

[54] **WATERPROOF SOUND, FLASH AND RECOIL SUPPRESSOR FOR FIREARMS**
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 [51] Int. Cl.F41c 21/18
 [58] Field of Search.....42/1 L, 1 N; 89/14 R, 14 B, 89/14 C, 14 D, 30, 31; 102/93

[57] **ABSTRACT**

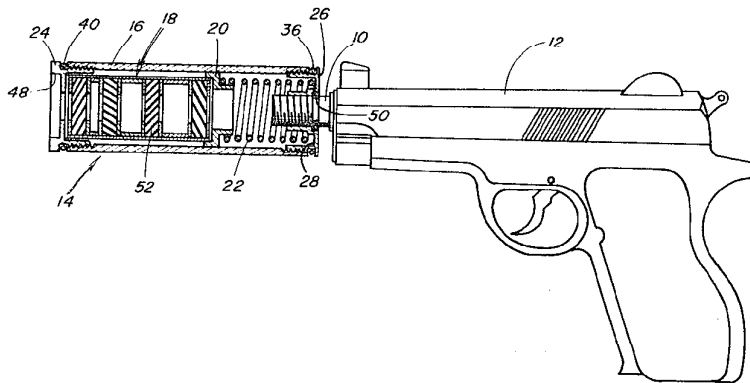
A muzzle attachment for the barrel of a firearm having O-ring seals around a front cap, a rear cap and the barrel of the firearm when engaged therewith and including a device therein for sealing the muzzle attachment behind a bullet passing therethrough to prevent escape of expanding gases therein propelling the bullet and an expansion chamber about the device. A chamber plug positionable in the firearm chamber makes the weapon waterproof from the chamber to the front cap of the muzzle attachment.

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5 Claims, 7 Drawing Figures



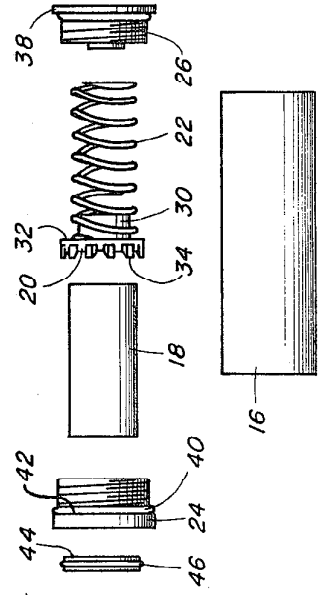
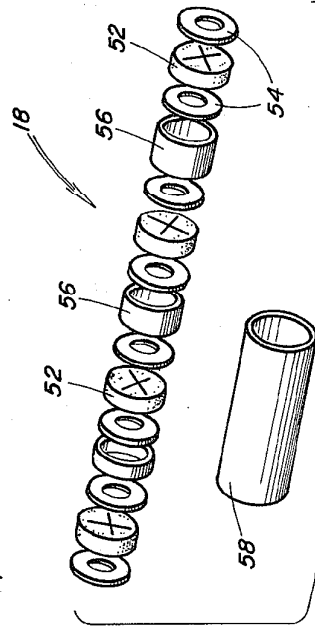
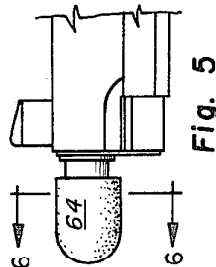
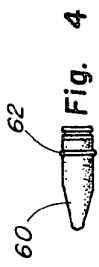
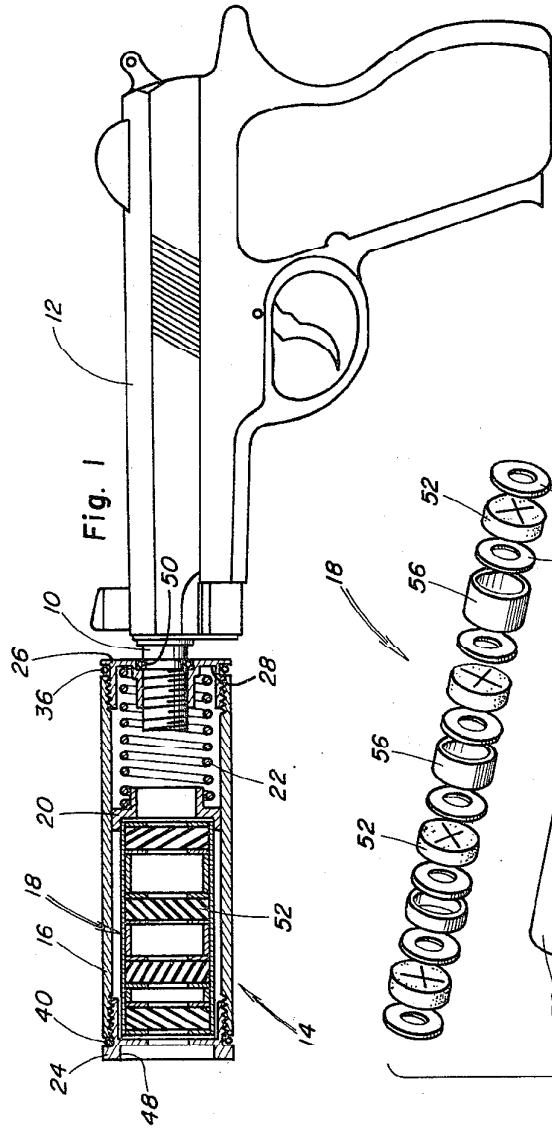


