Feb. 3, 1970 C. L. ASHBROOK 3,492,912

RECOIL CONTROLLING DEVICE

Filed Nov. 7, 1968 2 Sheets-Sheet 1

FIG 2

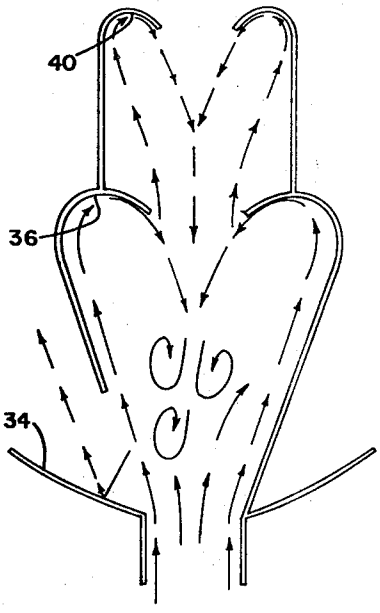


FIG 5

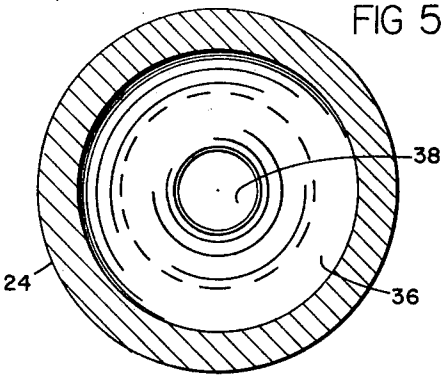


FIG 4

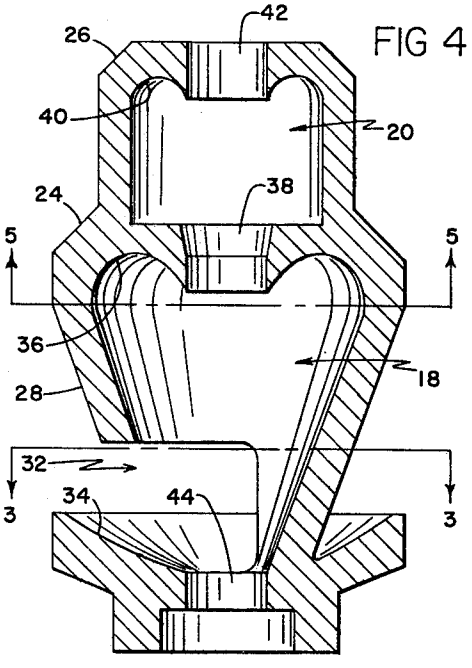


FIG 1

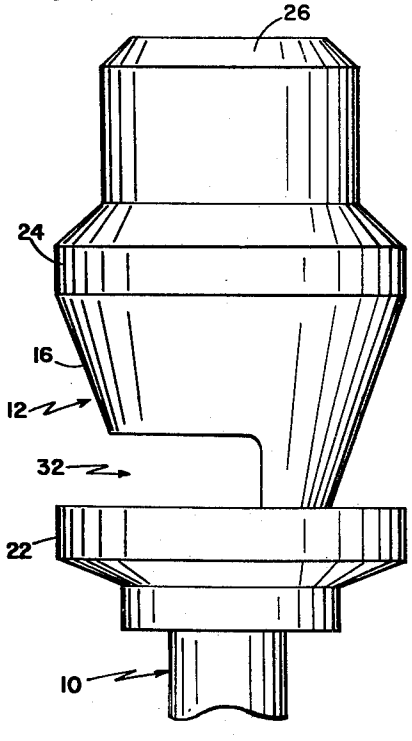
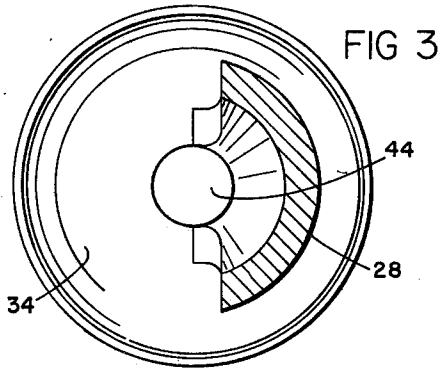


