

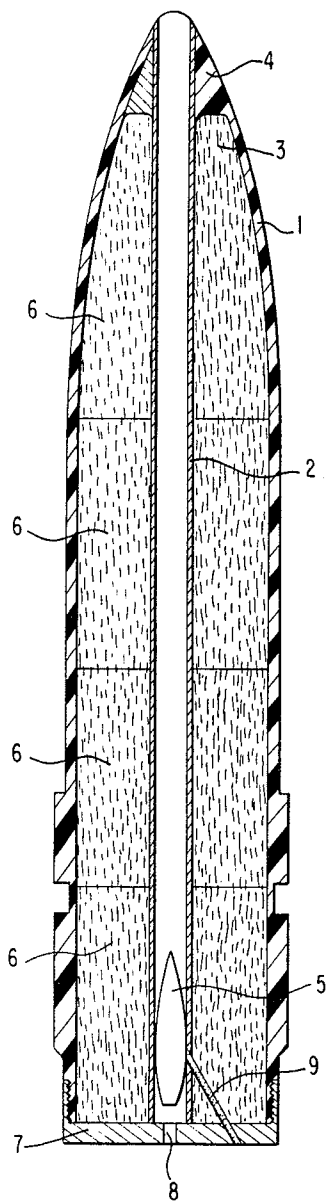
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E. JOCH

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PRACTICE PROJECTILE

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INVENTOR

ERICH JOCH

BY

Richard Craig

ATTORNEYS

1

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PRACTICE PROJECTILE

Erich Joch, Bensberg-Refrath, Germany, assignor to Dynamit Nobel Aktiengesellschaft, Troisdorf, Germany

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12 Claims

ABSTRACT OF THE DISCLOSURE

The present disclosure relates to a practice projectile that will fire from the barrel of a weapon in the manner of live ammunition, will partially disintegrate upon ejection from the barrel, hit the target with a simulated live projectile, and have a greatly reduced range of danger. The projectile includes a large calibre projectile that will readily disintegrate upon leaving the corresponding calibre barrel of the weapon and a small calibre projectile that will be guided along and projected from a sub-calibre barrel centrally arranged within the large calibre projectile. The small calibre projectile will receive its motive force through orifices in the rear of the large calibre projectile from the propellant gases so that it will leave the sub-calibre barrel around the time that the large calibre projectile leaves the barrel of the weapon. The rigid, small calibre projectile will then travel the trajectory to strike the target to simulate the effect of live ammunition. Preferably, the large calibre projectile is constructed with an outer thin walled case and inner sub-calibre barrel forming tube of a synthetic polymer; the space between these two elements is filled with particulate material.

Background of the invention

In training troops, particularly in peace time, it is desirable to provide ammunition for target practice, that is, ammunition that will produce a projectile for striking the target. It is also desirable to have the range of danger substantially reduced as compared to the shooting of live or normal-type ammunition and function in an automatic weapon substantially the same as live ammunition in regard to barrel recoil, cadence, muzzle blast, muzzle flash, etc.

It is known in the prior art to provide target projectiles, particularly constructed from synthetic resin or synthetic polymers, for shooting in a danger range that is substantially reduced as compared to live ammunition. While the desired result of a reduced range is obtained with this type of prior art projectile, the desired above-mentioned effects within the weapon, particularly a heavy automatic weapon with automatic recoil mechanisms, is either not obtained or at best obtained only to an unsatisfactory degree usually as a result of additional complex and expensive modifications of the weapon. In addition, it is known in the prior art to provide a disintegrating type projectile that will produce the desired above-mentioned effects within the barrel of the weapon, but no impact effect is produced with a target because the projectile disintegrates to a large degree while still within the barrel or shortly before emerging from the barrel. Both of the above-mentioned prior art types of projectiles do not satisfy the requirements of a target projectile for shooting within a reduced danger range, as compared to live ammunition, to strike a target and also assure the automatic operation of an automatic operation of an automatic weapon, par of an automatic weapon, particularly with automatic recoil mechanisms, as would be done with live ammunition. Therefore, it is seen that there are basically two desirable categories of effects or requirements for a target projec-

2

tile that has been satisfied singly by the prior art, but that have not been satisfied by a single prior art projectile. It is an object of the present invention to provide a projectile that will satisfy these heretofore conflicting requirements or effects in a simple and economical manner.

