

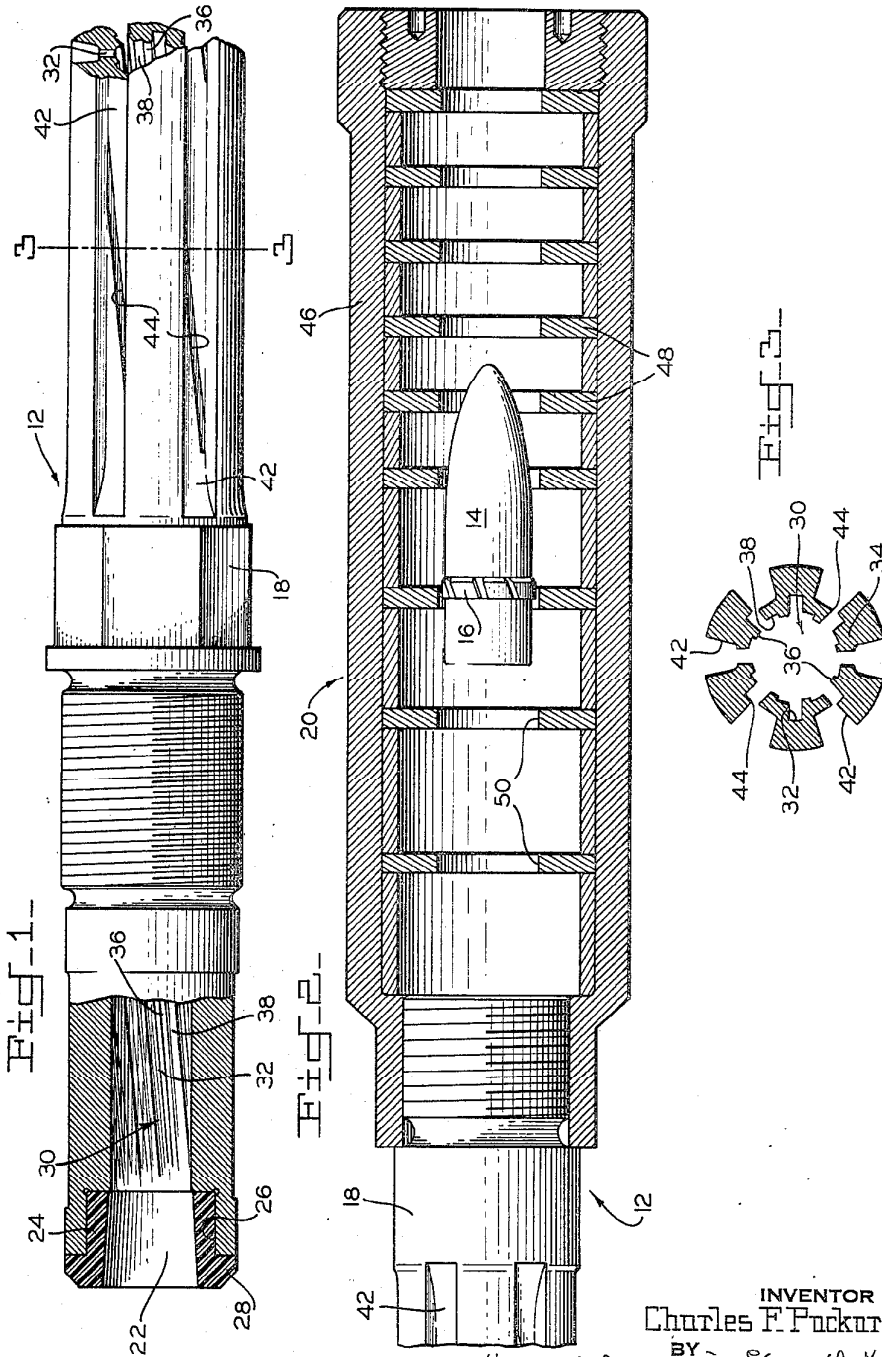
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GUN BARREL FOR SILENT LAUNCHING OF A PROJECTILE

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1

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GUN BARREL FOR SILENT LAUNCHING OF A PROJECTILE

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3 Claims

ABSTRACT OF THE DISCLOSURE

This invention provides a barrel for those weapons designed for silent launching a projectile which is propelled into flight by mechanical impulse of an energized element thereagainst. The barrel is designed to eliminate the shock waves produced by the initial acceleration of the projectile and the passage thereof through and from the barrel by forming therein deep rifling grooves which are intercepted by external channels to provide effective ventilation of the barrel bore. A plastic bushing is installed in the breech end to prevent metallic, noise producing impact by cooperating elements in the weapon and the impact of the projectile against the barrel during the chambering operation. A shock wave attenuator is mounted on the muzzle end of the barrel to break up the symmetrical configuration of any shock waves which might ont have been eliminated by the bore ventilation.

The invention described herein may be manufactured, used and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

It is seen in photographs taken at the muzzle end of a barrel during the firing cycle that a shock wave emerges well ahead of the projectile. This is followed by a column of air containing diamond-shaped shock waves and a shock wave which follows the emergence of the projectile from the barrel. These phenomena result in a muzzle blast which is heard each firing cycle, whereby the position of the weapon is revealed to the enemy.

This invention provides for those weapons designed for silent launching a projectile which is propelled into flight by mechanical impulse of an energized element thereagainst a barrel which attenuates the noise that results from the rapid propulsion of a projectile into flight in the barrel and its emergence therefrom. This is achieved by providing in the barrel deep groove rifling which allows relatively free passage of air from the front to the rear of the projectile as it passes down the barrel. Such rifling configuration results in a definite attenuation of the rumble which is caused in a conventional barrel by the muzzle emergence of the column of compressed air produced ahead of the projectile as it moves forwardly in the barrel.

