

[54] **MUZZLE BLAST SUPPRESSOR**
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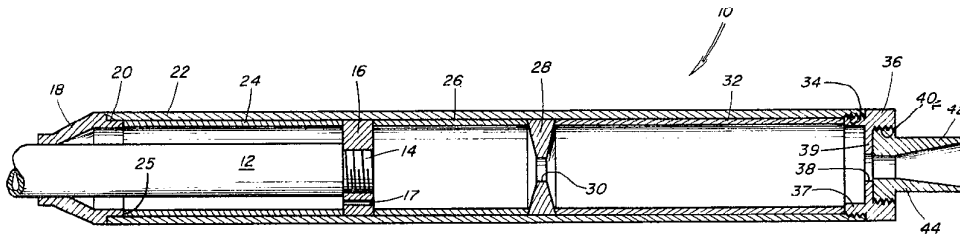
[57] **ABSTRACT**

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 [58] Field of Search **89/14 R, 14 B, 14 C, 89/14 D**

A muzzle blast suppressor having an elongate hollow body closed at its rearward end by a rearwardly tapering closure, centrally apertured to receive the barrel of a firearm, and having an internally disposed centrally apertured and threaded disc to which the muzzle of the firearm is threadedly secured. The forward end of the hollow body is closed by a centrally apertured closure, and a single internal baffle is positioned intermediate the forward closure and the threaded disc.

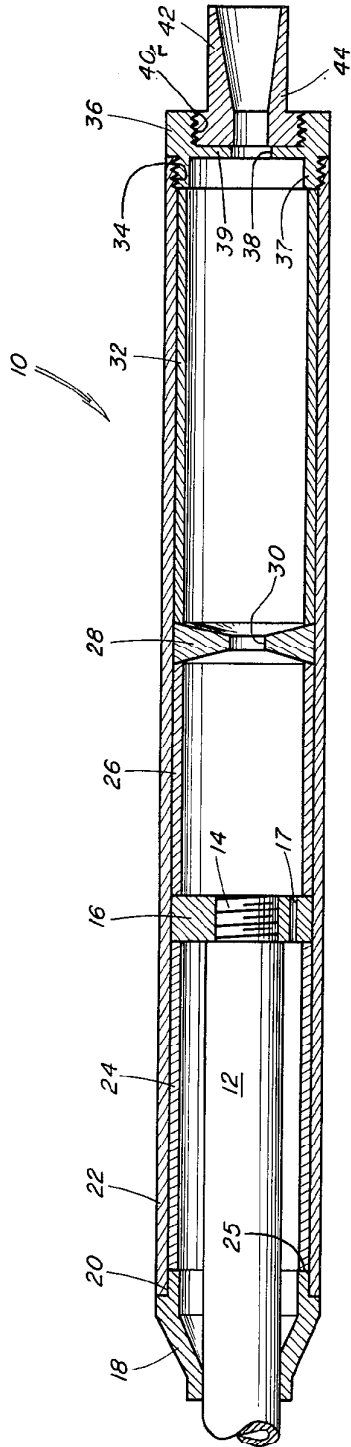
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1 Claim, 1 Drawing Figure



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MUZZLE BLAST SUPPRESSOR**BACKGROUND OF THE INVENTION**

This invention relates generally to muzzle blast suppressors, and more particularly to a muzzle blast suppressor for a rifle.

In many military applications, and in some civilian applications such as hunting, it is desirable that the sound emanating from a rifle upon discharge be minimized. Hunters prefer not to startle and frighten the other game in the area in which they are hunting, so that after firing their rifles they may continue to hunt in the same area without waiting for the frightened game to return. In military applications, the soldier firing a rifle desires that the sound generated thereby be minimal to render his detection by enemy forces as difficult as possible. If the enemy does not hear the rifle report they will be unable to locate its source. Moreover, even if they do hear the rifle report, it is far more difficult to locate the source of a soft or low intensity sound than that of a loud or high intensity sound. Therefore, it is distinctly advantageous to a soldier using firearms to have the sound emitted therefrom to be as quiet as possible.