Brief description of the invention

The above-mentioned disadvantages and the above-mentioned requirements have been satisfied with the projectile of the present invention that employs a relatively large calibre projectile having an outer synthetic polymer thin walled case and an inner thin walled synthetic polymer tube, with the space therebetween filled with particle type material, preferably metal powder, metal shavings, or the like that are usually disintegrated under the large forces encountered during firing shortly before the projectile leaves the barrel of the weapon or shortly thereafter. The tube is centrally located to form a central axial sub-calibre barrel open at the forward end and covered at the rear end except for relatively small orifices or apertures to throttle and admit propellant gases into the rear end of the sub-calibre barrel. A sub-calibre or relatively small calibre solid projectile or live ammunition is provided in the rear end of the sub-calibre barrel; the small calibre projectile may be constructed of metal, a synthetic polymer or other suitable materials.

The relatively large, heavy projectile of the present invention will completely assure the automatic operation of the weapon, particularly a weapon having automatic recoil mechanisms, because the projectile may be designed to have the same weight and other barrel characteristics as the live ammunition designed for the weapon. On the other hand, the inserted relatively small calibre solid projectile will be guided by and projected from the sub-calibre barrel of the large calibre projectile to produce an impact effect upon the target to truly simulate the live ammunition only within a substantially reduced danger range as compared to the live ammunition designed for the weapon.

Preferably, the projectile is designed so that the small calibre solid projectile is carried within the readily disintegratable large calibre projectile to within a short distance from the front of the weapon muzzle before it begins its own free flight after leaving the sub-calibre barrel of the large calibre projectile. Therefore, with this preferred construction it is assured that the small calibre projectile, which is very light when compared with the live projectile designed for the weapon, is securely guided within the weapon barrel up to about the muzzle thereof. Thus, there is no danger that the small calibre solid projectile will be deflected from its predetermined flight trajectory by passing gases while still being contained within the barrel of the weapon, which might result that it is struck against the inner weapon barrel wall where it could be smashed. According to a more narrow aspect of the present invention, the sub-calibre barrel may be provided with rifling or guiding grooves for rotating the small calibre projectile to improve its stability during flight. Broadly, the larger calibre projectile may be constructed as a unitary or multi-part readily disintegratable body so that these grooves may be made directly in the walls forming the sub-calibre barrel to thus eliminate any special lining or tube for the sub-calibre barrel. Preferably, the disintegratable charge is loosely accommodated within a thin-walled chamber producing a lining for the sub-calibre barrel, which may be provided with the rifling or grooves mentioned above. Preferably this chamber and sub-calibre barrel is formed with a thin-walled synthetic polymer tube for construction economy and improved stability within the weapon barrel. Preferably, the small calibre projectile is provided with a coating of soft material, particularly a soft synthetic polymer, so that it

will readily interengage with the grooves of the sub-calibre barrel to assure the faultless rotation of the small calibre projectile by the rifling.

The propulsion of the small calibre solid projectile in the sub-calibre barrel of the readily disintegratable large calibre projectile may be influenced to a large extent and in the desired manner by appropriately dimensioning the orifice means or bores in the bottom of the large calibre projectile case to correspondingly change the throttling of the propulsion gases into the sub-calibre barrel. Additional bores may be provided for introducing propellant gases into the rear end of the sub-calibre bore; particularly desirable results are obtained when these bores open into the side walls of the sub-calibre barrel immediately adjacent the sealing portions of the small calibre solid projectile so that these bores are not opened for conducting gases until the small calibre projectile has moved forwardly a substantial distance in the sub-calibre barrel. Also, these bores may be rendered inoperative until a predetermined time after ignition, by providing a delay combustible composition that will burn off at a controlled desired rate to open the bore for the passage of propellant gases into the sub-calibre barrel after a desired controlled delay period of time. Therefore, the propulsion characteristics of the sub-calibre or small calibre projectile may be accurately adjusted and controlled.

