

Nov. 9, 1948.

R. M. CUTTS

2,453,121

GAS PORTING DEVICE FOR SHOTGUNS

Filed April 20, 1945

3 Sheets-Sheet 1

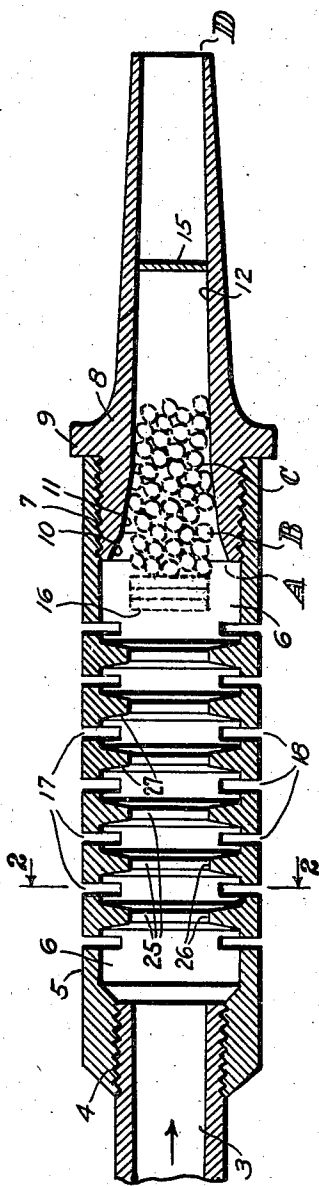


Fig. 1

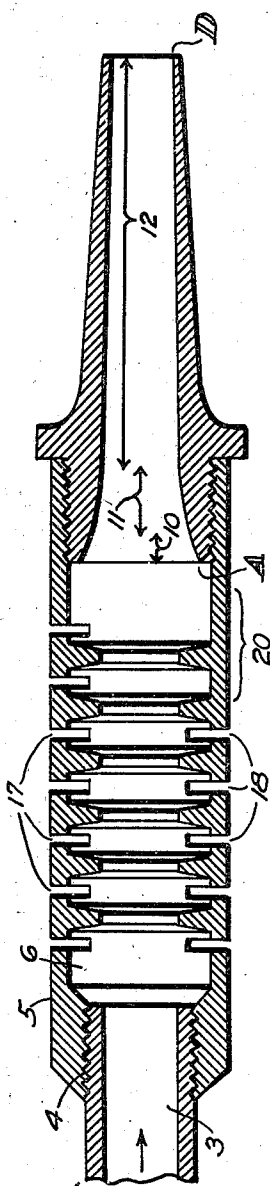


Fig. 4

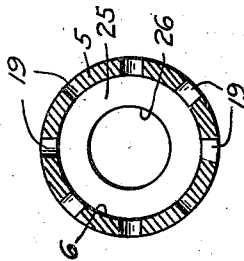


Fig. 3

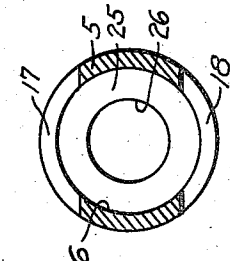


Fig. 2

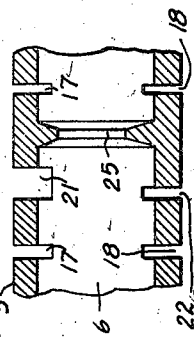


Fig. 4a

R. M. Cutts
Inventor

by *[Signature]*
Attorney

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R. M. CUTTS

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Fig. 5

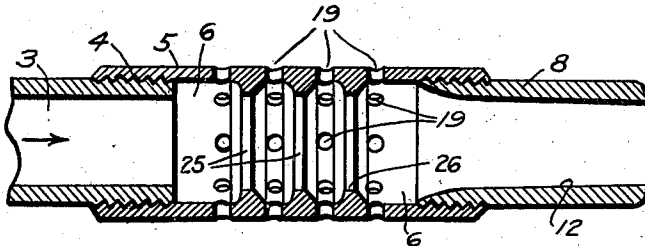


Fig. 6

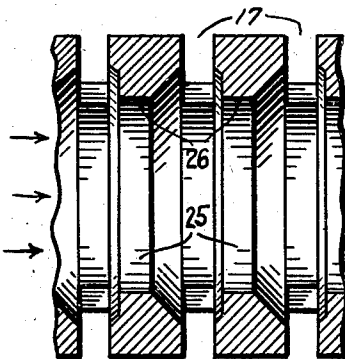


Fig. 7

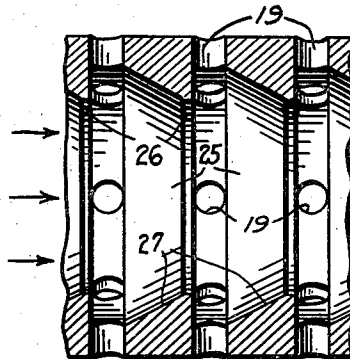
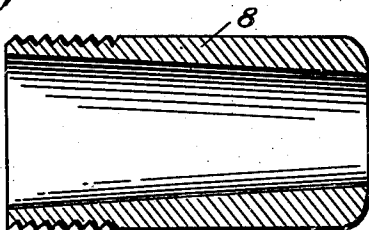


Fig. 8



R.M. Cutts
Inventor

by

[Signature]
Attorney

Nov. 9, 1948.

R. M. CUTTS

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Fig. 9

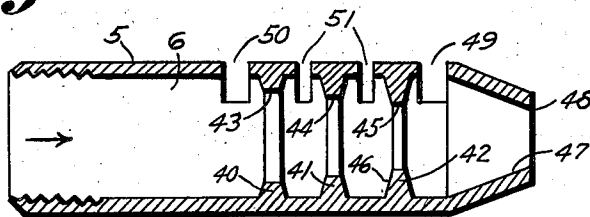


Fig. 10

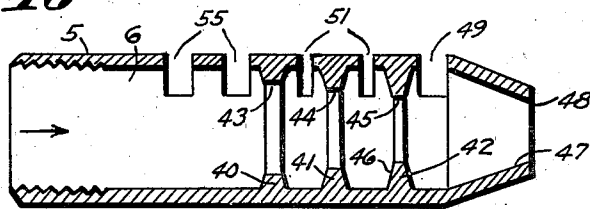


Fig. 11

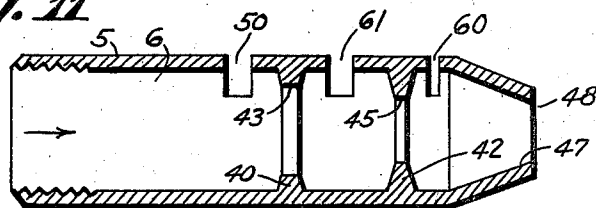


Fig. 12

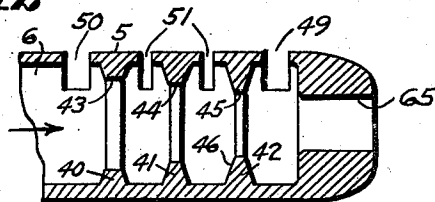
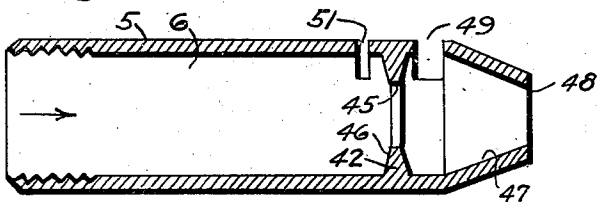


Fig. 13



R.M. Cutts
Inventor

by *[Signature]*
Attorney

UNITED STATES PATENT OFFICE

2,453,121

GAS PORTING DEVICE FOR SHOTGUNS

Richard M. Cutts, The Plains, Va., assignor of one-half to Dorothea Lane Cutts, The Plains, Va.

Application April 20, 1945, Serial No. 589,315

4 Claims. (Cl. 89—14)

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This invention relates to gas porting devices for ordnance, having for its object to produce a construction simple in parts, no more costly to manufacture, and more efficient in use, than those heretofore proposed.

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

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

Fig. 1 is a longitudinal sectional view of a device made in accordance with this invention;

Fig. 2 is a transverse sectional view of said device, said view taken as on the line 2—2 of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is a view similar to Fig. 2 but showing a modification of construction;

Fig. 4 is a view similar to Fig. 1 but showing a further modification of construction;

Fig. 4a is a fragmentary view in section of a modification of the gas porting arrangement shown in Fig. 4;

Fig. 5 is a longitudinal sectional view of a modified form of the construction;

Figs. 6 and 7 are enlarged detail sectional views of modified forms of ribs which may be employed in the device;

Fig. 8 is a detail view in section of a modified form of choke tube; and

Figs. 9 to 13 inclusive are longitudinal sectional views of still further modifications of the invention.

