March 11, 1952 I. D. VIRONDA 2,589,171

SHOTGUN CHOKE AND COMPENSATOR

Filed June 23, 1949

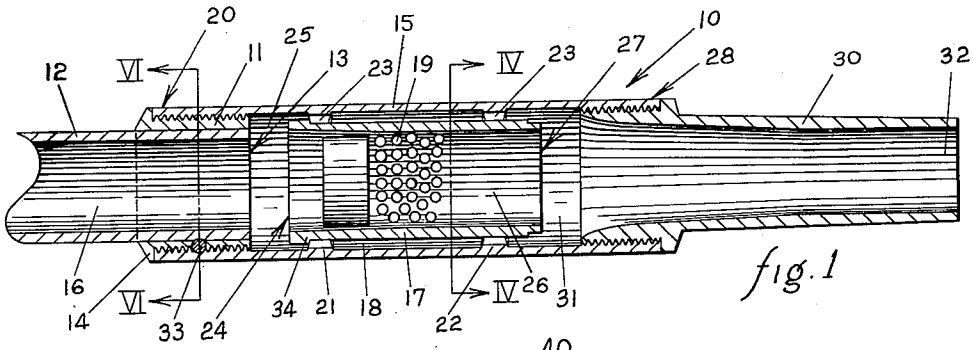


fig. 1

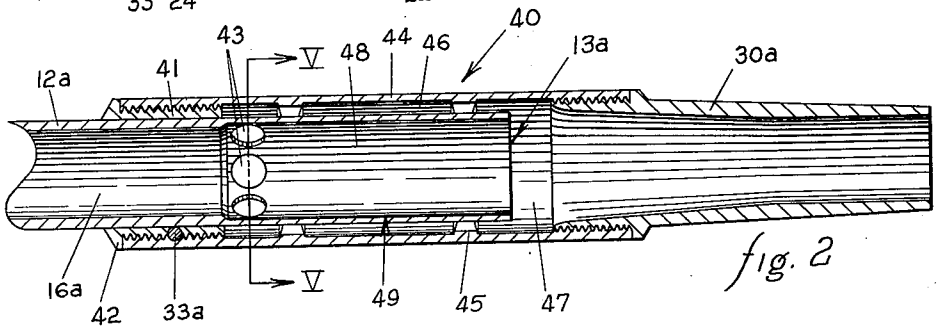


fig. 2

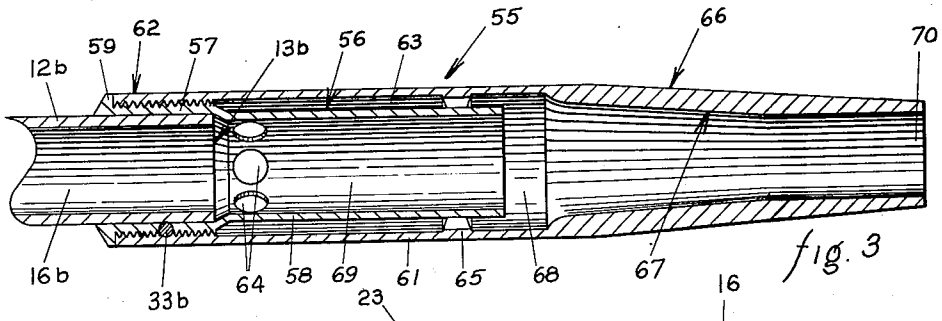


fig. 3

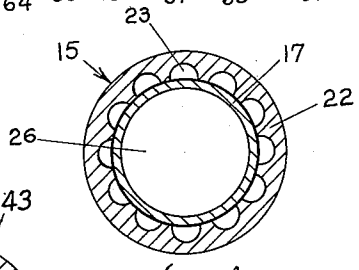


fig. 4

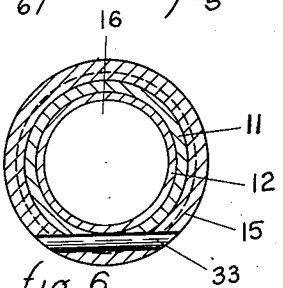


fig. 6

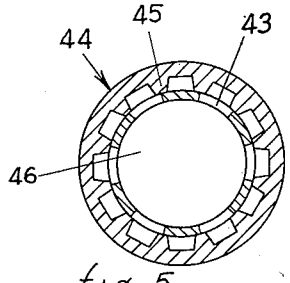


fig. 5

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SHOTGUN CHOKE AND COMPENSATOR

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2 Claims. (Cl. 42—79)

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This invention relates in general to a gun compensator cooperable with the muzzle of a gun barrel and more particularly to a type thereof adapted for use with a shot gun.

