June 13, 1944. S. G. GREEN 2,351,037

STABILIZER FOR GUNS

Filed Oct. 16, 1936

Fig. 1.

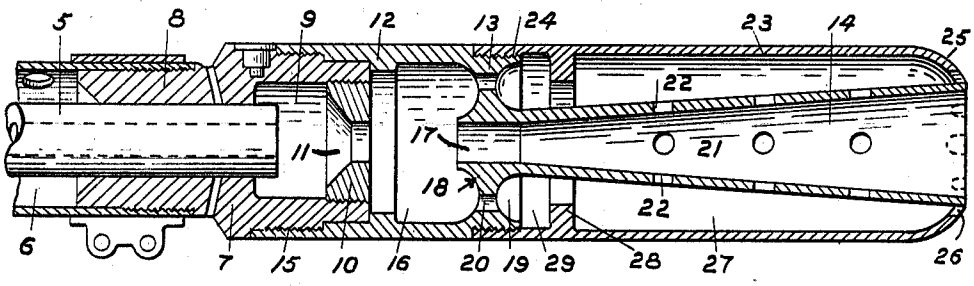


Fig. 2.

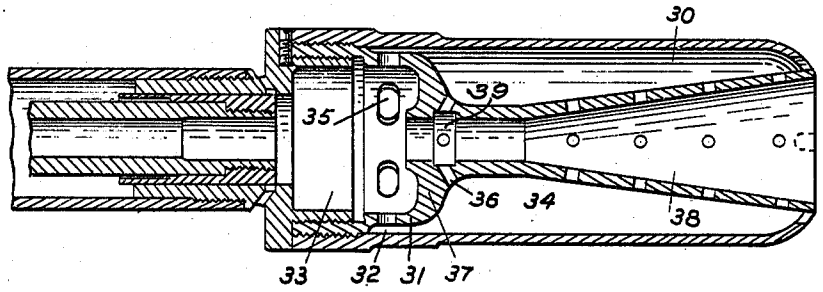


Fig. 3.

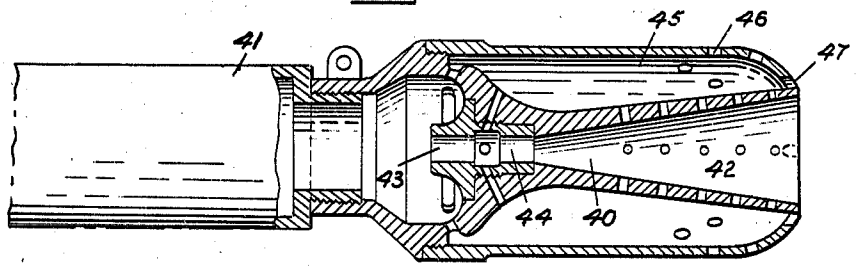
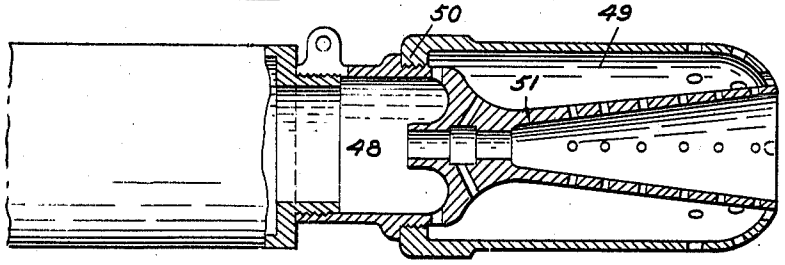


Fig. 4.



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STABILIZER FOR GUNS

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10 Claims. (Cl. 89—14)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

This invention relates to a stabilizer for guns and more particularly it has reference to a muzzle attachment serving to check recoil, silence the report, eliminate smoke and conceal flash.

It is generally recognized that only about 70% of the energy of the gases of the propelling charge is used in propelling the projectile. The unused balance escaping through the muzzle into atmosphere produces noise, smoke and flash, and impairs stability and accuracy. The velocity and pressure curves of the gases show that the unused energy is represented mainly by the velocity component which is much greater than the pressure component at the muzzle.