This invention constitutes an improvement of the device disclosed in U. S. Letters Patent No. 1,773,260 dated August 19, 1930, granted to Richard M. Cutts and which is directed to a compensating device for the muzzle end of a shotgun. The disclosure in that patent relative to the vibrations given to the gun barrel, upon firing the gun, and establishing what are known as bend and swing errors resulting in bullet impacts on the target which are above, below, or to one side of, the desired point of impact, such errors varying with the powder charge and other known conditions, is equally true and applicable to the instant invention. Also true and applicable are the statements in that patent relative to the action of the leakage gas and its pressure in the interstices of the projected shot column resulting in the lateral expansion of the gas in said column and thereby imparting lateral velocities to the shot pellets in said column (expanding said column), and the

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action of the powder wads upon the projected shot column to "pan-cake" the base of said column. Therefore, it is believed unnecessary to repeat here the explanation of these actions which are set forth in detail in said patent, since the device of the present invention is so generally similar to that of said patent.

According to the present invention, there is provided a device equally, if not more, capable of reducing and/or correcting the undesirable features above referred to. According to one aspect of the invention, approximately six inches of the muzzle end of the gun barrel may be cut off and then the device is threaded on the shortened barrel, thereby eliminating the original choke but maintaining substantially the same overall length and velocities as before without destroying the balance of the gun. Hence, the shot charge reaches the expansion chamber without distortion of the shot pellets, and the extremely high temperature gases of explosion are permitted quick lateral exhaustion, with relation to the axis of the bore, through the ports of said chamber. The rear or powder wads are practically consumed and/or torn to pieces by the time they leave the device due to the effect thereon of the hot gas turbulence in said chamber, and the leading or shot wad is given a rapid or increased forward acceleration due to the pressure of the gas in the shot column while passing through the choke tube, which permits said shot wad after leaving the choke tube to move laterally of the axis of shot projection and hence prevents said wad from "drifting back" into and disrupting the projected shot column. In traversing the expansion chamber, the shot column elongates slightly and in this condition, and without the presence therein of the white hot leakage gas and friction heat, reaches and readily passes through the choke tube without loss of velocity and without the undue disturbance to the shot pellets which has heretofore resulted in pellet damage and/or deformation.

The single expansion chamber of said patent, according to this invention, is provided with internal annular ribs spaced from each other and disposed between the gas discharge openings whereby such expansion chamber is divided into a plurality of successive, independent, and unconnected chambers gradually and diminishingly exhausting the total of the gases of explosion while, at the same time, reducing appreciably the forward travel of such gases in the device, thereby increasing the reduction of recoil of the gun.

During the short period of time the shot column

is traversing the expansion chamber of this device, the vibrations are being reduced and have substantially no effect upon the shot, but the damage due chiefly to the gas effect has been done. This improved device receives the column of shot, under the urge of expansion by the internal gas pressure as well as the vibration, but the internal diameter of the ribs and/or the chamber proper may be made such as to materially prevent such expansion, and may cause recompression and readjustment of any laterally dispersed shot pellets to any degree desired.

More specifically, and referring to Fig. 1 the shoe-gun barrel, which is indicated by the numeral 3, has threaded engagement as at 4 with one end of the cylindrical casing 5 defining the expansion chamber generally identified by the numeral 6, whereby said casing has rotatable adjustability, so that the exhaust ports, later to be described may be positioned top and bottom. The other end of said casing may be in threaded engagement as at 7 with a removable choke tube 8 provided with any suitable means, such as an outwardly extending flange 9, serving as a stop against the end of the casing 5 as well as a means by which the tube member 8 may be screwed to said casing. The device comprising this invention has primarily to do with the expansion chamber to the end that various choking arrangements and forms may be employed or the gun may be fired without the removable end member, while maintaining the desired effects of gas control and shot column pattern resulting from the construction of this device.

The tube member 8 may be axially bored to provide a conical surface 10 extending from the extreme inner end A of said member to a point B, as well as a second conical surface 11 joining said surface 10 and extending forwardly from the point B to a point C, the slope of the surface 11 being different from the slope of the surface 10; and said member 8 may be provided with a third internal surface 12 which may be conical, cylindrical, or of other generated formation, according to the desired shot pattern after the shot have left the device, said surface 12 extending from the point C to the outer or forward end D of said member. In Fig. 1 these slopes have been exaggerated so as to be readily visible or apparent. On the other hand, the surfaces 10 and 11 may be made other than conical, e. g. they may be curved or arcuate and merge with each other and/or merge with the surface 12 as indicated in Fig. 4 to the end that a continuous substantially smooth and unbroken inner surface may extend from the innermost end or point A of the tube member 8 to the outermost end point D thereof.