Fig. 3

Fig. 2

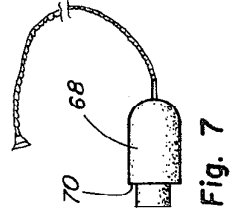


Fig. 7

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WATERPROOF SOUND, FLASH AND RECOIL SUPPRESSOR FOR FIREARMS

BACKGROUND OF THE INVENTION

This invention relates generally to firearms and more particularly to a waterproof muzzle attachment for gun barrels for reducing the audible noise, recoil and flash normally produced by the firing of a gun.

Various devices suitably designed for attachment to weapons and satisfying the purpose of preventing the escape of the expanding gases generated during firing of the weapon and thus substantially eliminating the sound and flash emitted during the firing of the weapon and the usual recoil effected by the discharge of the weapon are well known in the art. In certain operations, however, such as, for example, where it is desirable to arm a swimmer with a weapon equipped with such a recoil, flash and sound reducer assembly, the devices heretofore provided for this purpose are not adequate inasmuch as the weapon equipped with such devices becomes ineffective when it is wet. In order to overcome this problem and to maintain the usefulness of such weapons under these circumstances, the weapons have been placed in plastic bags and sealed. This method has not been found to be entirely satisfactory, however, since the plastic bags adhere closely about the weapon upon being subjected to moderate external pressure, such as that encountered by an underwater swimmer, making it a difficult and time consuming task to remove the weapon from the bag such that the weapon is not readily available for immediate use upon emergence from the water. The effectiveness of the sealed bag approach suffers also from the fact that sharp corners on the weapons often tear the plastic bags. Still another problem of this method is the difficulty of returning the weapon to the plastic bag and effectively resealing the bag under field conditions after it has been opened and the weapon removed therefrom, whereby the swimmer may, if necessary, return to the water and yet retain a weapon that is useful upon subsequent emergence therefrom.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a waterproof gun recoil, flash and sound reducer assembly.

Another object of the present invention is to provide a weapon having reduced recoil, flash and sound characteristics and capable of being fired immediately after being subjected to moderate external water pressures.

Still another object of this invention is to provide a waterproof recoil, flash and sound suppressor device sealably attachable to the barrel of a firearm which is easily and effectively resealable after discharging such firearm.

Yet another object of this invention is to provide a waterproof muzzle attachment for gun barrels for reducing recoil, flash and sound that is simple and practical in construction, strong and reliable in use, small and compact in structure, and relatively inexpensive to manufacture.