Persons acquainted with the use and operation of shot guns, especially on trap or skeet ranges, have long recognized the need for a shot gun compensator which would eliminate the loud report created when the impelling gases behind the gun charge expand as they pass from the discharge end of the gun barrel.

Persons acquainted with the ballistics of a shot gun have also recognized that the expansion of the impelling gases tends to spread the pattern of the shot, even when a choke is used, if no provision is made for dissipating the expansive potential of the impelling gases before they reach the discharge end of the gun barrel.

Numerous shot gun compensators, such as the one disclosed in Patent No. 2,453,747, have been developed to prevent distortion of the gun shot pattern by the expending impelling gases by providing one or more openings in the sidewall of the compensator through which the gases may escape progressively. However, neither this type of compensator nor other presently known compensators eliminate the loud report caused by the expanding gases. In fact, the report is actually more objectionable, especially to persons standing near the gun, where a compensator having said sidewall openings is used.

Patent No. 2,165,457 discloses another type compensator, which is designed for use with a gun firing a single projectile. The numerous openings between the inner chamber and the annular chamber in this compensator permit too rapid an escape of the impelling gases and a corresponding premature dissipation of the impelling force. Likewise, this compensator does not eliminate the objectionable noise.

Accordingly, a primary object of my invention is the provision of a compensating device cooperable with the muzzle of a shot gun barrel whereby the damaging effects upon the shot pattern, due to the expansion of the impelling gases, is positively prevented and, further, whereby the objectionably loud report incident to the expansion of such impelling gases is satisfactorily muffled.

A further object of this invention is the provision of a shot gun compensator, as aforesaid, for use in combination with gun chokes of varying internal diameters, said chokes becoming an integral part of my invention.

A further object of this invention is the provision of a shot gun compensator, as aforesaid, which is simple in structure and easily adaptable to the muzzle of a shot gun under a variety of conditions.

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Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon referring to the accompanying drawings and upon reading the following specification.

In meeting those objects and purposes heretofore mentioned, as well as others incidental thereto and associated therewith, I have provided a compensator cooperable with the muzzle of a shot gun barrel providing an inner cylindrical chamber coaxial with an having an internal diameter substantially equal to the internal bore of the shot gun barrel. An enclosed annular chamber is provided around and walled from the inner chamber by means of an outer tube supportable upon the gun barrel near the muzzle thereof. An entrance passageway is provided between the inner chamber and the annular chamber at one end of the annular chamber. An exit passageway is provided between the annular chamber and the inner chamber at the opposite end of the annular chamber. The inner and annular chambers are completely walled off from each other between the entrance and exit passageways. A choke of a conventional type is mounted upon the extended end of the outer tube. Thus, a portion of the impelling gases behind the gun charge may escape into the annular chamber through the entrance passageway and return to the inner chamber through the exit passageway ahead of the gun charge. The expansion of these gases as they pass into the annular chamber through the entrance passageway further dissipates the explosive potential thereof. Thus, the noise disturbance created by these preceding cases, when they pass through thte discharge end of the gun ahead of the gun charge, is much less than the disturbance caused by present guns. The impelling gases, remaining behind the gun charge, will be sufficiently reduced in explosive potential both by expansion and reduction in volume as to create a much less intense report, when they discharge from the gun behind the gun charge, than produced by present guns.

Therefore, it will be seen that my improved shot gun compensator both divides and expands the impelling gases before they can reach the atmosphere, thereby greatly reducing the objectionable noise normally incident to the emission of impelling gases from the discharge end

of a shot gun, especially when one of the presently known compensators is used.

For illustrations of preferred embodiments of my invention reference is made to the accompanying drawings in which:

Figure 1 is a centrally cross-sectioned view of a preferred embodiment of my invention.

Figure 2 is a centrally cross-sectioned view of a modification of my invention.

Figure 3 is a centrally cross-sectioned view of a further modification of my shot gun compensator.

Figure 4 is a sectional view substantially as taken along the line IV—IV of Figure 1.

Figure 5 is a sectional view substantially as taken along the line V—V of Figure 2.

Figure 6 is a sectional view substantially as taken along the line VI—VI of Figure 1.

Construction

As shown in Figure 1 the shot gun compensator **10** is comprised of a cylindrical mounting collar **11** which is sleeved upon and secured, as by brazing, to a shot gun barrel **12** adjacent to the muzzle **13** thereof. The mounting collar **11** is provided with an integral, radially extending, annular flange **14** adjacent to the outer end thereof which end is remote from the gun muzzle **13**. The mounting collar **11** is externally threaded between the annular flange **14** and the inner end thereof which is adjacent to the gun muzzle **13**.