The conical surface 10, or its equivalent area of the continuous inner arcuate surface of the tube member 8, creates between the points A and B a compression chamber; the conical surface 11, or its equivalent area of the continuous inner arcuate surface of said tube member 8, creates between the points B and C a recompression chamber for the laterally dispersed shot pellets; and the surface or area 12 creates between the points C and D a control ("choke" or otherwise) for the shot pellets with regard to the pattern desired when said pellets leave the gun. The internal diameter at the muzzle of a choke tube determines the degree of choke obtained, wherefore the choke tubes are provided with different muzzle diameters and are made interchangeable in order to obtain a shot pattern of any desired degree. In any choke tube, the size and shape

of the sloped or curved area B—C will be sufficient to coactively engage the shot pellets without detrimental effects thereon, and to direct said pellets fairly smoothly into the choke represented by the area C—D, in accordance with the powder charge and size of shot used, all as brought out in detailed explanation in said patent.

The shot, on emerging from the gun barrel 3 into the cylindrical casing 5, tend to expand laterally to a known extent as hereinbefore stated. The shot column then traverses the expansion chamber 6 and may enter the compression chamber A—B and thereafter the recompression chamber B—C. The internal diameter of the large end of this recompression chamber is at all times greater than the bore of the gun barrel. In Fig. 1 of the patent the shot column was shown as greatly expanded when entering the choke tube, but such showing was for demonstration only; in actual practice such is not the case and therefore such showing is an exaggeration. In practice it is definitely proven that the shot column impinges on the surface area 11 at a point which is so far forward as to be substantially at the point of entrance to the choke slope or area 12, or practically at point C as illustrated in Fig. 1 of this instant application. Thus, the slopes 10 and 11, which are one continuous smooth curve in actual manufacture, are mainly effective in checking and counteracting the force of the forwardly moving gas, and thus counteract recoil of the gun. By the time the shot column emerges from the choke at point D, the vibrations hereinbefore mentioned have been so dampened that the swing and bend errors are negligible and the internal gas pressure has been reduced, with the result that the shot pellets will fly substantially true to the target.

In Fig. 1 the shot wad 15 of the fired load is shown well within the choke chamber C—D and ahead of the shot column, the shot are shown substantially unexpanded within the compression chamber A—B, and the recompression chamber B—C is shown functioning to contract into alignment and compacted position all of the expanded shot pellets in the fore portion of the shot column. The usual wad 16, used to separate the shot from the powder charge in the shell, is shown following the shot but, for purposes of illustration only, it is shown in its original shape and size; as hereinbefore stated, its form is greatly changed while traversing the device and actually it leaves the choke tube at D in a decidedly broken-up or fragmentary condition, as has been proved by spark photographs. The internal diameters of the choke chamber C—D are such that the shot wad 15 will form a substantially mechanical seal or plug in said chamber. While not definitely known just where the greatest damage is done to the powder wad 16, yet it is believed true that there is a definite mass of the wad material which reaches and enters the choke chamber C—D, which mass is of sufficient formation to closely contact the walls of said chamber and thus provide an effective seal, so that the following gas, still under relatively tremendous pressure, will strike the sloped or curved surfaces 10 and 11 which, being tapered or curved forwardly and inwardly, will cause eddyings of said gas into whirls creating myriad vortices which constitute in effect a gas seal substantially preventing forward travel of further gases into and through the choke tube.

Therefore, the gases are permitted to escape laterally from this device through a plurality of

