

July 11, 1939.

R. M. CUTTS, JR

2,165,457

COMPENSATOR

Filed June 23, 1936

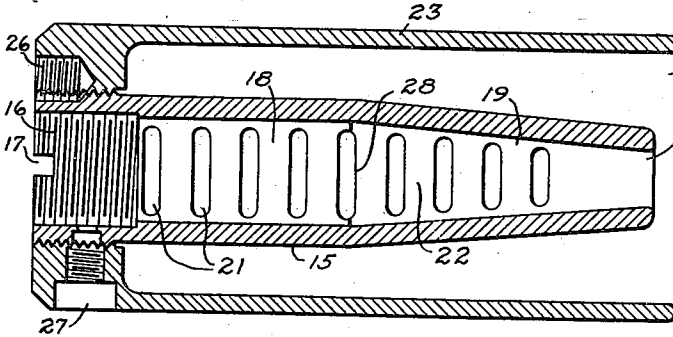


Fig. 1

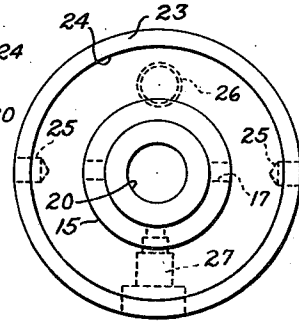


Fig. 2

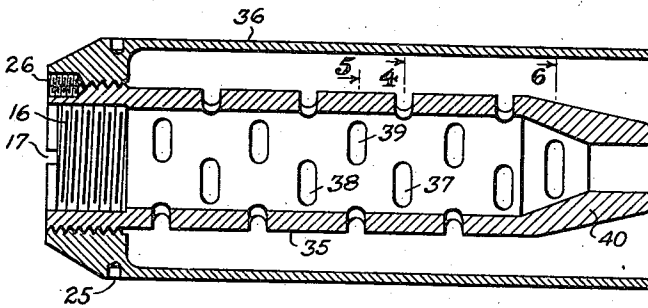


Fig. 3

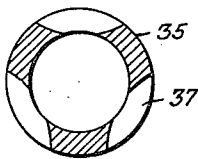


Fig. 4

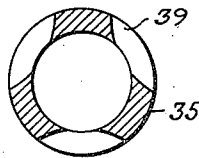
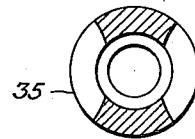


Fig. 5

Fig. 6



R. M. Cutts, Jr.
Inventor

by *[Signature]*
Attorney

UNITED STATES PATENT OFFICE

2,165,457

COMPENSATOR

Richard M. Cutts, Jr., Cape May, N. J.

Application June 23, 1936, Serial No. 86,847

3 Claims. (Cl. 89—14)

This invention relates to compensators for ordnance and has for its object to provide a construction more efficient in use and less costly to manufacture than those heretofore proposed.

With these and other objects in view the invention resides in the novel details of construction and combinations of parts as will be disclosed more fully hereinafter and particularly pointed out in the claims.

Referring to the accompanying drawing forming a part of this specification in which like numerals designate like parts in all the views,—

Fig. 1 is a diagram illustrating in substantial vertical section the construction of a compensator employing the principles of this invention;

Fig. 2 is an end view of the construction shown in Fig. 1;

Fig. 3 is a view similar to Fig. 1 but showing a modification of the construction;

Fig. 4 is a transverse sectional view taken as on the line 4—4 of Fig. 3 and looking in the direction of the arrow;

Fig. 5 is a transverse sectional view taken as on the line 5—5 of Fig. 3 and looking in the direction of the arrow; and

Fig. 6 is a transverse sectional view taken as on the line 6—6 of Fig. 3 and looking in the direction of the arrow.

