

March 7, 1950

R. TIFFANY

2,499,428

MUZZLE BRAKE

Filed Oct. 8, 1948

Fig. 1.

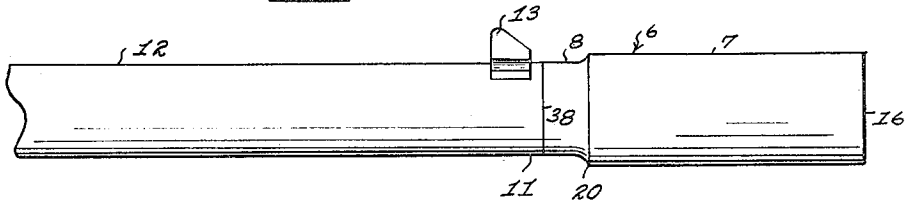


Fig. 2.

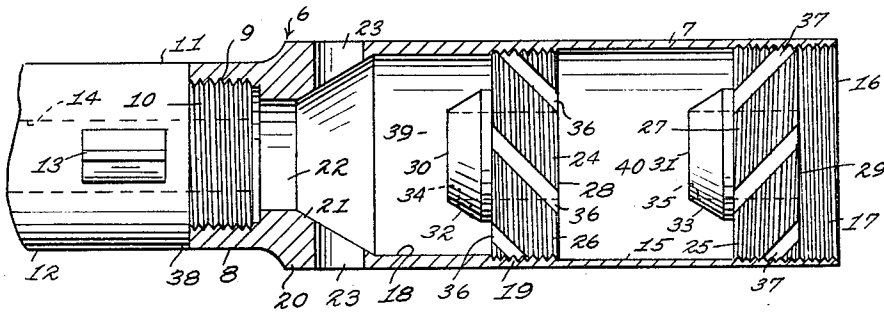


Fig. 3.

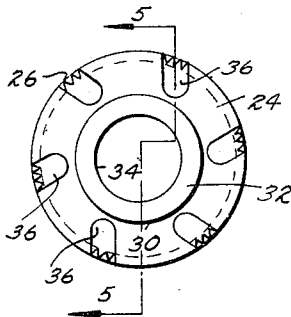


Fig. 4.

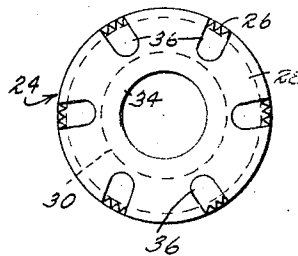
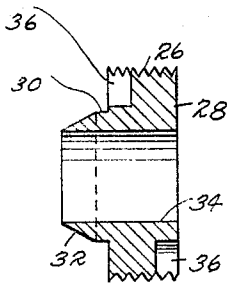


Fig. 5.



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2,499,428

MUZZLE BRAKE

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Application October 8, 1948, Serial No. 53,523

3 Claims. (Cl. 89-14)

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This invention relates to means for neutralizing, or at least minimizing the recoil of a gun or rifle of any type and also directing the gases of combustion away from the gunner, and particularly refers to a muzzle brake for a gun.

The main object of my invention is to provide a gun or rifle barrel with a muzzle brake adapted to be rigidly secured to the muzzle of the gun, virtually to form part of the latter.

Another object is to provide a gun with means for directing the muzzle blast and combustion gases away from the gunner in substantial parallelism to the line of fire.

A further object is to have a muzzle brake which serves as an effective recoil reducer capable of utilizing the blast of the gases during propulsion of a bullet through the gun barrel or beyond the latter for largely reducing the recoil of the shot fired.

It is also an object to make such a muzzle brake or recoil reducer which is simple in construction and consists of but three parts, and also requires a minimum of alteration or work to be done on the gun muzzle to fit the device thereon.

Other objects and advantages of the invention will appear in further detail as the specification proceeds.