The purpose of this invention is to provide a stabilizer in which the velocity component of the gases is reduced at a more rapid rate than the pressure component so that their energy values will be about equal when the gases are discharged into the atmposphere. The velocity of the gases is reduced until it is in the vicinity of the velocity of sound. While accomplishing the foregoing control of velocity and pressure through the expansion and recompression cycles, the unburned powder is consumed and heat is maintained sufficiently high within the combustable range to burn the residue and remaining gases and yet control the temperature below the detonating point.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

A practical embodiment of the invention is illustrated in the accompanying drawing, wherein:

Fig. 1 is a longitudinal sectional view of a stabilizer constructed in accordance with the invention.

Figs. 2, 3 and 4 are similar views of modified forms.

Referring to Fig. 1 there is shown a gun barrel 5 spaced from a surrounding jacket 6 which is of the air-cooled type. An adapter 7 has a reduced rear part 8 inserted in the jacket and threaded thereto and also forming a bearing for the gun barrel. The front part of the adapter is formed with an enlarged bore to establish an impact chamber 9 directly in front of the muzzle of the gun barrel. A plug 10 threaded in the front end of the adapter and constituting the front wall of the chamber 9 has a tapered entrance aperture 11 to permit passage of the bullet and the gases from the propelling charge.

The body of the stabilizer comprises a cylindrical member 12 open at its rear end and having a front wall 13 from which extends a flared tube 14 whose maximum diameter at its front end is preferably less than the diameter of the cylindrical member 12. The open rear end of the member 12 is mounted on the adapter and attached thereto by a threaded connection 15. The front wall 13 is spaced from the front wall 10 of the adapter to provide an expansion chamber 16. The front wall 13 is formed with a central passage 17 and has an annular concave rear face 18 and an annular concave front face 19 which merges with the outer surface of the flared tube 14. A plurality of longitudinally disposed apertures 20 in the front wall 13 establish communication between the concave faces 18 and 19.

The flared tube 14 has a flared chamber 21 in continuation of the passage 17. The wall of the tube is provided with a plurality of radially disposed apertures 22. The tube 14 is disposed within and is spaced from a sleeve 23 which is cylindrical over the greater portion of its length and has its rear end mounted on the member 12 and attached thereto by a threaded connection 24. The front end 25 of the sleeve is turned in and meets the front end of the flared tube. It is provided with apertures 26 to vent the chamber 27 established between the sleeve and the flared tube.

A baffle ring 28 is carried internally by the sleeve and is positioned a short distance forwardly of the front wall 13 to establish a chamber 29. The inner face of the baffle ring is spaced from the flared tube 14 to permit flow of gases from the chamber 29 to the chamber 27.

The approximate ratio between the volume of the chambers 16, 21 and 27—29 is respectively one, two, three.

When a projectile is fired and emerges through the muzzle of the barrel, the gases of discharge enter the impact chamber 9 and build up pressure therein which reacts on the gun barrel to drive it rearwardly and thereby increase the speed of the breech bolt and associated parts of an automatic machine gun. At the same time the gases exert a forward pressure on the plug

10 which is part of the jacket 6 and the non-recoiling elements of the gun and by tending to check recoil of these elements produce a stabilizing influence on the gun mount.

When the projectile has passed through the aperture in the plug 10 the gases follow and expand into the chamber 16 where they act on the wall 18 to maintain and augment the forward pressure on the non-recoiling elements of the gun. The expansion of the gases reduces their temperature, pressure and velocity. This chamber serves as an initial combustion chamber for burning the unconsumed particles of the propellent charge and the volatilized carbon of the gases. The carbon referred to in this application and present in the gases of discharge of the gun volatilizes and flashes at a temperature between 900° and 925° F.

As the projectile passes into the flared tube 14 a portion of the gases follow it while the remainder are throttled through the apertures 20. This throttling further reduces the velocity of the gases and increases the burning time in the chamber 16.

The chamber 29 serves to again reduce velocity of the gases and the baffle ring 28 receives the forward pressure of the gases and breaks up flame propagation. The gases from the chamber 29 flow into the second expansion chamber 27 whose cross-sectional area decreases gradually towards its front end. The purpose of constricting this chamber towards its vents 26 is to produce gradual increase in pressure and to thereby raise the temperature to about 1652° F. and cause the volatilized carbon to be consumed.