This invention constitutes an improvement over the construction disclosed in U. S. Letters Patent No. 1,605,393 dated November 2, 1926 entitled Climb arrester and No. 1,636,357 dated July 19, 1927 entitled Anticlimb device, both issued to Richard M. Cutts, Jr., in that by the present invention the advantages of the patented constructions are retained and in addition thereto the concealment of flash is accomplished.

The device illustrated in Fig. 1 comprises an inner compensator chamber and an encompassing sleeve-like member spaced therefrom. In other words there is provided an inner compensator chamber generally indicated by the numeral 15 internally threaded at one end as at 16 for securement to the gun muzzle, diametric kerfs such as 17 being provided for the reception of a suitable wrench or tool for tightening the threaded engagement. The rear portion of this compensator is substantially cylindrical, establishing an expansion chamber 18 for receiving the gases of explosion as they emerge from the gun muzzle, the forward end of the compensator being somewhat conically formed to provide inner tapering wall surfaces forming a compression chamber 19 with the orifice 20 for the projectile at the outer end of the chamber,

A plurality of elongated slots 21 is provided as shown in the opposite side walls of the chamber, said slots being in spaced relation to each other varying according to conditions to be met and having their longest dimension substantially in a transverse plane of said chamber in order to present through their forward edges a greater surface to the impact of the gases travelling forwardly through the chamber. In forming these slots the cutting tool may be actuated in a plane forming 90° with the axis of the compensator chamber or it may be actuated in a plane making a different angle with said axis, according to whether the particular gun to be fitted with the compensator would have its action improved by a rectilinear or oblique emission of gases through the slots.

This chamber is a construction which is adapted to prevent the climb, jump or whip, as well as to reduce the recoil, of machine guns, automatic and semi-automatic rifles of various sizes, and firearms of all kinds. It is attached to the muzzle of any of the above weapons in any suitable manner, and may be adapted, in conjunction with the outer sleeve, to reduce the noise of explosion, reduce the dust blast at the muzzle, eliminate smoke and muzzle blast interference with the men behind and to the side of the gun, and to hide the flash particularly during night firing. The chamber 15 is preferably cylindrical at the end attached to the gun barrel, the internal diameter being greater than the bore of the gun, thereby permitting the expansion of the gases of combustion as they emerge from the barrel. The opposite end however is drawn or molded or otherwise formed into a tapering portion creating the compression chamber 19 for the expanded gases.

In other words, the gases of combustion travelling forwardly at high velocity in the barrel will first be permitted to expand in the rearmost portion of this compensator, and then in their continued forward travel they will enter the tapered portion in order to seek and exit through the orifice 20. But by this time the projectile will have become more or less centered in said orifice thereby diminishing to a large extent the area of said orifice, but not, however, totally closing the same. The result is that the pressure of the gases expanded in the rearmost portion of the compensator will be increased, and in attempting to escape through the orifice 20, the gases impinging upon the inner surface of the conical portion of the compensator will create a friction, and therefore tend to impart a for-

ward drive to the entire weapon, thus overcoming to a large extent the recoil of said weapon.

To suit the best needs of the weapon to which this compensator is attached, the slots 21 may be positioned diametrically in the opposite side walls as shown, or they may be positioned in the side walls above the central horizontal plane of the chamber. When the slots are above the central horizontal plane, some of the high velocity expanded gases will pass therethrough but another portion of the gases will move in an opposite lateral direction and strike the imperforate lower wall portion of the chamber, thereby exerting a pressure upon said imperforate wall tending to move said wall in the direction of the pressure applied. The greatest amount of this pressure is in a downward direction wherefore the normal upward movement or climb of the gun muzzle is counteracted. When the slots, however, are positioned as shown the upper and lower imperforate wall portions will be substantially equal wherefore the force of the escaping gases will be equalized.

It is to be particularly noted that these slots have rounded ends instead of being rectangularly formed. The purpose of this construction is to give a stronger metal section at the base of each rib and to enable a better transfer of heat between the ribs such as 22 between any two slots and the main body of metal in the imperforate wall sections of the chamber, thereby reducing materially the possibility of fracture and/or crystallization in the metal at the ends of the slots or ports.