In order to facilitate ready comprehension of this invention for a proper appreciation of the salient features thereof, the invention is illustrated on the accompanying drawing forming part hereof, and in which:

Figure 1 is a side elevation of the muzzle of a rifle or gun barrel with a muzzle brake made according to the invention applied thereto;

Figure 2 is a longitudinal section through the outer member of the gun muzzle brake illustrating the manner in which the latter is mounted on the muzzle and disclosing internal detail of the brake device;

Figure 3 is an end view of one of the internal blast brake members within the interior of the brake, as seen from the left in Figure 2;

Figure 4 is another elevation of the same blast brake member, as seen from the opposite side, or from the right, in Figure 2;

Figure 5 is a section taken on line 5-5 in Figure 3.

In the views, the same reference numerals indicate the same or like parts.

It is quite well known that guns and rifles, and even small arms, display a certain amount of recoil when a shot is fired, not to mention that the sharp report of the shot without any

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diminution immediately reaches the ears of the gunner to his annoyance and discomfiture. While some means have been proposed in this connection, nothing reasonable and simple has appeared which has been generally adopted.

Upon considering this problem, it has occurred to me that a device should be available for attachment to the muzzle of a gun for directing the gases of combustion during the firing of a shot in the forward direction parallel to the line of fire, and which, in addition, should to some extent reduce the recoil which occurs during firing of the shot, and as a result I have found it quite feasible to produce a special muzzle brake adapted to be fitted to the end or muzzle of a gun barrel in alignment therewith, as will now be further described.

Hence, in the practice of my invention, and referring again to the drawing, a muzzle brake, generally indicated at 6, primarily consists of a brake casing 7 of substantially cylindrical form which has a rearwardly-reduced portion 8 which is internally threaded at 9 in such fashion as to mesh with the thread 10 on the muzzle 11 of a gun barrel 12 immediately in front of the sight 13, the bore 14 of the barrel extending through the threaded muzzle 10. Within the muzzle brake casing or cylinder 7 is a large bore 15 extending in from the forward end 16 of the casing and having a left-hand thread 17 cut a short distance inwardly from the end 16. The large bore 15 extends approximately midway between the ends of casing 7 and at that point is abruptly reduced to a smaller diameter bore 18 which along the first portion of its length is provided with a right-hand thread 19. A short distance forwardly of the outer shoulder 20 of the casing, the bore 18 abruptly changes into a conical or tapered converging hole 21 which connects by a smaller bore 22 with the still smaller bore 14 of the gun muzzle 11, as best seen in Figure 2. Immediately forward of the shoulder 20, a pair of aligned, transverse holes 23, 23 are provided which communicate with the tapering interior 21 for the two purposes of first having apertures for ventilation of the interior of the brake casing, and also for receiving the operating projection of a spanner wrench for screwing the casing on or off thread 10 of gun muzzle 11.

Within brake casing 7 are located a pair of spaced blast brake members, or discs, 24 and 25 of somewhat similar characteristics, the inner brake member or disc 24 being provided with a right-hand thread upon the periphery 26, while in corresponding fashion upon the periphery of

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brake member or disc 25 is a left-hand thread 27, the right-hand thread 26 of member 24 meshing with the threaded portion 19 of bore 18, while the threaded periphery 27 of member 25 meshes with thread 17 within the forward end 16 of casing 7.

The outer ends or surfaces 28, 29 are substantially flat, while upon the rear ends a pair of integral nipples 30, 31 project rearwardly, each being externally beveled, as indicated at 32, 33. In addition, both brake members 24 and 25 have central bores 34, 35 of slightly larger diameter than the bore 14 of the gun muzzle 11, so that a bullet shot from the gun will clear these bores without contact therewith. Thus far the general construction of the two brake members 24 and 25 is similar, except that one is of smaller diameter than the other and has a right-hand thread, namely, member 24, while the other 25 has a slightly larger diameter and a left-hand thread 27, due to the fact that the threads 19 and 17 are in bores of different diameters, the diameter of bore 15 being sufficiently large to allow brake member 24 to be inserted through the same to thread 19 into which this may then be screwed. The threaded periphery 26 of inner brake member 24 is diagonally serrated or cut through by a spaced series of angular grooves 36, 36 inclined substantially at a 45° angle in the rightward direction or in the same direction as the right-hand screw-thread 26 upon the periphery. In opposite fashion, the periphery 27 of brake member 25 is cut through by a series of grooves 37, 37 disposed at substantially a 45° angle in the left direction when considered from the front end of the casing at 16 so that the inclination of these grooves is substantially in the same direction as the left-hand thread 17 in the casing or 27 on the brake member 25. In each case the grooves or channels 36 or 37 form peripheral impedance passages by-passing the threads 19 and 17 in casing 7.