FIG 3



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RECOIL CONTROLLING DEVICE

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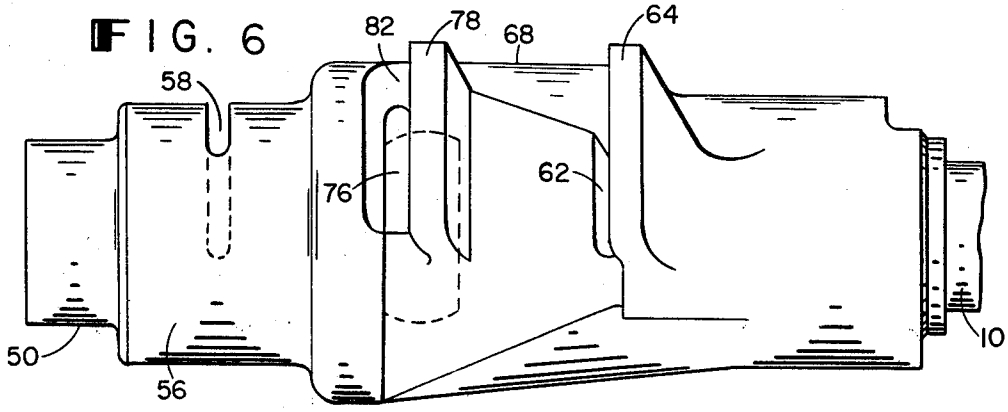
FIG. 6