A rifle report is composed of two distinct elements: the sound generated by the muzzle blast and the sound generated by the bullet. A bullet traveling at supersonic speeds generates a continuous shock wave which is perceived by those in the vicinity as a sharp crack which appears to come from the point along the path of the bullet closest to the perceiver. The only way to eliminate this sharp crack is to slow the bullet to below supersonic speeds. This has been done in the past but it renders the rifle ineffective in most tactical situations and therefore is not generally used. However, this sound source does not present a serious problem to the soldier because the sound generated by the supersonic bullet does not reveal the direction of the source and therefore is of no value to the enemy other than to inform him that there is an unfriendly presence in the area. It does not tell him in what direction he must look.

The second source of sound from a firing rifle, the muzzle blast, is a much more serious problem. The sound is generated at the muzzle of the rifle and propagates outwardly therefrom. This sound is perceived by the enemy as originating from its actual point of origin and thus reveals to the enemy not only the soldier's presence but also his location. If the sound can be attenuated to the point where it is inaudible or too low to reveal the direction of its source, the danger to the soldier will be greatly minimized.

Many attempts in the past have been made to achieve this goal, and some have been successful. The typical muzzle blast suppressor includes a hollow body secured to the muzzle end of the firearm and a series of baffles between the muzzle and the outer end of the device. They work by reducing the pressure and temperature of the gases issuing from the muzzle to subsonic level so that the gases do not issue from the exit end of the device in an abrupt high pressure front that produces a shock wave, but flow in a smooth and even current therefrom, producing no shock wave.

While these devices have been effective to reduce the muzzle blast, yet there are, for the most part, unacceptable for most military applications. This is because they are so large and heavy that they upset the balance of

the weapon to which they are attached and they render it so bulky and cumbersome as to preclude its use in most tactical situations where mobility and ease of manipulation are primary consideration.

Another disadvantage of the prior art muzzle blast suppressors is that their intricate interiors tend to trap and retain water and waterborne debris when the barrel is intentionally or unintentionally submerged. When this happens the device must be removed from the muzzle and disassembled for cleaning or must be discarded, because to fire the weapon when the muzzle blast suppressor is so blocked would cause the weapon to burst thereby greatly endangering the user.

The above deficiencies and limitations which characterize the prior art muzzle blast suppressors constitute a detriment more serious than the benefit their use provides. Therefore, the need has long existed for a small, lightweight, low cost, simple, and effective muzzle blast suppressor for use on the muzzle of a firearm.

SUMMARY OF THE INVENTION

Accordingly, one object of this invention is to provide a muzzle blast suppressor for a firearm that is small and effective.

Another object of the present invention is to present a firearm muzzle blast suppressor that is simple in construction and inexpensive to produce.

Still another object of the instant invention is to provide a firearm muzzle blast suppressor that is easily drained of water and waterborne debris.

Briefly, in accordance with one embodiment of this invention, these and other objects are attained by an elongate tubular body attached to, and axially aligned with the muzzle of a firearm and having an apertured end closure at the exit end thereof. Intermediate the end closure and the muzzle of the firearm is a single baffle having an aperture therethrough for the passage of a bullet. The distance between the muzzle end of the firearm and the interior baffle, and the distance between the interior baffle and the end of the suppressor is selected to minimize the exit impulse of the muzzle gases.

BRIEF DESCRIPTION OF THE DRAWING

A more complete appreciation of the invention and its many attendant advantages will develop as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying solitary drawing which shows an elevation of a muzzle blast suppressor according to the present invention, in longitudinal cross-section, and mounted on the muzzle of a firearm.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The solitary FIGURE shows a muzzle blast suppressor 10 mounted on the muzzle end of a rifle barrel 12. The muzzle of rifle barrel 12 is externally threaded at 14 and is threadedly secured to a disc 16 having vents 17 formed therethrough. A tapering collar 18 surrounds barrel 12 rearwardly of disc 16 and has formed on the outside periphery of the front end thereof an annular groove 20. The forward end of tapering collar 18 reduced in outside diameter by annular groove 20, fits into and is secured to the end of a tubular body 22 thereby sealing the end thereof around rifle barrel 12. The interior diameter of tubular body 22 is approxi-