Briefly, in accordance with one embodiment of the present invention, the foregoing and other objects are attained by a weapon provided with a muzzle attachment having O-ring sealing elements around a front cap, a rear cap and an expendable front cap plug thereof, and another O-ring disposed within the rear cap for sealably engaging the barrel of the weapon when the muzzle attachment is secured thereon. A dummy cartridge or a modified bullet having an O-ring sealing element thereon is also provided such that, in its waterproof configuration, the weapon is completely sealed from the chamber thereof to the front cap of the muzzle attachment. The weapon may be fired in this configuration, in which case the expendable muzzle plug is merely popped out as the bullet passes therethrough, and it is readily resealed simply by replacing the expendable muzzle plug and the chamber plug.

BRIEF DESCRIPTION OF THE DRAWINGS

Still other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals are used for designating like or corresponding parts throughout the several figures thereof and wherein:

FIG. 1 is a side elevational view of a weapon constructed according to the present invention with the muzzle attachment therefor shown in section;

FIG. 2 is an exploded view in side elevation of the several components comprising the muzzle attachment;

FIG. 3 is an exploded view in perspective of the several components comprising a silencer insert normally disposed within the muzzle attachment;

FIG. 4 is a side elevational view of the chamber plug;

FIG. 5 is a side elevational view of a cap specially designed for use with the barrel of the weapon shown in FIG. 1 whenever the muzzle attachment and the weapon are not attached to each other during the carrying thereof by a swimmer;

FIG. 6 is a sectional view of the barrel cap shown in FIG. 5 taken along the line 6-6 thereof; and

FIG. 7 is a side elevational view of a plug specially designed for use with the muzzle attachment shown in FIG. 2 whenever the muzzle attachment and the weapon are not attached to each other while being conveyed by a swimmer.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings and more particularly to FIGS. 1 and 2 thereof, the barrel 10 of a firearm 12 such as, for example, a modified small caliber automatic pistol, is threaded for securably receiving thereon a muzzle attachment generally indicated by the reference numeral 14.

The muzzle attachment 14 comprises a tubular shell or muzzle can 16 constructed of a suitable lightweight metallic material such as aluminum or the like, in which are disposed in axial alignment therein a substantially cylindrical-shaped gun silencer insert or housing 18, a spring retainer clip 20 and a coil spring 22. The ends of the tubular shell 16 are interiorly threaded for securably receiving at the forward end thereof a substantially ring-configured, exteriorly threaded front cap 24 and at the rear or gun end thereof a similar ring-shaped, exteriorly threaded back cap 26, both of which may be constructed of aluminum, stainless steel or some other material suitable for the purpose.

In assembling the muzzle attachment 14, one end of the coil spring 22 is inserted into a circular well 28 formed in the forwardly disposed end of the back cap 26. An integrally formed, axially disposed annular extension 30 is provided on the rear face of the centrally apertured spring retainer disc 20 for being positioned within the other or forward end of the coil spring 22, the inside diameter of which is selected for providing a snug fit about the annular extension 30. The disc 20 has a slightly larger diameter than the annular extension 30 thereof such that a shoulder 32 is formed therebetween on the rearwardly disposed face of the disc 20 against which the end of the coil spring 22 is disposed. The forwardly disposed face of the disc 20 is provided with a ring of integral, forwardly protruding fingers or finger-like elements 34 circumferentially spaced thereabout and having an outside diameter substantially the same as the inside diameter of the tubular shield or muzzle can 16. A shallow cylindrical-shaped cavity is formed within the ring of finger-like elements 34 for snugly receiving one end of the cylindrical insert 18. By slipping the muzzle can 16 over the aligned silencer insert 18, the spring retainer clip 20 and the coil spring 22, the muzzle can 16 may be secured to the back cap 26 by threadably engaging one to the other, whereupon an O-ring 36 predisposed upon the back cap 26 is compressed between the annular rearwardly disposed end portion of the muzzle can 16 and a shoulder 38 on the back cap. Another O-ring 40 is positioned on the threaded surface