Surrounding the chamber 15 is a substantially cylindrical sleeve 23 the outer end of which is freely open to the atmosphere as indicated at 24, but whose inner or rearmost end is internally threaded for engagement with threads formed upon the outer rear end of the inner chamber. This sleeve 23 is of such diameter internally as to provide a material space around the inner chamber for the reception of the gases which pass through the slots 21. In other words these gases pass laterally from the inner chamber through said slots and then their direction of travel is changed forwardly by their impinging on the inner surface of the outer sleeve, slowing down their velocity to permit complete burning of the powder grains, the clearance between the chamber and the sleeve being sufficient to insure this burning without increasing back pressure through the slots into the bore of the gun. The sleeve may protrude beyond the chamber as shown to give more effective concealment of the flash. In Fig. 2, 25 indicates a pair of diametric sockets for receiving a suitable tool by means of which the entire compensator is threaded into engagement with the gun, 26 indicates means for locking the chamber and sleeve together, and 27 is a bore for receiving a suitable set screw for locking the composite units to the gun.

This construction is well adapted for all types of weapons but when used with a machine gun under continued rapid fire the point 28 becomes the weakest, particularly since the sleeve diminishes the quick dissipation of the heat of the gases to the surrounding air and upon long sustained firing the blow caused by the impact of the gases is as great on the last shot as it was on the first shot, and the high temperatures created by the continued firing will have lowered the resistant qualities of the metal of which the compensator chamber is made. Therefore for heavy machine guns where long sustained firing

is often necessary it has been found that this type of compensator is not so efficient as that shown in Fig. 3 and presently to be described. The reason why the point 28 is weakest is that it is midway the ends of the slots wherefore heat has to travel the maximum distance to reach the mass of metal in the imperforate wall portions of the chamber, and further because the gas blow delivered at this point is farthest from the supports of the ribs 22.

According to the construction shown in Figs. 3 to 6, the inner compensator chamber indicated at 35 is adapted for threaded engagement with the gun muzzle and the outer sleeve 36 in substantially the same manner as described hereinbefore. Instead of forming the ports through the wall of this chamber as shown in Fig. 1, the ports such as 37 are staggered in the longitudinal dimension of the chamber, so that the distance between the port 37 and the port 38 is substantially twice the distance between the port 37 and the port 39, ports 37 and 38 being in one longitudinal plane of the chamber whereas the port 39 is in a different plane, thereby establishing the staggered effect of the ports. By this construction this compensator is more efficient in use with heavy machine guns under sustained firing because the ports in any one longitudinal plane are backed up by double the amount of metal for strength factors, because the flow of heat is better distributed due to the fact that there are no thin ribs of metal between any two ports in said plane, and because by rounding the ends of the ports greater strength factors are added particularly against crystallization and/or fracture of the metal.

Fig. 6 is a transverse sectional view taken as on the line 6-6 of Fig. 3 and looking in the direction of the arrow, particularly illustrating the formation of two diametric ports in the compression area of the compensator, and the thickening of the metal of the wall as at 40 in this portion of the device. Figs. 4 and 5 are similar transverse sections taken respectively on the lines 4-4 and 5-5 of Fig. 3 and looking in the direction of the arrows for particularly illustrating the staggered positioning of the ports longitudinally of the chamber, and showing the general idea of spacing of three ports in a transverse plane of said chamber.

These ports as shown are formed by a cutter having a semi-circular cutting edge producing rounded slot ends whereby sharp rectilinear corners are avoided and a better conductivity of heat is permitted from the gases to the metal of the chamber. Also these ports are formed to otherwise increase the conductivity of heat to the surrounding air with the tendency of fracturing or cracking of the metal reduced to a minimum. In both Figs. 1 and 3 the outer sleeves are shown imperforate but it will be understood that gas exits could be provided therein out of registry with the slots or ports of the inner compensator chamber if desired, so that the effectiveness of the outer sleeve would be maintained with respect to the hiding of the flash.

