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GUN BLAST SUPPRESSOR

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Fig. 1

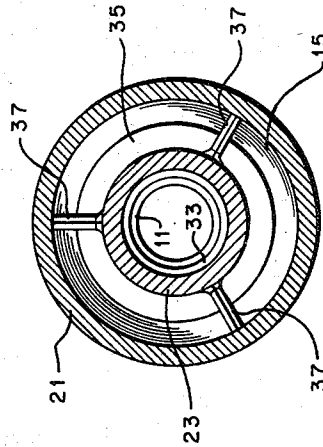
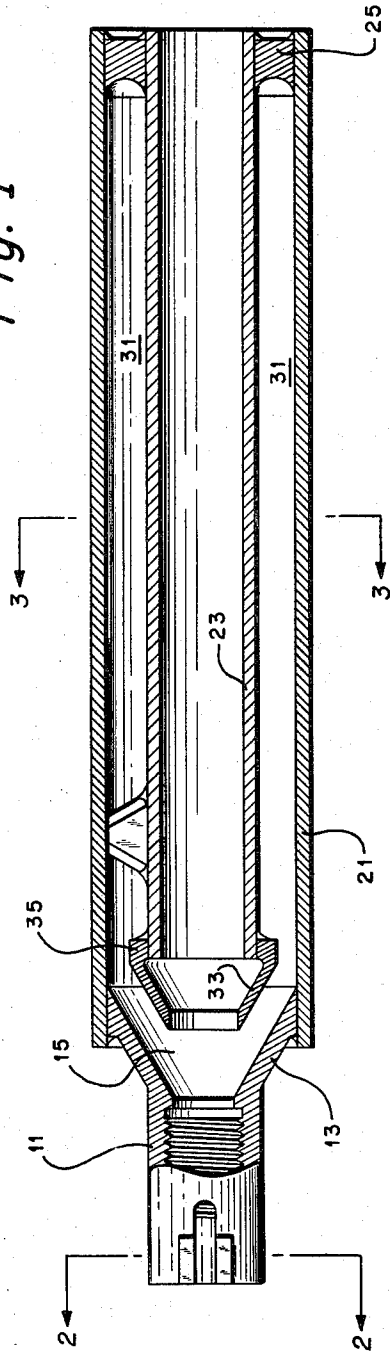


Fig. 3

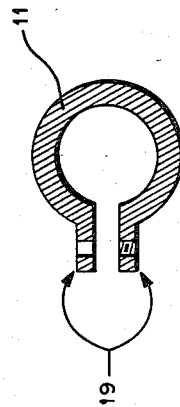


Fig. 2

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1

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GUN BLAST SUPPRESSOR

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3 Claims. (Cl. 89—14)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to a gun blast suppressor for machine guns and more particularly to a gun blast suppressor arranged to prevent damage to structural members immediately adjacent to the muzzle of a machine gun due to the blast effect of the gases released therefrom at a high velocity and under extremely high pressure when the gun is fired.

Various types of gun blast suppressors have been constructed. However, all known types are relatively large and heavy and they fail to reduce the gun blast sufficiently to preclude serious damage to structural parts immediately adjacent to the muzzle of a gun. These deficiencies become particularly significant for two reasons in aircraft installations wherein the guns must be fully enclosed within structural components of the airframe such as the wings; first, because in all aircraft installations size and weight of each part are critical factors; and, second, every structural component of the airframe of an aircraft is necessarily designed with a very small safety factor due to these same space and weight limitations, with the result that no substantial damage to such members can be tolerated since it would dangerously weaken the structure. Consequently, gun blast suppressors have henceforth been used only infrequently for gun installations on aircraft, notwithstanding the need in this type of installation for the protection which an effective gun blast suppressor would afford.

The present invention contemplates an improved gun blast suppressor assembly reduced in size and weight and capable of a greater reduction in blast pressure. Hence, the device described in the present application is particularly suitable for gun installations in aircraft.

An object of the present invention is to provide a gun blast suppressor of substantially increased efficiency.