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ports such as the slots 17 shown in Figs. 1 and 4 formed in the top wall of the casing 5 defining the expansion chamber 6. These ports may be slots or they may be a series of circular holes, as desired, and they are for the purpose of releasing the gases of combustion directly to the atmosphere after leaving the gun barrel. By disposing all of these ports above the horizontal center of the expansion chamber 6, a combinative effect of overcoming recoil and preventing climb of the muzzle is obtained. In some instances it may be desired to balance such ports as indicated in Fig. 1 by forming a substantial duplication thereof, as indicated at 18, in the bottom chamber wall, all of said ports being substantially diametrically opposed to each other with reference to an axial plane of said chamber, and disposed either in the top and bottom, or in the sides, of said chamber, as desired. In other instances it may be desired to form such ports as circular holes 19 substantially equally spaced entirely around the chamber wall as indicated in Figs. 3 and 5. In still other instances it may be desired to balance only some of such ports 17 (or 19) with substantially diametrically opposed ports 18 (or 19), leaving an imperforate section 20 (see Fig. 4) in the wall of said chamber opposite the unbalanced ports 17 (or 19), such imperforate wall section being disposed in that portion of the chamber wall as will effect the desired lateral movement of the muzzle through counteraction of the pressure of the gases escaping through the unbalanced ports 17. The imperforate wall section 20 may be at either end of the expansion chamber or at a position intermediate of said ends, and of an extent according to the amount of lateral movement desired. This unbalanced relationship between the total of the top porting and the total of the bottom porting may also be accomplished by making provision for more gas to be released through the top ports for example than through the bottom ports, and one way of doing this is to make one or more of the ports of an area which is greater than the area of another port. This is illustrated in Fig. 4a wherein ports 17 and 18 are substantially equal in area and hence are in balanced opposition, but the top port 21 is of such size as to have an area which is greater than the area of the bottom port 22 to thereby create a condition of unbalanced gas release there-through. The ports 21 and 22 need not be oppositely disposed since the unbalanced relationship is with respect to the total of the gas release made possible by the porting arrangement. In any case, these ports cumulatively permit an escape of the expanded gases to an extent where little effective pressure is left within the shot column when it is ready to leave the expansion chamber to produce the undesirable lateral shot velocities after leaving the device, and at the same time relieve such an amount of the pressure from behind the powder wads 16 that said wads will not catch up to and "pan-cake" the rear end of the shot column.

According to Figs. 1, 2 and 3, the expansion chamber 6 is provided with a plurality of transversely disposed annular ribs 25 supported by the wall of the casing 5 and extending inwardly of said chamber, said ribs being relatively parallel to each other with a rib disposed between two longitudinally adjacent ports 17, 18 or 19. Each rib has an internal diameter or bore which may be equal to or greater than the diameter of the shot column at such rib, and all of the ribs are substantially similar in construction wherefore

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their inner surfaces 26 lie substantially in a cylindrical plane coaxial with the barrel bore, as a result of which the wads 15 and 16 form substantial seals successively with such surfaces after leaving the barrel.

Due to the fact that said ribs are imperforate and relatively closely spaced from each other, these successive seals tend to prevent forward travel of any appreciable quantity of the gases of combustion, and also materially reduce through the exhaust ports the amount of gas pressure which otherwise would reach and become active in the shot column as said column passes said ribs. Hence, with such minimization of internal gas pressure within the shot column, there is a material reduction in the tendency of the shot pellets to lateral dispersion, and this reduction is such that the inner cylindrical surfaces 26 of the ribs will constitute means for keeping such dispersed pellets from too great a lateral deviation from the axis of flight; this takes into consideration the close spacing of the ribs, the axial extent of their cylindrical surfaces, and the speed of projection of the shot column.

On the side of safety, the rear surface 27 of each rib may be sloped or curved forwardly and inwardly as will be observed from Figs. 1, 4 and 7, and/or may be merged smoothly into the cylindrical rib surface 26, in order that said rear surface may receive thereagainst any materially laterally dispersed shot pellets, and to turn and direct such pellets inwardly toward the axis of the shot column so as to pass all of the ribs along with the other pellets of said column. Thus, the ribs serve to maintain the relatively compact formation of the shot column, with concurrent control of the quantity and pressure of the forwardly moving gases, so as to give maximum effect to the forward drive or projection of said column. The ports successively exhaust portions of said gases during the travel of the shot column through the device, but the sizes and shapes, and spacings of the ports in a device may be varied and the total area of all the ports will be kept within proper and desired operating limits, to the end that there is sufficient exhaustion of the gases through the ports to prevent the building up of a "back pressure" in the barrel which might be detrimental upon the next opening of the breech of the gun. Should any pellets become dispersed after passing the last or most forward rib, the rear portions of the inner surface of the desired choke tube will act thereon, as hereinbefore disclosed with respect to the surfaces 10 and 11, to return them to the body of the shot column.

The construction shown in Fig. 5 is a modification wherein the casing 5 defining the expansion chamber 6 is of a lesser internal diameter, and is provided with a choke tube 8 the inner rearmost surface of which may be outwardly and rearwardly flared (conical or arcuate), or the inner surface of said tube may comprise a single conical slope as shown in Fig. 8. In other words said choke tube, having a lesser internal diameter, may have a very much reduced compression and recompression chamber area.