mately equal to the external diameter of disc 16 hence a forwardly venting rear chamber is provided between collar 18 and disc 16. A first sleeve 24 having an external diameter approximately equal to the interior diameter of tubular body 22 fits between the forward end 25 of tapering collar 18 and the rearward face of disc 16 thereby holding tubular body 22 against forward movement and fixing the volume of the rearward chamber. A second sleeve 26 fits within tubular body 22 and abuts at its rearward end against the forward face of disc 16. A circular baffle disc 28 having an outside diameter approximately equal to that of the interior diameter of tubular body 22 fits within tubular body 22 and abuts against tubular sleeve 26 thereby providing between baffle disc 28 and disc 16 a central chamber of fixed volume. Both forward and rearward faces of baffle 28 taper inwardly to an axial aperture 30 formed through baffle 28 in axial alignment with rifle barrel 12. A third sleeve 32 having an outside diameter approximately equal to the inside diameter of tubular body 22 fits within tubular body 22 and abuts against the forward face of baffle 28. Sleeves 26 and 32 are effective to hold baffle 28 securely in place against axial shifting. Sleeve 32 is held in place by an end plug 36 threadedly secured to the end of tubular body 22 which is internally threaded at 34. End plug 36 has an integral sleeve 37 extending rearwardly therefrom of the same interior diameter as sleeve 32 and has threads formed on its exterior surface by which end plug 36 is secured to tubular body 22. An end closure disc 39 extends across end plug 36 and has formed therethrough an axial aperture 38 in alignment with axial aperture 30 in baffle 28 and rifle barrel 12. The forward chamber of fixed volume is thereby provided between baffle disc 28 and end closure 39. The forward end of end plug 36 is interiorly threaded at 40 and receives the externally threaded end of a flash hider 42. Flash hider 42 has a forwardly protruding tubular extension 44 having a forwardly flaring bore 46 which serves to obscure lateral observation of the muzzle flash.

The muzzle blast suppressor, designed for use on the 0.223 caliber M16 military rifle, was developed after extensive empirical and theoretical experimentation after testing and rejecting a great many prior art designs. The present design was discovered to give comparable or superior suppression of muzzle blast with a great reduction in size, weight, complexity, and production cost. The dimensional parameters found to provide the optimum combination of muzzle blast suppression and compactness of design are the following: inside diameter of the tubular sleeves is 1.334 inches; total length of tubular body is 10.969 inches; distance between the rearward face of disc 16 and the collar 18 did not appear to be important, provided it was long enough to provide secure and accurate alignment of tubular body 22 with rifle barrel 12; the distance between the forward face of disc 16 and the rearward face of baffle disc 28 is 2.406 inches; the distance between the

forward face of baffle 28 and the rearward face of end closure disc 39 is 3.344 inches. The diameter of apertures 30 and 38 is 0.260, only slightly larger than the bullet. The described device so dimensioned has been found to substantially eliminate the shock wave caused by the muzzle blast from the M16 rifle. It is believed that the excellent results achieved with such a simple device are due, at least in part, to a mutual cancellation of shock waves by out-of-phase reflections of other shock waves within the rearward, central and forward chambers. The dimensions and proportions of these chambers appear to be responsible for causing the shock waves to cancel each other.

Some adjustment of the dimensional parameters of the central and forward chambers may be necessary for different caliber firearms having significantly different propellant charges in the cartridges fired from them. Changes in the dimensions of the rearward chamber did not appear to significantly alter the performance. The essential simplicity of design and approximate proportions between the several dimensional parameters should produce equally satisfactory results for all hand and shoulder weapons as achieved in the abovescribed preferred embodiment.

Obviously, numerous modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A muzzle blast suppressor for a firearm, comprising:

- a hollow elongate body having a longitudinal axis;
 - an attachment disc, connected to said body intermediate the ends thereof, having a threaded aperture formed coaxially therethrough for engagement with a threaded portion of the muzzle of a firearm barrel and having at least one vent bore extending therethrough;
 - a reduced diameter tapered collar at one end of said body for engaging a circumferential portion of the barrel of a firearm positioning said body in accurate axial alignment with the barrel axis;
 - a closure attached to the other end of said body having a coaxially disposed aperture formed therethrough; and
 - a single internal baffle disc having a coaxially disposed aperture formed therethrough and positioned transversely within said body and spaced from said attachment disc by a distance approximately 0.42 of the distance between said attachment disc and said end closure;
- the distance between said attachment disc and said end closure being approximately 4.31 times greater than the internal diameter of said body.

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