For the purpose of convenience in description, the terms "inner" or "inwardly" and "outer" or "outwardly" as used in this specification shall be understood to have reference to the geometric center of the compensator **10** and will be applied either in a radial or axial direction as best serves the disclosure.

One end **20** of the outer cylindrical solid tube **15**, which tube is internally threaded near both ends thereof, is threadedly mounted upon the threaded portion of the mounting collar **11** and bears snugly against the annular flange **14**. The outer tube, which is coaxial with the internal bore **16** of the gun barrel **12**, extends substantially beyond the gun muzzle **13**.

The outer tube **15** is positively secured upon the collar **11** by means of a lock pin **33** (Figure 6) which is driven into an appropriate opening intersecting the external threads of the mounting collar **11** and cooperating threads of the outer tube **15** and preferably perpendicular to the axis of the gun barrel **12**.

An inner, cylindrical solid tube **17** (Figures 1 and 4), which is coaxially disposed within the outer tube **15** is spaced therefrom and supported thereon by a pair of spaced, support rings **21** and **22** to provide an annular chamber **18** between the inner and outer tubes **17** and **15**, respectively. The support rings **21** and **22** (Figure 4), which are preferably, but not necessarily, integral with the outer tube **15**, are relieved by a plurality of axially disposed slots **23**. Although the slots are shown in Figure 4 as substantially semi-circular and positioned along the inner wall of the rings, they may be of any size and contour desirable, such as substantially rectangular (Figure 5), and may pass through the rings between the said inner wall thereof and the outer tube **15**.

One end **24** of the inner tube **17** is spaced axially from the gun muzzle **13** thereby providing an entrance passageway **25** between the gun muzzle **13** and the end **24** of the inner tube **17**, communicating with the annular chamber **18**.

The internal diameter of the inner tube **17** is preferably slightly larger, such as .030 of an inch, than the barrel bore **16** at the gun muzzle **13**. Furthermore, a portion of the internal bore of the inner tube **17** at the end **24** thereof may be slightly expandingly tapered toward the gun muzzle **13**. There will be a slight tendency for the gun shot to disperse between the gun muzzle **13** and the inner tube **17**. Therefore, this taper, in combination with the enlarged bore of the inner tube **17**, prevents interference of the inner tube end **24** with the gun charge **19** as it passes through the space between the gun muzzle **13** and the end **24** of the inner tube **17**.

The inner tube **17** is preferably, but not necessarily, provided with an external, radially extending, annular stop flange **34** adjacent to the end **24** thereof which bears against the support ring **21**. The stop flange **34** prevents movement of the inner tube **17** away from the gun muzzle **13**.

The opposite end **27** of the inner tube **17**, remote from the gun muzzle **13**, is spaced inwardly with respect to the extended end **28** of the outer tube **15**. A shot gun choke **30**, which may be of any convenient conventional type having external threads at one end thereof, is threadedly engaged by the internal threads within the extended end **28** of the outer tube **15**. The choke **30**, when in operable position, is spaced from the adjacent end **27** of the inner tube **17** thereby providing an exit passageway **31** between the choke **30** and the inner tube **17** communicating with the annular chamber **18**.

An inner chamber **26**, which extends from within the gun muzzle **13** to the discharge end **32** of the gun choke **30**, is defined by the internal bore of the gun muzzle **13**, the inner tube **17** and the gun choke **30**.

Accordingly, it will be seen that the gun choke **30**, or a similar gun choke, constitutes a necessary and integral part of this invention.

The entrance passageway **25** connects the inner chamber **26** with the annular chamber **18** at the end thereof adjacent to the gun muzzle **13**, and the exit passageway **31** connects the inner chamber with the annular chamber at the opposite end thereof.

Alternate structures

An alternate shot gun compensator **40** (Figures 2 and 5) is comprised of a mounting collar **41**, which may be substantially identical to the above described mounting collar **11**, including an annular flange **42** extending radially and externally therefrom adjacent to the outer end thereof. However, in the alternate compensator **40**, the mounting collar **41** is secured to the gun barrel, as by brazing, at a point spaced approximately two inches from the muzzle of the gun barrel. A plurality of entrance passageways **43**, here six, are provided through the sidewall of the gun barrel **12***a* between the mounting collar **41** and the gun muzzle **13***a*, preferably adjacent to the mounting collar **41**.