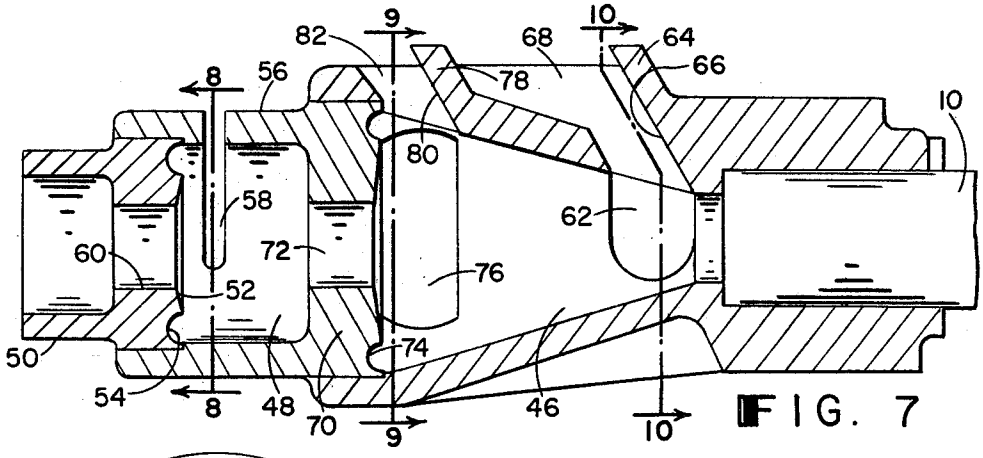


FIG. 7

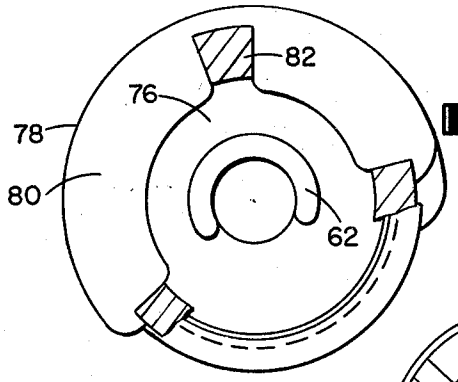


FIG. 9

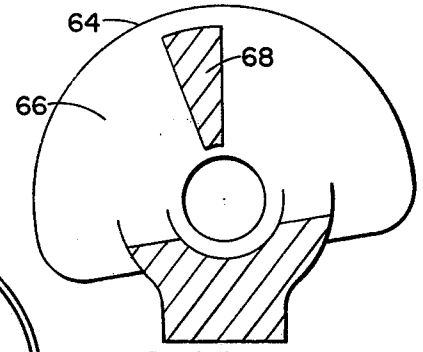


FIG. 10

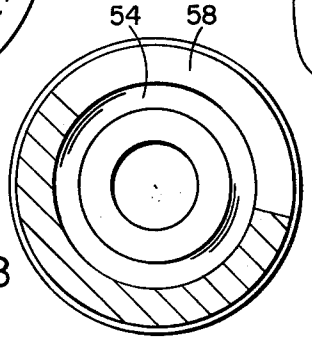


FIG. 8

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3,492,912

RECOIL CONTROLLING DEVICE

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Continuation-in-part of application Ser. No. 576,630, Sept. 1, 1966. This application Nov. 7, 1968, Ser. No. 774,021

Int. Cl. F41f 17/12

U.S. Cl. 89—14 10 Claims

ABSTRACT OF THE DISCLOSURE

A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a body having a muzzle plate with a concave-surface facing away from the muzzle, a recoil plate with a concave surface facing the muzzle and spaced from the muzzle plate and an end plate having a curved surface also facing the muzzle and spaced from the recoil plate, and passageways through said plates for the passage of the bullet, dimensioned such that they are substantially closed to the flow of gases therethrough during the interval that the bullet is in the bore.

The present application is a continuation-in-part of my prior application Ser. No. 576,630, now abandoned, filed Sept. 1, 1966 for Recoil Controlling Devices.

This invention relates to recoil controlling devices or muzzle brakes adapted for attachment to gun barrels and particularly to a gas inertia controller particularly adapted for use with rifles, pistols, shotguns and similar small arms and which is designed to reduce gun recoil by utilizing the gases generated by the firing of the gun.

Generally, in prior art devices of this nature, the gases expelled from the gun muzzle were diverted and the forces created by the change in direction of the gases used to oppose the recoil force. However, most such prior devices merely diverted the gases radially of the gun-barrel axis, which effectively served to reduce recoil but in doing so greatly increased the amount of noise heard by the user.

In an attempt to reduce the noise problem, the present applicant and another developed the gas inertia controller shown in Patent No. 3,152,510. Such controller utilized two chambers, the first one conical and the second cylindrical, through which the bullet passed and which controlled the flow of gases, with radial porting at the forward end of the conical chamber to allow outward venting of the gases somewhat in the forward direction to reduce the noise heard by the user. Although such controller was a substantial improvement on prior devices, the amount of noise it produced was still objectionable.

Accordingly, it is a primary object of this invention to provide a much improved recoil controlling device that not only diminishes recoil but also noise level far below that of heretofore known devices.

Another object is to provide an improved and reliable recoil controlling device capable of simple manufacture and which is of simple and rigid construction.

Still another object is to improve the accuracy of the firearm.

A further object is to reduce the intensity of the flash produced by the firing of the gun.

The above and still further objects of the present invention have been achieved by the establishment of a unique pattern of gas flow within the controller of the invention, wherein the gases are not simply caused to move radially, but, rather are, at least in part, first retroverted by in effect turning the gas stream radially inwardly and back within itself so that the kinetic energy of the gas stream is to a large extent dissipated within the stream itself before it is allowed to pass radially outwardly from the controller.

More specifically, the gas inertia controller of the invention, like that of Patent No. 3,152,510, is used with a firearm having a predetermined bore and terminating at a muzzle and is mounted on the muzzle end of the firearm. It includes a casing having a recoil plate and preferably an end wall, the end wall being at the front end of the device and the recoil plate in between the muzzle plate and the end wall. The plate and the end wall are generally perpendicular to the axis of the muzzle. The casing thus preferably defines two chambers, a conical recoil control chamber of increasing cross-section area from the muzzle to the recoil plate, the axis of the conical chamber coinciding with the extended axis of the gun muzzle, and a cylindrical chamber between the recoil plate and the end wall. The cylindrical chamber may be provided with a port. The diameter of the conical chamber near the muzzle is about equal to the bore diameter. The plate and end wall have apertures that form a passageway for the bullet fired from the gun.