of the front cap 24 and the front cap 24 is threadably attached to the forward end of the tubular muzzle can 16, the forward end of the cylindrical insert 18 being received in a cylindrical well bored into the rearwardly facing surface of the front cap 24. As the front cap 24 is tightly screwed into the tubular muzzle can 16, the spring 22 is placed under a load and becomes slightly compressed, and the O-ring 40 is compressed between a shoulder 42 on the front cap 24 and the forwardly disposed annular end surface of the tubular muzzle can 16. If desired, a small flange, not shown, may be provided on the front and back caps 24 and 26, respectively, between the threaded surfaces and the shoulders thereof for retaining the O-rings and thereby protecting and keeping the O-rings 26 and 40 from getting mixed up in the threads during assembly of the muzzle attachment 14.

An expendable muzzle plug 44 of a polyurethane or another suitable plastic material is provided for sealingly closing the forward end of the muzzle attachment 14. The plug 44 is disc-shaped and includes an integral ridge 46 about the annular surface thereof for permitting the plug 44 to be press-fitted into a cylindrical cavity or well 48 bored into the forwardly disposed face of the front cap 24. Watertight closure of the rear end of the muzzle attachment 14 is effected by an O-ring 50 disposed between the outer surface of the gun barrel 10 and the inner threaded surface of the ring-shaped back cap 26, which is tightly compressed therebetween upon threadable attachment of the muzzle assembly 14 and the gun barrel 10.

Turning now to FIG. 3, it may be seen that the cylindrical insert 18 comprises a plurality of polyurethane discs or plugs 52 sandwiched between flat metallic washers 54 and spaced apart by ring members 56. The plugs 52 are x-slotted on both faces thereof for permitting a bullet to pass therethrough without fragmenting or rupturing the element, whereby the disc or plug 52 automatically closes and reseals itself after a bullet has been fired. Each spacer element 56 is of a different width, providing in the illustrated embodiment a progressively shorter path between adjacently disposed plugs or discs 52 as one moves from the rear or gun end of the insert 18 to the forward end thereof. The component discs 52, washers 54 and spacers 56 are aligned within a tubular sleeve 58 which is crimped or folded over at its ends for tightly retaining the components therein, yet preserving the open end characteristic thereof for permitting free passage therethrough of a bullet.

When the muzzle attachment 14 is threadably engaged with the gun barrel 10 the weapon is waterproof from the barrel end thereof, but the silencer assembly 14 is still subject to being filled with water from the gun end if the weapon is submerged, as in the case of being carried by an underwater swimmer. Accordingly, as shown in FIG. 4, a chamber plug 60 configured like a bullet for use with the weapon is provided with an O-ring 62 disposed in a shallow annular depression in the periphery thereof. When the plug 60 is inserted into the chamber of the gun, the weapon becomes waterproof from the chamber to the front cap of the muzzle attachment 14. Thus, merely by removing or ejecting the plug 60, the weapon is made ready for firing, removal of the muzzle plug 44 not even being required inasmuch as it is an expendable item and is readily popped out as the bullet passes through. It is further contemplated that an actual modified live round of ammunition may be employed as a chamber waterproofing plug by fitting the shell thereof with an O-ring.

In FIGS. 5 and 6 there is shown a barrel cap 64 substantially cylindrical in configuration and having a cylindrical cavity 66 formed in one end thereof for receiving in tight-fitting engagement therewith the end of the gun barrel 10. The cap 64 is molded from a rubber material or the like and is designed for maintaining a dry chamber in conjunction with the chamber plug 60 whenever the weapon is carried independently of the special muzzle attachment 14.