The mounting collar **41** is externally threaded, in a manner similar to that described with respect to the mounting collar **11**, for threaded engagement by cooperating internal threads at one end of a cylindrical outer tube **44**, which outer tube may be similar in all respects to the cylindrical outer tube **15**. The outer tube **44**, which is coaxial with and extends beyond that portion of the gun barrel **12***a* between the mounting collar **41** and the gun muzzle **13***a*, is spaced there-

from and supported thereon by means of support rings 45 (Figures 2 and 5), thereby providing the annular chamber 46 between the gun barrel 12a and the outer tube 44. The support rings 45 may be similar in all respects to the support rings 21 and 22, hereinabove described.

A gun choke 30a, which may be similar in all respects to the gun choke 30, is threadedly engaged by the extended end of the outer tube 44. The gun choke 30a is spaced from the gun muzzle 13a to provide an exit passageway 47 communicating with the annular chamber 46. An inner chamber 48 is substantially defined by that portion of the internal bore 16a of the gun barrel 12a between the mounting collar 41 and the gun muzzle 13a, and the internal bore of the gun choke 30a.

Accordingly, the entrance passageways 43 connect the inner chamber 48 with the annular chamber 46 at the end thereof adjacent to the gun muzzle 13a. The exit passageway 47 connects the inner chamber with the annular chamber at the opposite end thereof.

The internal bore 16a of the gun barrel 12a may be counterbored from the gun muzzle 13a to a point on the opposite side of the entrance passageways 43, as shown in Figure 2, to prevent interference of the exit passageways 43 with the flight of the gun shot in the gun charge. A lock pin 33a, similar in all respects to the lock pin 33, may be provided for securing the outer tube 44 upon the mounting collar 41, as above described.

Another alternate compensator 55 (Figure 3) is comprised of a solid cylindrical inner tube 56 having a portion 57 of enlarged diameter which is sleeved upon and secured to the gun barrel 12b, as by brazing, at the muzzle 13b thereof. The remainder 58 of the inner tube 56, which preferably has an internal diameter slightly larger than the internal bore 16b of the gun barrel 12b, is coaxial with and extends away from the gun muzzle 13b. The enlarged portion 57 of the inner tube 56 is provided with an integral, external, annular flange 59, remote from the small portion 58, and the remainder of the enlarged portion 57 is externally threaded. An outer, solid cylindrical tube 61 is internally threaded at one end 62 for threaded engagement with the threads on the enlarged portion 57 of the inner tube 56. The outer tube 61, which is coaxial with and extends substantially beyond the extended end of the inner tube 56, is spaced from and supported upon the inner tube small portion 58 by means of a support ring 65, thereby providing an annular chamber 63 between the outer tube 61 and the small portion 58 of the inner tube 56. The support ring 65 may be similar to the support rings 21 and 22 (Figures 4 and 5), hereinabove described in detail. A plurality of passageways 64 communicating with the annular chamber 63 are provided through the sidewall of the small portion 58 of the inner tube 56 adjacent to the gun muzzle 13b.

The outer tube 61 is provided with an internal gun choke 66 at the extended end thereof, having an internal bore 67. A space is provided between the extended end of the small portion 58 of the inner tube 56 and the adjacent portion of the choke internal bore 67 thereby creating an exit passageway 68 communicating with the annular chamber 63. An inner chamber 69 is substantially defined by the internal bore of the gun muzzle 13b, the small portion 58 of the inner tube 56 and the choke internal bore 67. A lock pin 33b (Figure 3), which may be substantially identical to the lockpin 33, may be provided for locking the end 62 of the outer tube 61 upon the enlarged portion 57 of the inner tube 56.

Accordingly, the entrance passageways 64 connect the inner chamber 69 with the annular chamber 63 at the end thereof adjacent to the gun muzzle 13b. The exit passageway 68 connects the inner chamber with the annular chamber at the opposite end thereof.

Operation

The compensator 10 (Figure 1) and the alternate compensators 40 and 55 (Figures 2 and 3), are all designed with the following basic essentials in common: An inner tube, a coaxial outer tube spaced from the inner tube to provide an annular chamber therebetween, an entrance passageway from the inner chamber into the annular chamber at one end thereof, an exit passageway from the annular chamber, at the other end thereof, into the inner chamber and a gun choke, either integral or otherwise, which becomes a cooperating part of the compensator.

Accordingly, a detailed description of the operation of the compensator 10 (Figure 1), given hereinafter, shall be understood as applicable in substance to the operation of the alternate compensators 40 and 55.

