilient compressible porous cellular material having pores opening on at least the major part of the cylindrical surface of the body and having a substantially non-porous wall extending substantially across at least one end of said body, and lubricant impregnated in the pores of said body.

5. A projectile according to claim 3 in which said porous cellular body is sponge rubber and in which said non-porous wall is of rubber.

6. A projectile according to claim 4 in which said porous cellular body is sponge rubber.

7. A projectile according to claim 4 in which said porous cellular body is sponge rubber and in which said lubricant has relatively low evaporation characteristics.

8. As a new article of manufacture, a projectile for use in a toy gun, said projectile comprising an approximately cylindrical body of highly resilient compressible porous cellular material having pores opening on at least the major part of the cylindrical surface of the body, and lubricant impregnated in the pores of said body.

EDWARD S. SAVAGE.