The gases passing through the flared tube 14 are vented into the chamber 27 until the pressures are equalized. Since the tube 14 has an increasing volume towards its front the pressure and temperature of the gases are gradually reduced as they flow towards the exit and when discharged they are at less than combustion temperature.

Stabilizers of this character are usually designed to cool the gases and dissipate heat and most of them as a result discharge the gases to atmosphere as soon as possible. According to the invention however the stabilizer is designed as a combustion member to consume the smoke and flash ingredients of the gases before they are discharged into the atmosphere.

The stabilizer of Fig. 1 is designed for use on a .30 caliber machine gun which is intended to fire long bursts.

In Fig. 2 there is shown a stabilizer for a .50 caliber machine gun which is intended to fire short bursts. In this design the impact chamber 9 of Fig. 1 is omitted and the sleeve 30 is spaced from the front portion of the cylindrical member 31 of the stabilized body to provide an annular throttling chamber 32 between the first expansion chamber 33 and the second expansion chamber 34. Gases from the chamber 33 are vented laterally into the throttling chamber 32 through apertures 35 and their velocity is considerably reduced. Inclined passages 36 are provided in the front wall 37 at its junction with the flared tube 38 and conduct gases from a small chamber 39 in the tube 38 to the chamber 34.

In Fig. 3 the stabilizer body 40 is mounted on a part of the water jacket 41 and has a flared expansion chamber 42. The central bullet passage 43 has its origin in a bushing 44 of heat-resisting metal. The sleeve 45 has apertures 46 in its front portion in addition to the apertures 47 in its extremity.

In Fig. 4 the structure is similar to that of Fig. 3 but has a cylindrical first expansion chamber 48 and a sleeve 49 with an inturned flange 50 whereby it is threadedly attached to the stabilizer body 51.

The drawings in Figs. 3 and 4 are on a smaller scale than the drawing of Fig. 2. They are intended for a .50 caliber gun firing long bursts and in actual size they are about one-half again as large as the stabilizer of Fig. 2 which is for a gun normally firing short bursts.

I claim:

1. A muzzle attachment for a gun comprising an adapter securable to a gun and having a chamber receiving only the gases of discharge of the gun, said adapter having an apertured front wall, a body mounted on the adapter and having a front wall spaced from the front wall of the adapter and formed with annular concave front and rear faces, said front wall of the body having a central passage and circumferentially arranged throttling apertures, a flared tube extending from the front wall of the body and formed with a flared chamber in continuation of the central passage of the body, said tube having apertures in its wall, a sleeve mounted on the body and having a turned-in front end engaging the front end of the flared tube, said tube and sleeve providing a forwardly constricted chamber with a gas outlet at its front end, and a baffle ring on the sleeve spaced from the flared tube and from the front wall of the body.

2. A muzzle attachment for a gun comprising an adapter securable to a gun and having a chamber receiving only the gases of discharge of the gun, said adapter having an apertured front wall, a body mounted on the adapter and having a front wall spaced from the front wall of the adapter and formed with annular concave front and rear faces, said front wall of the body having a central passage and circumferentially arranged throttling apertures, a flared tube extending from the front wall of the body and formed with a flared chamber in continuation of the central passage of the body, said tube having apertures in its wall, a sleeve mounted on the body and having a turned-in front end engaging the front end of the flared tube, and said tube and sleeve providing a forwardly constricted chamber with a gas outlet at its front end.

3. A muzzle attachment for a gun comprising an adapter securable to a gun and having a chamber receiving only the gases of discharge of the gun, said adapter having an apertured front wall, a body mounted on the adapter and having a front wall spaced from the front wall of the adapter, said front wall of the body having a central passage and circumferentially arranged throttling apertures, a flared tube extending from the front wall of the body and formed with a flared chamber in continuation of the central passage of the body, said tube having apertures in its wall, a sleeve mounted on the body, and said tube and sleeve providing a forwardly constricted chamber with a gas outlet at its front end.