Further dissipation of the column of compressed air, attenuation of the initial shock wave and elimination of the shock wave produced upon projectile emergence from the barrel bore is achieved by providing bore ventilation along most of the barrel length through the provision of external channels in the barrel arranged to intercept the rifling grooves and form orifices between the bore and the outside atmosphere. The free passage of air around the projectile from the nose to the base thereof also reduces the air pressure differentials fore and aft of the projectile in the bore and thereby eliminates any muzzle "pop" upon emergence of the projectile therefrom. The controlled passage of air from the barrel bore to the surrounding atmosphere through the orifices provides for further reduction of air pressure differential in the barrel bore

2

and attenuation of the initial shock wave into smaller patterns of lower intensity.

Further objects and advantages of the invention will be apparent from the specification and accompanying drawings which are for the purpose of illustration only and in which:

FIG. 1 is a fragmentary, elevational view of the rear end of the barrel assembly which is partially cross-sectioned to show the rifling and the installation of the plastic bushing therein;

FIG. 2 is a similar fragmentary, elevational view of the front end of the barrel assembly partially cross-sectioned to show the interior of the shock wave attenuator thereon; and

FIG. 3 is a two-dimension cross-sectional view taken along line 3--3 of FIG. 1.

Shown in the figures is a barrel assembly 12 for silent launching a projectile 14 having a rifling band 16. Barrel assembly 12 is composed of a barrel tube 18, a shock wave attenuator 20 mounted on the front end thereof, and a bushing 22 installed in the breech end. Bushing 22 consists of a sleeve portion 24 which is received by a mating counterbore 26 in the breech end of barrel tube 18 and a flange 28 that extends radially from the rear end of the sleeve portion to cover the rear end of the barrel tube. Bushing 22 is fabricated from a suitable plastic material for cushioning the rear end of barrel assembly 12 and eliminates any noise producing metallic impact between the barrel assembly and cooperating elements. Bushing 22 is provided with a centered bore therethrough which is coaxial with the bore 30 and has tapered walls to facilitate insertion of a projectile into the breech end of the barrel, as particularly shown in FIGURE 1 of the drawing.

Barrel tube 18 is provided with a bore 30 having eight equally spaced deep rifling grooves 32 and an equal number of stepped lands 34 formed therebetween. Grooves 32 are formed deep enough to permit free passage past projectile 14 of the air displaced forwardly thereof during passage along bore 30. Each of the stepped lands 34 includes an engraving rib 36 which extends radially from guiding surface 38 along the length of the land. Ribs 36 act to engrave rifling band 16 and thereby cause projectile 14 to spin, during passage thereof along bore 30. The diametrical distance between guiding surfaces 38 is approximately the same as the outside diameter of rifling band 16, which is the largest diameter of projectile 14, so that the guiding surfaces securely support the projectile during its flight along bore 30 and prevent ballooning therein. Ribs 36 are designed to positively spin projectile 14 with the least amount of engraving to minimize the loss of velocity caused thereby. This is important because projectile 14 with such a weapon for which barrel assembly 12 is designed, as described above, gains its maximum velocity immediately upon flight initiation and there are no entrapped gases under pressure to give further impetus to the projectile during its travel along the barrel bore as with conventional cartridge fired weapons.

Extending along the outside of barrel tube 18 are six equally spaced channels 42 which run out at both ends to the outside surface of the barrel tube and which are arranged to intersect grooves 32 to form elongated orifices 44 that permit passage of air between the grooves and channels. For instance, if grooves 32 are designed to twist one turn every eight inches of barrel length, then for twenty-four inches of rifling length each groove is intercepted at least twice by each channel 42. The amount of ventilation through orifices 44 can be controlled by varying the width of channels 42, which changes the size of orifices 44.

Attenuator 20 includes a cylindrical canister 46 mounted by screw means to the front end of barrel tube

18. Assembled inside cannister 46 are a plurality of washer-like baffles 48 each provided with a concentric hole 50 having a diameter greater than the largest diameter of rifling band 16 and they are all arranged so that the holes are aligned with bore 30. Baffles 48 are variably spaced so as to break up the symmetrical configuration of any shock wave which might emerge from bore 30, for attenuation of such shock wave.

I wish it to be known that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. A barrel for silent launching of a projectile, said barrel including a bore, and rifling in said bore formed to reduce differential air pressure fore and aft of the projectile during passage along said bore and comprised of a plurality of grooves having sufficient depth to permit passage of air therethrough around the projectile during passage along said bore, a plurality of lands respectively disposed between said grooves, said lands being of stepped configuration and each being composed of an engraving rib projecting radially into said bore from a guiding surface formed concentric with said bore, said engraving rib being designed to engrave a rifling band on the projectile during passage along said bore to impart a spin to the projectile, said guiding surfaces being disposed diametrically apart a distance approximately equal to the largest diameter of the projectile outside the rifling band, and a bushing means of plastic material in the

breech end of said barrel for preventing metallic, noise-producing contact between said barrel and cooperating elements contactable with the breech end thereof.

2. The barrel as defined in claim 1 and including a plurality of channels formed longitudinally along the outside of said barrel, said channels having sufficient depth to intersect said grooves and form at such intersections for venting said bore to the outside atmosphere.

3. The barrel as defined in claim 1 wherein said engraving ribs extend along the lengths of the associated ones of said lands parallel to the adjacent ones of said grooves.

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