Although from the foregoing description and the drawing it would appear that the device of this invention was intended solely to be secured to the barrel of a gun at the muzzle thereof, it is to be understood that this compensating device could as well be attached to the water jacket, muzzle gland, etc., of machine guns or the like and still maintain its intended and correct relationship to the muzzle of the gun.

It is understood from the above dissertation that the petitioner has a thorough knowledge of ordnance and all of its characteristics and requirements. Therefore it is not desired to be limited exactly to the above disclosure inasmuch as any minor modifications thereof would be evident to any one skilled in the art, and would not constitute invention.

What is claimed is:

1. In a firearm provided with a barrel the combination of a walled member constituting an expansion chamber secured to said barrel to receive the gases of explosion as they emerge from the barrel; means comprising converging wall portions of said chamber to increase the pressure of the expanded gases said wall portions offering a surface resistance to the forwardly moving gases for counteracting recoil of the firearm, said wall portions terminating in a projectile opening of a size to be substantially sealed when the projectile passes therethrough thereby aiding the increase of gas pressure; a plurality of slots in the chamber wall arranged in plural transverse planes, the slots in one plane staggered with respect to the slots of the next adjacent plane, all of said slots to release the expanded gases under pressure to further aid in the counteraction of recoil and to transmit the heat from the burning gases to the body of the chamber wall with the least possibility of fracturing the material of the chamber; and an imperforate cylindrical member freely open at its forward end and extending over said slots in spaced relation to the outer surface of the chamber wall, said member for receiving the released gases under pressure and delaying their dispersion to the atmosphere to insure complete combustion of the powder grains and the concealment of flash.
2. A device for attachment to the barrel of a gun, the same comprising a tubular member constituting an expansion chamber to receive the gases of explosion as they emerge from the barrel; means comprising converging wall portions of said chamber to increase the pressure of the expanded gases said wall portions having continuous unobstructed surfaces offering a single surface resistance to the forwardly moving gases for counteracting recoil of the gun upon firing,

said wall portions terminating in a projectile opening capable of being substantially sealed when the projectile passes therethrough to build up a back pressure aiding in the increase of gas pressure within said chamber; a plurality of parallel elongated slots in the chamber wall to release the expanded gases under pressure, said slots arranged in plural transverse planes throughout substantially the length of said chamber, the greater dimension of each slot being substantially in a right transverse plane of said chamber to present an effective surface for receiving the impact of the gas moving forwardly in said chamber to further aid in the counteraction of recoil, said slots having rounded ends for aiding in the transfer of heat upon firing the gun; and an imperforate cylindrical member freely open at its forward end and coaxially supported at its other end by said chamber for receiving the released gases under pressure and delaying their dispersion to the atmosphere to insure complete combustion of the powder grains and the concealment of flash when the gun is fired.

3. A device for attachment to the barrel of a gun, the same comprising a walled member constituting an expansion chamber to receive the gases of explosion as they emerge from the barrel, and a plurality of parallel elongated slots in the chamber wall to release the expanded gases, said slots arranged in plural transverse planes throughout substantially the length of said chamber, the slots in one plane staggered with respect to the slots of the next adjacent plane, the greater dimension of each slot being substantially in a right transverse plane of said chamber to present an effective surface for receiving the impact of the gas moving forwardly in said chamber to aid in the counteraction of recoil, the slots in each plane separated from each other a distance substantially equal to the greater dimension of a slot, a slot in one plane separated from a slot in the next adjacent plane a distance equal at least to the lesser dimension of a slot, all of said slots having rounded ends for aiding in the transfer of heat upon firing the gun.

RICHARD M. CUTTS, Jr.