Another object is the provision of a light weight, compact gun blast suppressor assembly for machine guns.

A final object of this invention is to provide a gun blast suppressor assembly capable of minimizing gun blast damage to structural members disposed immediately adjacent to the muzzle of a gun.

The exact nature of this invention as well as other objects and advantages thereof will be readily apparent from consideration of the following specification in relation to the annexed drawing wherein:

Fig. 1 shows a cross section taken upon the longitudinal axis of a preferred embodiment of the present invention,

Fig. 2 shows a cross section taken on line 2—2 of Fig. 1, and

Fig. 3 shows a cross section taken on line 3—3 of Fig. 1.

Referring now to the drawing, wherein like reference characters designate like or corresponding parts, the showing in Fig. 1 includes an assembly supporting member

2

11 generally cylindrical in shape and flared outwardly at one end to form a hollow tapered portion 13 which in turn forms the outer surface of a tapered annular passage 15 and provides the mechanical connection with the outer tube 21 of the gun blast suppressor assembly. The supporting member 11 also includes means for connecting the gun blast suppressor assembly to the muzzle of a machine gun which means may conveniently comprise an internally threaded portion for engagement with existing threads on the barrel of the gun and a slotted clamping means 19 adjacent thereto, shown best in Fig. 2. The outer tube 21 is an elongated hollow cylindrical member forming the outer surface of the gun blast suppressor assembly and permanently connected at one end to the portion 13 of the supporting member 11 by any suitable means, such as a welded joint. The outer tube 21 in turn supports a relatively smaller elongated hollow cylindrical member comprising the inner tube of the annular gun blast suppressor assembly and disposed concentrically within the outer tube 21. The inner and outer tubes are interconnected at the end of the outer tube most remote from its connection to the portion 13 of the supporting member 11 by means of an annular end plate 25 which may be sealably engaged with the respective tubes by any suitable means such as welded joints as illustrated in Fig. 1 or threaded engagement of the end plate with the ends of the respective tubes. The respective tubes 21 and 23 along with the end plate 25 form an elongated annular chamber 31 fully enclosed and sealed except for the annular opening adjacent the portion 13 of the supporting member 11. In order to provide the most favorable configuration for the chamber 31, the inner face of the end plate 25 is provided with an annular depression which is substantially semi-circular in cross section to facilitate the reversal of flow of gases which strike the end plate. The inner tube 23 also requires support adjacent its opposite end to accurately maintain it in proper alignment with the outer tube 21. This additional support may comprise a plurality of radially extending braces 37, one of which is shown in Fig. 1, all fixedly secured to the inner tube 23 as by welding or formed integrally therewith. The outer ends of the braces 37 should be in bearing engagement with the inner surface of the outer tube 21, but preferably are not attached thereto, because the tubes may shift relative to each other as they become heated in use. The end of the inner tube 23 remote from the end plate 25 is fitted with a tapered annular deflector member 33 fixedly secured thereto by suitable means such as welding, and so disposed that it forms the inner surface of the tapered annular passage 15. In addition, the member 33 is provided with a circumferential shoulder portion 35 around its outer periphery and adjacent its point of attachment to the inner tube 23, to restrict reverse flow through the passage 15. It will be noted that the braces 37 are preferably spaced sufficiently from the deflector 33 and its shoulder 35 that they do not adversely interfere with the flow of gases through the passage 15.

In operation, the device comprising the present invention is fixedly attached to the muzzle end of a machine gun with the inner tube 23 in axial alignment with the bore of the gun barrel. As each projectile is fired from the gun, it passes out of the muzzle and through inner tube 23 and thence out of the end of the inner tube 23 remote from the muzzle of the gun. As the projectile passes through the central opening in the tapered annular deflector member 33 which is just slightly larger than the outer circumference of the projectile and is concentric with the gun barrel, the tapered outer surface of the deflector member which at its widest point is about one and one-half times the diameter of the inner tube 23 is effective to initially separate the gases behind the projectile