4. In a muzzle attachment for a gun, a casing securable to a gun so as to receive only the gases of discharge of the gun and having walls forming a series of chambers including an impact chamber, an expansion chamber in front of the impact chamber, an inner flared chamber and an outer forwardly constricted chamber both

disposed forwardly of the expansion chamber, the inner and outer chambers being in communication with each other and with the expansion chamber, and means for venting the outer constricted chamber at its front end, the ratio in the volume of the expansion chamber, the inner flared chamber and the outer constricted chamber being respectively about one, two, three.

5. In a muzzle attachment for a gun, means securable to a gun adjacent the muzzle thereof so as to receive only the gases of discharge of the gun, said means comprising a cylindrical expansion chamber, an inner chamber and an outer forwardly constricted chamber both disposed forwardly of the expansion chamber, the walls forming said inner and outer chambers being secured to each other adjacent their forward ends, said walls being provided with ports establishing intercommunication between each of said chambers, and means for venting the outer constricted chamber at its front end directly to the atmosphere, the ratio in the volume of the expansion chamber, the inner flared chamber and the outer constricted chamber being respectively about one, two, three.

6. In a muzzle attachment for a gun, means securable to a gun adjacent the muzzle thereof so as to receive only the gases of discharge of the gun, said means comprising a cylindrical expansion chamber, an inner chamber and an outer forwardly constricted chamber both disposed forwardly of the expansion chamber, the walls forming said inner and outer chambers being secured to each other adjacent their forward ends, said walls being provided with ports establishing inter-communication between each of said chambers, and means for venting the outer constricted chamber at its front end directly to the atmosphere.

7. In a muzzle attachment for a gun, means securable to a gun and having a closed rear end so as to receive only the gases of discharge of the gun, said means comprising a cylindrical expansion chamber, a flared chamber, and a forwardly constricted chamber having an outlet at its small end venting directly to the atmosphere, means for throttling some of the gases out of said expansion chamber, into said forwardly constricted chamber, said constricted chamber being adapted to compress the gases it receives from the expansion chamber to increase their temperature and insure a temperature above 925° F., said flared chamber being in communication with the constricted chamber and receiving some of the gases from the expansion chamber and serving to decrease the pressure and temperature of the gases and the walls forming said forwardly constricted and flared chambers being secured to each other adjacent their forward ends.

8. In a muzzle attachment for a gun, a casing securable to a gun and having a closed rear end so as to receive only the gases of discharge of the gun and having a central bullet passage and comprising a cylindrical expansion chamber, a forwardly constricted chamber annularly positioned relative to the said central bullet passage and provided with a plurality of openings in communication therewith to receive some of the gases and having an outlet at its small end venting directly to the atmosphere, said constricted chamber serving by compression of the gases to increase their temperature and insure a temperature above 925° F., and a flared chamber in communication with the constricted chamber and receiving some of the gases from the expansion chamber and serving to decrease the pressure and temperature of the gases the walls forming the forwardly constricted and flared chambers being secured to each other adjacent their forward ends.

9. A compensating device for attachment to the muzzle of firearms and to receive the gases of explosion issuing therefrom, said device comprising a pair of serially connected and coaxial chambers as well as a third chamber encompassing portions of the pair of chambers, all of said chambers having substantially cylindrical portions and having a projectile opening at an end thereof, said chambers also having gas conducting passages therebetween, the walls at the forward end of the encompassing chamber having a forwardly converging and apertured interior surface extending from the cylindrical portion thereof forwardly and inwardly to the projectile opening thereof to increase the pressure of the forwardly moving gases, the forward wall portion of one of said pair of chambers having an inwardly directed interior surface extending from the cylindrical portion thereof inwardly substantially to the projectile opening thereof.

10. A compensating device for attachment to the muzzle of firearms and to receive the gases of explosion issuing therefrom, said device comprising a pair of serially connected and coaxial chambers as well as a third chamber encompassing portions of the pair of chambers, all of said chambers having substantially cylindrical portions and having a projectile opening at an end thereof, said chambers also having gas conducting passages therebetween, the walls at the forward end of the encompassing chamber having a forwardly converging and apertured interior surface extending from the cylindrical portion thereof forwardly and inwardly to the projectile opening thereof to increase the pressure of the forwardly moving gases, the forward wall portion of one of said pair of chambers having a converging interior surface extending from the cylindrical portion thereof inwardly and provided with a central projectile opening.

SAMUEL G. GREEN.