Unlike the device of said patent, however, the device of the present invention, in order to create the unique gas flow pattern upon which its effectiveness depends, has its recoil plate and preferably its end wall provided with concavely curved surfaces. The curvature of the surfaces of the recoil plate and the end wall forces the escaping gases impinging on them to reverse and converge inwardly at the axis of the device. This convergence has the effect of compressing the reversed gases (an effect aided by the conical nature of the primary chamber). This gas flow opposes the flow of gases still escaping the gun barrel, absorbing much of their energy. A portion of the wall of the conical chamber adjacent the muzzle is provided with a port, with the forward portion of the device being partially or entirely enclosed to ensure the reverse gas flow characteristic of the invention. Thus the location of the port near the muzzle has the result that gases finally escaping by that route must have travelled to the recoil plate and then radially inwardly and back to near the muzzle. Optionally, the wall of the conical chamber may be provided with a second port, located forwardly of the port adjacent the muzzle.

In addition, the device of the present invention is provided with a muzzle plate, also preferably having a concave surface adjacent the muzzle end of the device which curved surface ensures that the gases escaping through the port adjacent the muzzle must take a forward component of velocity further to reduce noise. When the second port is present, a plate similar to the muzzle plate is also provided for the second port, performing the same function.

Other objects, features, and advantages will appear from the following description of preferred embodiments of the invention, taken together with the attached drawings thereof, in which:

FIG. 1 is an elevational view of a gas inertia controller, according to the invention, mounted on a gun barrel;

FIG. 2 shows the pattern of gas flow in the chambers of the device during the period just after a bullet is fired;

FIG. 3 is a cross-sectional view of the device taken along the line 3—3 of FIG. 4.

FIG. 4 is partially a longitudinal sectional view of the device shown in FIG. 1 and partially a side elevational view of the gun barrel as shown in FIG. 1;

FIG. 5 is a cross-sectional view of the device taken along the line 5—5 of FIG. 4;

FIG. 6 is a side elevational view showing a modification;

FIG. 7 is a longitudinal vertical sectional view of the device of FIG. 6;

FIG. 8 is a cross-sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a cross-sectional view taken along line 9—9 of FIG. 7; and,

FIG. 10 is a cross-sectional view taken along line 10—10 of FIG. 7.

In the drawings is shown a gun barrel **10** on which the gas inertia controller **12** is mounted. The device **12** is secured to the necked down portion **14** of the barrel **10** by silver solder or other suitable well-known means.

The casing **16** forms the two chambers; the primary conical chamber **18** and the secondary, cylindrical chamber **20**. The primary chamber **18** extends from the muzzle plate **22** to the recoil plate **24**. The conical walls **28** of the primary chamber **18** define an angle of about 20° from the axis of the cone. The recoil plate **24** is spaced from the muzzle a distance at least three times the diameter of the barrel bore. The diameter of the muzzle plate **22** is about equal to that of the recoil plate **24**.

The secondary chamber **20** extends from the recoil plate **24** to the end wall **26**. The end wall **26** is spaced from the recoil plate **24** a distance about twice the bore diameter. The inner diameter of the wall **30** of the cylindrical chamber **20** is at least about twice and more preferably about three to four times the bore diameter.

There is a port **32** adjacent the muzzle **14** in the wall **28** of the primary, conical chamber **18**. The port **32** is in the upper portion of the conical chamber wall **28** between lines on the wall **28** aproximately on the same horizontal plane as the bottom of the bore of the gun barrel and between the surface of the muzzle plate **22** and a circumferential line approximately halfway between the muzzle plate **22** and the recoil plate **24**.

The surface **34** of the muzzle plate **22** facing away from the muzzle **14** is curved in a concave fashion. The surface **36** of the recoil plate **24** facing the muzzle **14** is curved, in a cross-sectional view (see FIG. 4), concave from outer edge to aperture **38**. The surface **40** of the end plate **26** is curved in a manner similar to the recoil plate surface **36**. The end plate **26** has an aperture **42**. The muzzle plate **22** is so constructed for mounting on the gun muzzle **14** that it, in effect, has an aperture **44**. These apertures **38**, **42** and **44** provide a passageway for the bullet. The length of the recoil plate aperture **38** is preferably about equal to the diameter of the bore and the diameter of the aperture **38** is slightly greater than that of the bore. The aperture **38** flares slightly toward the end plate **26** to facilitate the spreading of the gases. The end plate aperture **42** also has a diameter slightly greater than that of the bore.