An example of a synthetic polymer is polyvinyl chloride. As mentioned in the specification, various elements of the present invention may be constructed of a synthetic polymer for ease of molding, destructibility, economy and efficiency.

Additional objects, features, advantages and embodiments of the present invention will become more apparent from the following description of the drawing.

Brief description of the drawing

The single figure in the attached drawing illustrates a preferred embodiment of the present invention.

Detailed description of the invention

The target projectile of the present invention consists of a relatively large calibre readily disintegratable projectile and a relatively small calibre relatively rigid projectile contained therein.

The relatively large calibre projectile comprises an outer synthetic polymer case 1 that has a plurality of sealing rings on its outer periphery adjacent its rear end for providing sealing engagement with the walls of the weapon barrel to prevent the escape of the propulsion gases past the projectile. The forward end of the case 1 is closed with and sealed with the forward end of a synthetic polymer thin-walled tube 2, which forms the sub-calibre barrel for guiding the small calibre projectile. At the rear end, the tube 2 and case 1 are closed by a cover or cap-like constructed bottom 7 except for an axially extending centrally located orifice or bore 8 communicating with the sub-calibre barrel. The space or chamber formed by the case 1, tube 2, and bottom 7 is filled with loose particles of relatively heavy material, for example, metal shavings, which are at most only loosely bonded together. Preferably, this particle material is bonded into several separate annular blocks 6. An additional orifice or bore 9 is provided to extend at an angle through the bottom 7, the rearmost portion of the particle material 6 and the side wall of the tube 2 to provide communication between the outside rear of the projectile and the rear interior of the sub-calibre barrel; this bore 9 is filled with a delaying composition that will burn upon ignition to open up the bore after a controlled period of time after ignition. The tip or forward end of the projectile is reinforced by an integral molded thickening of the synthetic polymer case 1 as shown at 4 or alternatively by a separate synthetic polymer insert as shown in the left-hand side opposite the reinforcement 4; thus, two embodiments have been shown in the drawing for purposes of simplicity.

The relatively small calibre solid projectile 5 is accommodated within the rear end of the sub-calibre barrel formed by the tube 2. The projectile 5 is formed as a conventionally shaped projectile and may be constructed of a synthetic polymer, metal or like material.

Upon ignition, the propellant gases which develop from the ignited propellant charge (not shown) will form behind the projectile to drive the projectile, that is, the large calibre projectile and small calibre projectile as a unit, forwardly in the barrel of the weapon (not shown) by the reaction of the pressure against the bottom 7. An amount of the propellant gas that is determined by the size and shape of the throttling bore 8 enters the rear end of the sub-calibre barrel at a controlled rate to thereby drive the small calibre solid projectile 5 forwardly within the sub-calibre barrel formed by the tube 2. The propulsion of the small calibre projectile may be adjusted and varied by a suitable design of the orifice 8. In the meantime, the delaying composition within the slanted bore 9 is ignited and burns over a predetermined delay period, after which the bore 9 is opened to allow the entrance of the hot propellant gases, which will then provide an additional impulse to the bullet 5 for its desired final projection from the sub-calibre barrel. It is highly advantageous to provide the opening of the slanted bore 9 adjacent the sealing surface of the small calibre projectile 5 so that this bore 9 will not be opened until the small calibre projectile 5 has moved a substantial distance forwardly in the sub-calibre barrel formed by the tube 2.