from the projectile as it leaves the muzzle of the gun and divert these gases through the passage 15. As the gases emerge from the muzzle of the gun they continue to expand and, due to the pressure in the muzzle, are forced through the passage 15 and into the annular chamber 31 defined by the inner surface of the outer tube 21, the outer surface of the inner tube 23, and the end plate 25 wherein the gases can continue to expand until they reach the end plate 25. Here they strike the radially curved surface of the end plate 25, bounce back in the opposite direction toward the muzzle of the gun, and pass over the turbulence creating shoulder 35 of the deflector 33 before returning through the passage 15, and thence out through the inner tube 23. During this process in which the gases are turned twice through 180 degrees and subjected to a turbulent flow their velocity is greatly reduced and meanwhile the projectile has traveled the length of the inner tube 23. Then, the gases pass out through the inner tube at greatly reduced pressure and velocity, in comparison to the conditions under which they initially leave the muzzle of the gun, so that the discharge of gases from a gun equipped with the device comprising the instant invention is extended over a relatively longer time interval.

Thus, the present invention provides a compact, light weight means for effectively reducing the pressure and velocity of the gases released from the muzzle of a machine gun when it is fired and arranged to minimize impingement of these gases upon structural members adjacent to the muzzle of the gun, thereby substantially reducing the possibility of serious damage to such structures.

In an alternate configuration designed to provide a more concentrated weight distribution for a gun assembly fitted with the present invention, structure defining the annular passage 15 may be located at the right end of the device as illustrated in Fig. 1 and the respective tubes 21 and 23 may be sufficiently enlarged to permit the barrel of a gun to extend well within the elongated annular gun blast suppressor assembly to a point immediately adjacent the relocated annular passage. With such an arrangement, the gun blast suppressor assembly is disposed much closer to the center of gravity of the gun assembly upon which it is mounted. In addition, two or more units of the type shown in Fig. 1 can be mounted in tandem, if desired, to produce a cumulative effect upon the gases discharged from a gun.

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 gun blast suppressor assembly, comprising a first elongated cylindrical hollow imperforate tubular member, a second relatively larger elongated cylindrical hollow imperforate tubular member disposed concentrically of and in spaced relation to said first member, a generally conical hollow supporting element connected at its larger end to one end of said second member and attached at its other end to the muzzle of a gun barrel to fixedly support said second member in axial alignment

with the barrel and projecting forwardly from the muzzle end thereof, an imperforate annular end plate sealably and fixedly interconnecting said first and said second tubular members at the end of said second tubular member remote from the conical supporting element, said annular end plate having a radially curved annular depression upon its inner face, and a tapered annular deflector element attached at its larger end to the end of said first member nearest the supporting element, said deflector element being spaced from and disposed concentric of said supporting element to define an annular venturi type passage therebetween adjacent the muzzle of a gun.

2. A gun blast suppressor assembly comprising an elongated hollow annular housing encompassing an elongated axial opening therethrough of sufficient size to permit the passage of a projectile, said housing including an elongated outer tubular imperforate member, a generally cylindrical supporting member securely attached to the muzzle end of a machine gun and provided with a flared portion fixedly secured to one end of said outer tubular member to fixedly maintain said outer tubular member in alignment with the barrel of a gun and projecting forwardly from the muzzle end thereof, an imperforate annular end plate connected to the other end of said outer tubular member and supporting one end of a relatively smaller elongated inner tubular imperforate member of substantially the same length as the outer tubular member, said end plate being effective to seal the annular space between said members to form a substantially closed chamber within said housing for the temporary entrapment of the gases released when a projectile leaves the muzzle of a gun, and an annular flared deflector member fixedly secured to the opposite end of said inner tubular member and provided at its outer periphery with a shoulder projecting beyond the outer circumference of said inner tubular member, said deflector member being disposed in spaced relation to the flared portion of said supporting member to form a single restricted annular passage sloping outwardly from a point adjacent to the muzzle of a gun to which said suppressor assembly is attached to the annular space between said outer and inner tubular members.

3. A device as described in claim 2, in which said end plate is provided with a radially semi-circular annular depression covering its entire inner surface.

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