In operation, the explosion of the charge generates gases which push the bullet and the slug of air in front of the bullet out of the barrel **10**. Some of the gases generated escape around the base of the bullet and travel ahead of it.

The gases leaving the barrel impinge on the recoil plate curved surface **36** and the end plate curved surface **40**. They are reflected back and toward the axis of the chambers **18** and **20** (see FIG. 2). This convergence along the axis has the effect of compressing the gases. Compression is aided by the narrowing of the cavity of the conical chamber **18** as the reversed gases flow toward the muzzle **14**. The compressed gases traveling back along the axis meet gases still escaping from the gun barrel **10** and absorb much of their energy.

While the bullet is traveling through the apertures **38**, and **42**, it cuts off an escape route for the gases in the preceding chamber. When the bullet is not in one of the apertures **38** and **42**, that aperture provides a main exit for gases moving forward from the muzzle **14**. The gases are reflected from the curved recoil plate surface **36** and the curved end wall surface **40** in such a manner that they converge on the axis and are therefore particularly effective in counteracting the movement of the forward gases because they oppose the movement of the forward gases in the area of their main escape route. The reflection and opposition of flowing gases in the chambers **18** and **20** of the device result in a less rapid discharge of the gases from the device.

The change in direction of the gases that results when they strike the surfaces **36** and **40** creates a force opposite to that of the recoil, thereby diminishing the recoil.

Because of the buildup of pressure in the chambers **18** and **20** of the device due to the reflection of the gases, when the bullet emerges from the barrel of the firearm, it enters a zone of intermediate pressure, rather than a zone of substantially zero pressure as is the case where no gas inertia controller is being used. The bullet becomes spin stabilized much more rapidly, with resulting increased accuracy.

As the bullet moves into the aperture **38** there is a significant increase of pressure in the primary chamber **18** since a port of substantial area is then closed. As the bullet leaves the recoil plate aperture **38**, pressure will build up in the enclosed cylindrical chamber and so further delay the release of gases. During the entire operation, however, gases are gradually but continually being released through the port **32**. Because the port **32** is near the muzzle **14** the gases leaving through the port will have traveled to the recoil plate surface **36** or the end plate surface **40**, being reflected from them and then from the walls of the chambers **18** and **20** while moving back to the port **32**. The gases thus spend some time in the device before exiting.

The curvature of the muzzle plate surface **34** results in the gases leaving through the port **32** having a tendency to move forward, away from the gun user, and hence, diminishing the noise level apparent to him.

The successive discharge of gases from the two successive chambers **18** and **20**, one ported and the other enclosed, over a comparatively extended period of time reduces the magnitude of sound and also the temperature of the gases, which in turn tends to reduce the volume of gas by cooling, so that the flash is sharply reduced.

The modification of FIGS. 6–10 is in general organization similar to the device of FIGS. 1–5 described above. It is mounted on the gun barrel **10** as shown. It includes a primary, conical chamber **46**, a cylindrical chamber **48** and, forwardly of the cylindrical chamber **48**, a flash hider **50**. The end plate **52** which forms the forward wall of the cylindrical chamber **48** is provided with an annular groove **54** whereby the end plate is curved in a concave fashion, being concave toward the gun muzzle. The groove **54** is optional and may be omitted. The cylindrical wall **56** of the cylindrical chamber **48** is formed with a gas discharge port **58**, in the form of a slot disposed at right angles to the axis of the device. As shown, the port **58** extends across the top of the device and extends farther down on the right side than it does on the left, thus directing discharged gases upwardly and to the user's right, thus serving to counteract any tendency of the barrel to move upwardly when fired and also counteracting any tendency of the barrel to move to the right, as during automatic fire. The port **58** is spaced rearwardly of the concave surface **54** and thus possesses to some extent the advantages as to location described above in connection with the port **32**. The port **58** is an optional feature and may be omitted. The aperture **60** at the forward end of the cylindrical chamber **48** is similar in structure and function to the aperture **42** previously described.