To permit similar independent conveyance of the muzzle assembly 14 in a waterproof configuration, a special back cap plug 68 of a rubber or similar material is provided. As shown

in FIG. 7, the plug 68 is molded in a substantially cylindrical configuration for insertion in tight fitting engagement therewith into the aperture in the rear face of the back cap 26 wherein the gun barrel 10 is normally threadably received. A shoulder 70 defined by an enlarged cylindrical portion thereon further aids the plug 68 in its waterproofing function.

Thus a waterproof muzzle attachment for reducing the sound, recoil and flash of a gun is provided which may be carried underwater either independently or attached to the gun, as desired. Moreover, it will be readily apparent from the foregoing that when a bullet is fired through the barrel 10, it will pass axially within the muzzle assembly 14, through the central aperture in the ring-shaped spring retainer clip 20 and into the cylindrical insert 18. The bullet thereafter passes through the penetrable, x-slotted discs or plugs 52, which due to the resiliency thereof will substantially seal or close behind the bullet to prevent escape of the expanding, propelling gases. The tubular shell or muzzle can 16 behind and around the insert 18 is of sufficient size to allow for expansion of the propelling gases so that they do not follow the bullet therethrough. Such expansion through the spring retainer 20 is permitted readily by the openings therein between the fingers 34. The gases will escape ultimately back through the barrel 10 and out through the breech of the weapon. Although an automatic weapon is illustrated, such weapon may be modified for single shot action whereby shell ejection after firing will not automatically occur and further silencing is afforded by preventing sound escape through the open chamber. In practical use, therefore, the reduction of the volume pressure of the gases in the manner indicated acts to reduce the sound, recoil and flash produced in firing the weapon.

Obviously many 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.

What is claimed is:

1. A waterproof muzzle attachment for a firearm comprising:
 - a tubular housing;
 - a cylindrical cap member sealedly secured to one end of said tubular housing and having an axial bore therethrough;
 - means for sealedly securing said cylindrical cap to the barrel of a firearm with said barrel extending into said housing through said axial bore in said cap;
 - a second cylindrical cap member sealedly secured to the other end of said tubular housing and having an axial bore therethrough;
 - elongate cylindrical means axially aligned in said tubular housing with the path of a projectile fired from said firearm including,
 - a tubular sleeve;
 - a plurality of resilient discs disposed in said sleeve;
 - a metallic washer element disposed against each face of each of said discs;
 - spacer means between each adjacent pair of said washer elements; and
 - means for securing said discs, said washers and said spacers within said tubular sleeve; and
 - an expendible plug sealedly secured to said second cap member and normally closing said axial bore therein.
2. Apparatus as set forth in claim 1 further comprising means disposed between said elongate cylindrical means and said cap member secured to said barrel for biasing said elongate cylindrical means toward said second cylindrical cap member.
3. Apparatus as set forth in claim 1 wherein said discs are polyurethane discs.
4. A waterproof recoil, flash and sound reducer assembly for a firearm comprising:
 - a tubular housing;

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a cylindrical cap member threadably secured to one end of said tubular housing and having a threaded axial bore therethrough for receiving the threaded barrel of a firearm;

an O-ring on said cap member and compressible between said cap member and said tubular housing upon engagement therebetween;

a second O-ring disposed within said axial bore of said cap member for sealably securing said housing to said barrel when said cap member is threadably engaged therewith;

a second cylindrical cap member threadably secured to the other end of said tubular housing and having an axial bore therethrough;

a third O-ring on said second cap member and compressible between said second cap member and said tubular housing upon engagement therebetween;

an expendable plug member for sealably closing said axial

6

bore in said second cap member; and

elongate cylindrical means disposed in said tubular housing in axial alignment with the path of a projectile fired from said firearm including,

a tubular sleeve,

a plurality of resilient discs disposed in said sleeve,

a metallic washer disposed against each face of each of said discs,

spacer means between each adjacent pair of said washers, and

means for securing said discs, said washers and said spacers within said tubular sleeve.

5. Apparatus as set forth in claim 4 wherein said expendable plug is a disc-like polyurethane plug having an annular ridge integrally formed on the peripheral edge thereof for being press-fitted into said second cap member.

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