When the gun charge 19, here shot and the wadding associated therewith, are passing through the inner tube 17 a portion of the impelling gases are permitted to expand through the entrance passageways 25 into the annular chamber 18, then bypass the gun charge 19 through the annular chamber 18 and return to the inner chamber 26 through the entrance passageway 25 ahead of the gun charge 19, and finally precede the gun charge through the discharge end 32 of the gun choke 30. The expansion dissipates a substantial amount of the expansive potential in the said portion of impelling gases which bypass the gun charge while it is in the inner tube 17, thereby greatly reducing the explosion created by these preceding gases as they are emitted from the discharge end 32 of the gun choke 30.

Since the impelling gases are much lighter and have much less inertia than the shot, a substantial portion will bypass the gun charge 19 through the annular chamber 18 while the gun charge 19 is passing through the inner tube 17. The remaining impelling gases behind the gun charge, having been substantially reduced in volume by the escape of a substantial portion thereof, produce only a minor explosion when they are emitted from the discharge end 32 of the gun choke 30 behind the gun charge 19. While the gun charge 19 is entering into and passing through the choke 30, thereby blocking the escape of the portion of impelling gases remaining behind the gun charge, said remaining gases are permitted to expand through the entrance and exit passageways 25 and 31, respectively, into the annular chamber 18 thereby dissipating some of the explosive force remaining therein.

Accordingly, it may be seen that my compensator first divides the impelling gases which produce the objectionable report normally produced by present compensators, into two portions, one portion of which precedes the gun charge and one portion of which follows the gun charge from the discharge end 32 of the gun choke 30. The explosive potential of each of these two por-

tions is further reduced by the expansion of the gases through the entrance and exit passageways into the annular chamber **18**, surrounding the inner chamber **26** through which the gun charge **19** passes. Thus, the report produced by a shot gun equipped with my compensator is negligible by comparison with the explosive report produced by shot gun compensators of the type presently in use.

Another advantage of my compensator resides in the fact that only a portion of the impelling gases are removed from behind the gun charge before the charge leaves the discharge end **32** of the choke **30**.

In addition to the above advantages of my compensator, it will be observed that the inner tube **17** in cooperation with the gun choke **30** tends to control the pattern of the shot through the entire length of the compensator thereby preventing losses in muzzle velocity due to an abrupt change in direction of any of the shot when they funnel through the gun choke. An excessive amount of funneling action upon the gun charge materially reduces the muzzle velocity of the gun charge.

Although the above mentioned drawings and description apply to one particular, preferred embodiment of the invention, it is not my intention, implied or otherwise, to eliminate other variations or modifications which do not depart from the scope of the invention unless specifically stated to the contrary in the hereinafter appended claims.

I claim:

1. A muzzle device for firearms of the shotgun type discharging a scatter shot charge, comprising the combination: externally threaded base means mountable on a shotgun muzzle; a cylindrical, unbroken, outer tubular member internally threaded at its one end for engagement with said base means, said outer tubular member having an internal diameter materially larger than the barrel of said gun; a choke member at the other end of said outer tubular member and co-axial therewith, having at its end closest to said base member an internal opening of a size approximating the internal diameter of said outer tubular member and thence tapering to a smaller internal diameter in a direction away from the muzzle of said gun; an inner, cylindrical, unbroken, tube arranged coaxially with respect to said outer tubular member and having its external walls parallel with the internal walls of said outer tubular member, said inner tubular member being axially spaced from the muzzle of said shotgun and being also axially spaced from said choke member; said inner and outer tubular members together forming an annular chamber of substantially constant cross sectional area from one end of said inner tubular member to the other end thereof; and means mounted internally of said outer tubular member for supporting said inner tubular member with respect to said outer tubular member, said means being perforated sufficiently as not to restrict materially the passage of gases through said annular chamber.

2. A muzzle device for firearms of the shotgun type discharging a scatter shot charge, comprising the combination: base means mountable on a shotgun muzzle; a cylindrical, unbroken, outer tubular member having means at its one end for engagement with said base means, said outer tubular member having an internal diameter materially larger than the barrel of said gun; a choke member at the other end of said outer tubular member and co-axial therewith, having at its ends closest to said base member an internal opening of a size approximating the internal diameter of said outer tubular member and thence tapering to a smaller internal diameter in a direction away from the muzzle of said gun; an inner, cylindrical, unbroken, tube arranged co-axially with respect to said outer tubular member and having its external walls parallel with the internal walls of said outer tubular member, said inner tubular member being axially spaced from the muzzle of said shotgun and being also axially spaced from said choke member; and means supporting said inner tubular member with respect to said outer tubular member, said means being perforated sufficiently as not to restrict materially the passage of gases through said annular chamber.

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