The arrangement is such that if a spanner wrench is caused to engage at least one of the holes 23 in casing 7 and the reduced end 8 with its thread 9 screwed on thread 10 of gun muzzle 11 of the gun barrel 12, so that casing 7 is securely screwed in position against the shoulder 38 of the muzzle, the muzzle brake device is disposed in effective position to operate during firing of a shot, as will now be outlined. When a shot is fired, the bullet requires but a small fraction of a second to pass through the inner chamber 39 into bore 34 of inner brake member 24, and as it almost completely fills this bore without contact, the gases of combustion issuing from bore 14 in the gun barrel tend to build up considerable pressure within said chamber as long as any portion of the bullet still remains within even the farthest or outermost end of bore 34. Then, as the bullet proceeds, and the built-up pressure of gases in chamber 39 having, of course, a considerable forward thrust, will tend to act on the rear portion and nipple 30 of brake member 24, and while issuing into chamber 40 in casing 7 through angular grooves 36, 36, the gases will also act on the forward sides of these grooves due to their angularity with respect to the axis of the device, with the result that a partial forward impulse is imparted to the inner brake member 24 to partly neutralize the rearward recoil of the gun which is due to the expansion and projection of the gases in and from the muzzle. When the bullet enters bore 35 of the forward brake member 25, it also nearly closes

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this bore followed by gases at a high velocity passing through bore 34 in the inner brake member 24, these gases being given also high velocity of rotation by the gases passing through the peripheral slots or grooves 36. The whirling or rotation of the gases entering chamber 40 thus becomes so great that they are detained for a short interval within this chamber while the bullet speeds through bore 35 and finally out into the atmosphere. The central column of gases passing directly in the path of the bullet behind the latter through bores 34 and 35 will thus be largely diverted temporarily by the whirling of the gases within chamber 40, the central portion issuing through bore 35 to the outside, while gradually the whirling gases are also caused to issue through the peripheral slots or grooves 37, 37 in brake member 25, these slots or grooves being inclined in the opposite direction to the direction of rotation of the gases, the net result being that a further forward impulse is imparted to the outer brake member 25 further contributing to the neutralization of the reaction or recoil caused by the explosion of the gases when the shot is fired. It is obvious that the time interval from the moment that the bullet leaves the muzzle and passes through chambers 39 and 40, as well as the bores 34 and 35 in brake members 24 and 25 and out into the atmosphere is very short so that the forward impulses imparted by the gases to both brake members occur substantially simultaneously with the recoil caused by the gas jet propulsion of the bullet through the device as the gases expand in the gun barrel and leave the muzzle.

Inasmuch as the recoil in a gun is due to two factors, namely, the reaction due to the forward propulsion of the bullet itself and then the recoil or reaction due to the expansion of the gases, some recoil will, of course, remain, namely, that which is due to the original inertia of the bullet and the momentum imparted to the same, while a large portion of the recoil due to the action of the gases is the portion which is successfully reduced by the device.

A very useful purpose well served by the present muzzle brake is to direct the sound waves of a fired shot in the forward direction away from the gunner, which is definitely desirable, as this to a certain extent reduces and thereby apparently muffles the sharp report of the shot before the sound reaches the ears of the gunner.