In order to assure, on the one hand, that the small calibre projectile 5 is guided over the entire length of the weapon barrel but will not be deflected, on the other hand, from the predetermined flight path or trajectory thereof as a result of the subsequent disintegration of the readily disintegratable large calibre projectile, care must be taken that the conditions and construction are such that the small calibre projectile 5 will emerge from the sub-calibre barrel formed by the tube 2 shortly before the large calibre projectile leaves the weapon barrel and disintegrates, according to the most preferred embodiment of the present invention. This action will be enhanced by the propellant gases still present in the sub-calibre barrel when the readily disintegratable large calibre projectile emerges from the muzzle of the weapon and, respectively, by the propellant gases passing therethrough. Also, it is preferable that the large calibre projectile and the relatively small calibre projectile 5 together close off the barrel of the weapon (not shown) with respect to the propellant gases until the projectiles have arrived approximately at the muzzle of the weapon so that the pressure of the propellant gases will act with their full force for the propulsion of the movable parts, that is, provide the necessary recoil for the actuation of the automatic mechanisms of the automatic weapon, particularly a heavy automatic weapon. Independently of these characteristics, it is possible to influence or adjust to a relatively large degree and in the desired accurate manner the flight range or trajectory of the small calibre projectile 5 by corresponding design or choice of the associated structure, for example, by a correlation between the cross-sectional dimensions of the relatively large calibre projectile and the relatively small calibre solid projectile 5, by the dimensions of the bore or orifice 8, by the number and dimensions of the bores or orifices 9, by the placement of the bores 9, by the selection of the delaying composition within the bore 9, and by a selection of the particular material used to construct the relatively small calibre projectile 5 to change its weight.

The above described preferred embodiment and variations have been set forth merely as illustrative examples of the present invention and additional variations, modifications, embodiments and the like are contemplated within the spirit and scope of the present invention as defined by the following claims.

I claim:

1. A practice projectile with an axis for practice firing from the normal barrel of a firearm in its axial direction under the influence of a separate motive force to strike a target within a reduced danger range and produce barrel firing effects substantially the same as live ammunition, comprising: large caliber projectile means of readily destructible construction for firing and for thereafter disintegrating within the close proximity of the firearm muzzle before striking a target; small caliber projectile means of relatively rigid construction, with respect to said large caliber projectile means, mounted within said large caliber projectile means for separating from said large caliber projectile means after firing to travel intact separately to the target independently of said large caliber projectile means; said large caliber projectile means having a central sub-caliber barrel means extending in the axial direction at least twice as far as said small caliber projectile means and being of uniform diameter substantially equal to the external diameter of said small caliber projectile means for guiding said small caliber projectile means; said small caliber projectile means being mounted in said sub-caliber barrel means.

2. The device of claim 1, said sub-caliber barrel means extending forwardly without restriction to and opening to the atmosphere at the forwardmost axial end of said large caliber projectile means; said sub-caliber barrel means extending rearwardly substantially without restriction to within close proximity to the rearwardmost axial end of said large caliber projectile means for guiding said small caliber projectile means during its separation from said large caliber projectile; said small caliber projectile means being mounted in the rearmost portion of said sub-caliber barrel; said large caliber projectile means having orifice means forming flow restricting gas passage for establishing fluid communication between said sub-caliber barrel rearwardly of said calibre projectile means and the exterior of the projectile at its rearward end, and for throttling the propulsion gases for said large calibre projection means and conducting them to the rear of said small calibre projectile means for providing the motive force to propel said small calibre projectile means forwardly along and out of said sub-caliber barrel.

3. The device of claim 2, said orifice means including a plurality of bores uniformly distributed around and extending completely through the rear portion of said large calibre projectile means.

4. The device of claim 2, said orifice means including at least one bore being filled with a combustile composition means for closing the corresponding bore only for a predetermined time after initial firing of the projectile to conduct propellant gases to said small calibre projectile means only after said large calibre projectile means has moved at least a substantial distance forwardly in the said sub-caliber barrel.

5. The device of claim 2, said orifice means including at least one passage means extending completely through the rear portion of said large calibre projectile means and having an opening in said sub-caliber barrel means immediately adjacent and aligned with the sealing portion of said small calibre projectile for conducting propellant gases into said sub-caliber barrel means only after said small calibre projectile has moved a substantial distance forward within said sub-caliber barrel means to open said opening.