The primary, conical chamber **46** is provided with a port **62** corresponding to the port **32** previously described. A muzzle plate **64** having a concave forward surface **66** corresponds to the muzzle plate previously described. A rib **68** extending across the port **62**, as shown, reinforces the structure at this point. The recoil plate **70** with its aperture **72** and its rearwardly concave surface at **74** corresponds to the recoil plate **24** previously described. In this modification, a gas-discharge port **76** is provided at the forward end of the primary, conical chamber **46**

shaped, as shown to best advantage in FIG. 9, to discharge upwardly and to the user's right. A deflector plate **78** having a forwardly concave face **80** is provided adjacent and rearwardly of the port **76**, functioning like the muzzle plates previously described to reduce the noise apparent to the user. A rib **82** reinforces the structure at this point.

Other modifications of the disclosed structure (e.g. varying the pressure buildup by varying the passageway length or varying the area of the port) will be obvious to those having ordinary skill in the art.

What is claimed is:

1. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion with a concavely curved surface facing the muzzle, and an end plate portion with a concavely curved surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body in axial alignment with the barrel of the firearm for the passage therethrough of the bullet, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm and a substantially cylindrical bore disposed in said recoil plate being dimensioned such that said recoil plate cylinrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter suffcient to permit free passage of the bullet therethrough, a conical chamber intermediate said muzzle plate and recoil plate portions, the axis of said conical chamber lying on the extended axis of said muzzle, the interior wall of said conical chamber increasing in cross-sectional area from said muzzle plate to said recoil plate, said chamber having peripheral port means extending through the wall of said chamber positioned adjacent said muzzle plate whereby gases expelled from said muzzle move past a bullet within said chamber, strike the concave surface of said recoil plate within the enclosed forward portion of said chamber and are diverted inwardly and back toward said muzzle and said port as said bullet is passing through said recoil plate bore substantially to dissipate the kinetic energy of said gases before they pass outwardly through said port, said muzzle plate's concavely curved surface giving a forward component of velocity to gases leaving the apparatus via said port.

2. The apparatus of claim **1** in which the cross-sectional area of the chamber increases at a substantially uniform rate from said muzzle plate portion to said recoil plate portion.

3. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion of substantial thickness with a concavely curved surface facing the muzzle and an end plate portion with a concavely curved surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body adapted to be positioned in axial alignment with the barrel of the firearm for the passage therethrough of the bullet and the gases expelled from the muzzle upon explosion of the charge, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm, a substantially cylindrical bore disposed in said recoil plate having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the end plate is substantially closed to the flow of gases therethrough during the interval that the bullet is in said end plate bore, a conical chamber intermediate said muzzle plate and recoil plate portions, the interior wall of said conical chamber being disposed at an angle to said longitudinal axis so that the cross-sectional area of the chamber increases at a substantially uniform rate from said muzzle plate to said recoil plate, said chamber being substantially enclosed throughout its length and having at its end adjacent said muzzle plate peripheral port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, and an enclosed cylindrical chamber intermediate said recoil plate and end plate portions, whereby gases expelled from said muzzle move past a bullet within said chambers, strike the concave surface of said recoil plate within the enclosed forward portion of said conical chamber and are diverted inwardly and back toward said muzzle and said port as said bullet is passing through said recoil plate bore, and strike the concave surface of said end plate within the enclosed said cylindrical chamber and are diverted inwardly and back toward said muzzle and said port as said bullet is passing through said end plate bore, substantially to dissipate the kinetic energy of said gases before they pass outwardly through said port, said muzzle plate's concavely curved surface giving a forward component of velocity to said gases passing through said port.

4. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion with a concavely curved surface facing the muzzle, and an end plate portion with a surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body in axial alignment with the barrel of the firearm for the passage therethrough of the bullet, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm and a substantially cylindrical bore disposed in said recoil plate being dimensioned such that said recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough, a conical chamber intermediate said muzzle plate and recoil plate portions, the axis of said conical chamber lying on the extended axis of said muzzle, the interior wall of said conical chamber increasing in cross-sectional area from said muzzle plate to said recoil plate, said chamber having peripheral port means extending through the wall of said chamber positioned adjacent said muzzle plate whereby gases expelled from said muzzle move past a bullet within said chamber, strike the concave surface of said recoil plate and are diverted inwardly and back toward said muzzle and said port as said bullet is passing through said recoil plate bore substantially to dissipate the kinetic energy of said gases before they pass outwardly through said port, said muzzle plate's concavely curved surface giving a forward component of velocity to gases leaving the apparatus via said port.

5. The apparatus of claim **4** in which the cross-sectional area of the chamber increases at a substantially uniform rate from said muzzle plate portion to said recoil plate portion.

6. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion with a concavely curved surface facing the muzzle,

and an end plate portion with a surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body in axial alignment with the barrel of the firearm for the passage therethrough of the bullet, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm and a substantially cylindrical bore disposed in said recoil plate being dimensioned such that said recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough, a cylindrical chamber intermediate said recoil plate and said end plate portions and having a slot therein, a conical chamber intermediate said muzzle plate and recoil plate portions, the axis of said conical chamber lying on the extended axis of said muzzle, the interior wall of said conical chamber increasing in cross-sectional area from said muzzle plate to said recoil plate, said chamber having peripheral port means extending through the wall of said chamber positioned adjacent said muzzle plate whereby gases expelled from said muzzle move past a bullet within said chamber, strike the concave surface of said recoil plate and are diverted inwardly and back toward said muzzle and said port as said bullet is passing through said recoil plate bore substantially to dissipate the kinetic energy of said gases before they pass outwardly through said port, said muzzle plate's concavely curved surface giving a forward component of velocity to gases leaving the apparatus via said port.

7. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion of substantial thickness with a concavely curved surface facing the muzzle and an end plate portion with a surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body adapted to be positioned in axial alignment with the barrel of the firearm for the passage therethrough of the bullet and the gases expelled from the muzzle upon explosion of the charge, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm, a substantially cylindrical bore disposed in said recoil plate having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the end plate is substantially closed to the flow of gases therethrough during the interval that the bullet is in said end plate bore, a conical chamber intermediate said muzzle plate and recoil plate portions, the interior wall of said conical chamber being disposed at an angle to said longitudinal axis so that the cross-sectional area of the chamber increases at a substantially uniform rate from said muzzle plate to said recoil plate, said chamber having at its end adjacent said muzzle plate peripheral port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, said chamber having a second port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, said second port being located forwardly of said port means, and a cylindrical chamber intermediate said recoil plate and end plate portions and having a port therein, whereby gases expelled from said muzzle move past a bullet within said conical chamber, strike the concave surface of said recoil plate within the forward portion of said conical chamber and are diverted inwardly and back toward said muzzle and said port means as said bullet is passing through said recoil plate bore, and strike the surface of said end plate within the said cylindrical chamber and are diverted inwardly and back toward said muzzle and said port means as said bullet is passing through said end plate bore, substantially to dissipate the kinetic energy of said gases before they leave the controller, said muzzle plate's concavely curved surface giving a forward component of velocity to said gases passing through said port means.

8. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion with a concavely curved surface facing the muzzle, and an end plate portion with a surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body in axial alignment with the barrel of the firearm for the passage therethrough of the bullet, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm and a substantially cylindrical bore disposed in said recoil plate being dimensioned such that said recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough, a conical chamber intermediate said muzzle plate and recoil plate portions, the axis of said conical chamber lying on the extended axis of said muzzle, the interior wall of said conical chamber increasing in cross-sectional area from said muzzle plate to said recoil plate, said chamber having peripheral port means extending through the wall of said chamber positioned adjacent said muzzle plate whereby gases expelled from said muzzle move past a bullet within said chamber, strike the concave surface of said recoil plate and are diverted inwardly and back toward said muzzle and said port as said bullet is passing through said recoil plate bore substantially to dissipate the kinetic energy of said gases before they pass outwardly through said port, a second port means in the wall of said chamber located forwardly of said first-mentioned port means, said muzzle plate's concavely curved surface giving a forward component of velocity to gases leaving the apparatus via said port.

9. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion of substantial thickness with a concavely curved surface facing the muzzle and an end plate portion with a surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body adapted to be positioned in axial alignment with the barrel of the firearm for the passage therethrough of the bullet and the gases expelled from the muzzle upon explosion of the charge, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm, a substantially cylindrical bore disposed in said recoil plate having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the

end plate is substantially closed to the flow of gases therethrough during the interval that the bullet is in said end plate bore, a conical chamber intermediate said muzzle plate and recoil plate portions, the interior wall of said conical chamber being disposed at an angle to said longitudinal axis so that the cross-sectional area of the chamber increases at a substantially uniform rate from said muzzle plate to said recoil plate, said chamber having at its end adjacent said muzzle plate periphera. port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, said chamber having a second port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, said second port being located forwardly of said port means, a deflector plate having a forwardly concave face located adjacent and rearwardly of said second port means, and a cylindrical chamber intermediate said recoil plate and end plate portions, whereby gases expelled from said muzzle move past a bullet within said conical chamber, strike the concave surface of said recoil plate within the forward portion of said conical chamber and are diverted inwardly and back toward said muzzle and said port means as said bullet is passing through said recoil plate bore, and strike the surface of said end plate within the said cylindrical chamber and are diverted inwardly and back toward said muzzle and in said port means as said bullet is passing through said end plate bore, substantially to dissipate the kinetic energy of said gases before they leave the controller, said muzzle plate's concavely curved surface giving a forward component of velocity to said gases passing through said port means.

10. A gas inertia controller adapted for attachment to the muzzle end of a firearm comprising a generally annular body having a muzzle plate with a concavely curved surface facing away from the muzzle, a recoil plate portion of substantial thickness with a concavely curved surface facing the muzzle and an end plate portion with a surface facing the muzzle spaced from said recoil plate, said plates being disposed perpendicularly to the longitudinal axis of said body, a passageway through said body adapted to be positioned in axial alignment with the barrel of the firearm for the passage therethrough of the bullet and the gases expelled from the muzzle upon explosion of the charge, said passageway being defined by a rear cylindrical bore disposed in said muzzle plate portion adapted to be secured to the muzzle end of said firearm, a substantially cylindrical bore disposed in said recoil plate having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the recoil plate cylindrical bore is substantially closed to the flow of gases therethrough during the interval that the bullet is in said recoil plate cylindrical bore, a cylindrical bore disposed in said end plate portion having a diameter sufficient to permit free passage of the bullet therethrough but being dimensioned such that the end plate is substantially closed to the flow of gases therethrough during the interval that the bullet is in said end plate bore, a conical chamber intermediate said muzzle plate and recoil plate portions, the interior wall of said conical chamber being disposed at an angle to said longitudinal axis so that the cross-sectional area of the chamber increases at a substantially uniform rate from said muzzle plate to said recoil plate, said chamber having at its end adjacent said muzzle plate peripheral port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, said chamber having a second port means extending through the wall of said chamber and for a portion of the length of said conical chamber along said axis, said second port being located forwardly of said port means, a deflector plate having a forwardly concave face located adjacent and rearwardly of said second port means, and a cylindrical chamber intermediate said recoil plate and end plate portions and having a port therein, whereby gases expelled from said muzzle move past a bullet within said conical chamber, strike the concave surface of said recoil plate within the forward portion of said conical chamber and are diverted inwardly and back toward said muzzle and said port means as said bullet is passing through said recoil plate bore, and strike the surface of said end plate within the said cylindrical chamber and are diverted inwardly and back toward said muzzle and said port means as said bullet is passing through said end plate bore, substantially to dissipate the kinetic energy of said gases before they leave the controller, said muzzle plate's concavely curved surface giving a forward component of velocity to said gases passing through said port means.

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