While I have described the brake casing 7 as cylindrical, it may assume any other convenient form and whereas also two brake members 24 and 25 have been mentioned as occupying spaced positions within the casing, it is obvious that only one could be used or more than two, if desired.

Manifestly, variations may be resorted to and parts and features may be modified or used without others within the scope of the appended claims.

Having now fully described my invention, I claim:

1. A muzzle brake for a gun or rifle provided with a gun barrel having a gun bore and adapted to receive the muzzle brake upon the muzzle thereof, said muzzle brake including a hollow casing adapted to be aligned with the gun barrel and mounted on the latter, and having at least one bore therein extending from the forward end thereof, an internal thread in a portion of the bore, a peripherally-threaded disc screwed into the internal thread in the bore, an externally

beveled nipple rigid upon a face of the disc, the latter having an axial bore of larger diameter than that of the gun bore extending therethrough and through the nipple, said disc also having a plurality of grooves disposed at an inclined angle with respect to the longitudinal axis of said bore in the periphery thereof by-passing the internal thread and thread on said periphery, and means on said casing for mounting the latter upon the muzzle of said gun.

2. A muzzle brake for a gun or rifle provided with a gun barrel having a gun bore and adapted to receive the muzzle brake upon the muzzle thereof, said muzzle brake including a hollow cylindrical casing adapted to be aligned with the gun barrel and having a bore of predetermined diameter extending a distance from the forward end thereof with an internal thread in the outer portion of the bore, the casing having a second bore of smaller diameter than that of the first-named bore extending from the inner end of the latter a further distance in said casing and having an internal thread at the outer end thereof of smaller diameter than that of the first-mentioned internal thread, one thread being a left-hand thread and the other being a right-hand thread, a pair of discs spaced apart in said bores and having peripheral threads and fitting individually in the two internal threaded portions within said bores, a nipple rigidly disposed upon the inner intermediate portion of each disc, and each of the latter having an axial bore extending therethrough and through the nipple thereon in line with the gun bore and of greater diameter than that of the latter, and each of the peripheries of said discs having a series of spaced grooves extending at an inclined angle through the discs with respect to the axis thereof, the inclination of the grooves in the periphery of one disc being opposite to that of the inclination of the grooves in the other disc and being in each case directed in the same general direction of the thread through which the grooves are cut upon said discs, a reduced rear portion upon said casing having an internal thread adapted to fit upon a thread upon the gun muzzle, the casing also having a third bore extending forwardly of the internal thread of the reduced rear portion, said third bore extending a predetermined distance in line with the gun bore and being of greater diameter than that of the latter and terminating a short distance forwardly of said gun muzzle, said casing having also a divergently-tapered bore connecting the small rear bore with

the inner end of the second inner bore and at least one radially-disposed hole in the wall of said casing extending into the diverging portion or bore within the latter adapted for engagement with a spanner wrench by which to screw the casing on or off the gun barrel.

3. A muzzle brake for a gun or rifle provided with a gun barrel having a gun bore and provided with an external thread upon the muzzle thereof, said muzzle brake including a hollow cylindrical casing having an internal thread in the rear end thereof fitting the thread upon the muzzle of said gun and having a plurality of bores of successively smaller diameters extending from the forward end thereof, there being a short bore located in the portion of said casing forwardly of the internal thread, said casing having a conical bore inter-connecting said short bore and the adjacent bore of the previously-mentioned series of bores, an internal thread disposed in the forward end of each of the bores in said series, a peripherally-threaded disc fitting in the internal threads in said bores and spaced apart to form a spaced series, an externally beveled nipple rigid upon a face of each disc, each of the latter having a bore extending therethrough, each of said discs having a series of grooves extending through the peripheral portion thereof and spaced apart and individually disposed at an inclined angle with respect to the central axis of the disc involved, the internal threads within said series of bores being alternately right-hand and left-hand threads and the threaded peripheries on the discs being correspondingly right-hand and left-hand threads to fit said internal threads with the peripheral grooves being correspondingly inclined in alternately opposite directions in said discs.

RAY TIFFANY.

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