6. The device of claim 2, a plurality of rifling groove means on the inside of said sub-caliber barrel means for rotating said small calibre projectile means to improve its stability during flight.

7. The device of claim 6, said small calibre projectile means having a coating on its exterior that is substantially softer than the remainder of said small calibre projectile means.

8. The device of claim 2, wherein said large calibre projectile means comprises a substantially tubular relatively thin-walled synthetic polymer case closed at one end

except for said sub-calibre barrel means; a synthetic polymer relatively thin walled tube forming said sub-calibre barrel means; additional synthetic polymer material between said case and tube in the vicinity of and reinforcing the forward end of said large calibre projectile means; means closing the rearward end between said tube and said case; particulate material at most loosely bound together filling substantially the entire space between said case, said tube and said closing means; and synthetic polymer annular sealing ring means on the circumferential exterior of said case for providing annular sealing engagement with the barrel of the weapon.

9. A practice projectile with an axis for practice firing from the normal barrel of a firearm in its axial direction under the influence of a separate motive force to strike a target within a reduced danger range and produce barrel firing effects substantially the same as live ammunition, comprising: large caliber projectile means of readily destructible construction for firing and for thereafter disintegrating within the close proximity of the firearm muzzle before striking a target; small caliber projectile means of relatively rigid construction, with respect to said large caliber means, mounted within said large caliber projectile means for separating from said large caliber projectile means after firing to travel intact separately to the target independently of said large caliber projectile means; said large caliber projectile means having a central sub-caliber barrel means extending in the axial direction and being of uniform diameter substantially equal to the external diameter of said small caliber projectile means for guiding said small caliber projectile means; said small caliber projectile means being mounted in said sub-caliber barrel means; said large caliber projectile means comprises a substantially tubular relatively thin-walled synthetic polymer case closed at one end except for said sub-caliber barrel means; a synthetic polymer relatively thin-walled tube forming said sub-caliber barrel means; additional synthetic polymer material between said case and tube in the vicinity of and reinforcing the forward end of said large calibre projectile means; means closing the rearward end between said tube and said case, particulate material at most loosely bound together filling substantially the entire space between said case, said tube and said closing means; and synthetic polymer annular sealing ring means on the circumferential exterior of said case for providing annular sealing engagement with the barrel of the weapon.

10. A practice projectile with an axis for practice firing from the normal barrel of a firearm in its axial direction under the influence of a separate motive force to strike a target within a reduced danger range and produce barrel firing effects substantially the same as live ammunition, comprising: large caliber projectile means of readily destructible construction for firing and for thereafter disintegrating within the close proximity of the firearm muzzle before striking a target; small caliber projectile means of relatively rigid construction, with respect to said large caliber means, mounted within said large caliber projectile means for separating from said large caliber projectile means after firing to travel intact separately to the target independently of said large caliber projectile means; said large caliber projectile means having a central subcaliber barrel means extending in the axial direction and being of uniform diameter substantially equal to the external diameter of said small caliber projectile means for guiding said small caliber projectile means; said small caliber projectile means being mounted in said sub-caliber barrel means; a plurality of rifling groove means on the inside of said sub-caliber barrel means for rotating said small caliber projectile means to improve its stability during flight.

11. The device of claim 10, said small calibre projectile means having a coating on its exterior that is substantially softer than the remainder of said small calibre projectile means.

12. The device of claim 11, wherein said large calibre projectile means comprises a substantially tubular rela-

7

tively thin-walled synthetic polymer case closed at one end except for said sub-calibre barrel means; a synthetic polymer relatively thin walled tube forming said sub-calibre barrel means; additional synthetic polymer material between said case and tube in the vicinity of and reinforcing the forward end of said large calibre projectile means; means closing the rearward end between said tube and said case; particulate material at most loosely bound together filling substantially the entire space between said case, said tube and said closing means; and synthetic polymer annular sealing ring means on the circumferential exterior of said case for providing annular sealing engagement with the barrel of the weapon.

5

10

8

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