The ribs may have such cross-sectional shapes as desired, and the diameters of their cylindrical surfaces 26 may be varied, the diameters varying from that of the barrel bore to larger than said bore. However, when the rib diameter is equal to or closely approximates the diameter of the barrel bore, it is preferable to give the ribs a cross-sectional shape as shown in Figs. 1 and 7. This is evident because when the shot column clears the

muzzle of the gun barrel it has a tendency to expand laterally due to internal gas pressure, air pressure or resistance ahead of the column, and because it is no longer confined by the barrel wall. When the rear face of the rib is in a plane substantially at right angles to the direction of shot projection, as illustrated in Fig. 6, and when the rib diameter approaches that of the barrel bore, it is evident that the outer pellets of the expanding shot column will impinge on the rear face of the rib adjacent its innermost edge, with consequent damage to such pellets.

The cross-sectional shape of ribs shown in Figs. 1 and 7, on the other hand, provides a rear rib face which will deflect the outermost and dispersed pellets back to the shot column without inflicting any serious damage to said outermost pellets, the rear faces of all the ribs thus performing the function of recompressing the shot column, in successive steps, as the column passes the ribs or, in other words, performing the function of slopes 10 and 11 of said patent.

In the said patent it is evident that the choking off and control of the gas takes place at only one point viz., in the rearward portion of the choke tube, wherefore a certain amount of gas is bound to leak past the rearmost (or powder) wad and thus enter the shot column. According to the present invention, the series of ribs creates a plurality of relatively short subordinate expansion chambers in the main expansion chamber 6, to the end that a series of substantial gas seals are formed as the shot column and wads pass the ribs, and the gas, therefore, is successively valved off to the outside atmosphere through the ports between the ribs, thereby materially reducing the amount of gas which otherwise would enter the shot column before it enters the rearward portion of the choke tube. Each rib is imperforate so that there is no gas communication between such adjacent subordinate chambers.

Coming now to the modifications of this invention illustrated in Figs. 9 to 13 inclusive, it is pointed out that these constructions are exemplifications of devices which might be more properly applicable to rifles or other ordnance capable primarily of discharging a single shot or bullet, as contradistinguished from the devices illustrated in Figs. 1 to 8 and which have been hereinabove described as applicable to a shotgun where plural shot or shot pellets are discharged with one powder charge. However, it is to be distinctly understood that the principles involved in all of the modifications herein illustrated, are substantially the same, particularly with respect to the treatment of the gases, and that the specific constructions illustrated as well as modifications or variations thereof are equally applicable to all types of ordnance. Therefore, the constructions shown in Figs. 9 to 13 are to be considered as improved modifications of those disclosed in U. S. Letters Patent No. 1,605,393 granted November 2, 1926, entitled Climb arrester, and No. 1,636,357 granted July 19, 1927, entitled Anti-climb device, both issued to Richard M. Cutts, Jr.

In general, these modified constructions comprise a cylinder 5 creating a main expansion chamber 6, said cylinder disposed at the muzzle end of the gun barrel so that said expansion chamber receives the projectile and the gases of combustion as they leave the barrel. The cylinder is provided with transversely disposed annular ribs, ports for the escape of the gases of combustion, and a constricted forward end or projectile opening having such an internal diameter as to

create a substantial gas seal with the projectile, when the projectile is passing therethrough. Hence, in general, the statements given hereinbefore with respect to the constructions shown in Figs. 1 to 8, are applicable to the modifications shown in Figs. 9 to 13; however, the following additional statements will be made since they are deemed to be rather pertinent to said latter modifications.

According to Fig. 9 individual or separate internal annular ribs such as 40, 41 and 42 are provided within the cylinder 5, said ribs having the cylindrical surfaces 43, 44 and 45 respectively, but these surfaces are of different diameters, the rearmost rib 40 having the largest, the foremost rib 42 having the smallest, and the middle rib 41 having a diameter which is intermediate the others. In other words, the diameters of these rib surfaces successively decrease in the direction of the path of the projectile (represented by the arrow) through the cylinders, with the diameter of the foremost rib just slightly greater than the bore of the barrel so that when the projectile passes through the foremost rib, the projectile and the cylindrical surface 45 of said rib will together create a substantial gas seal.

Since all of the ribs are of substantially the same thickness where they join the wall of the cylinder, and since each rib has at least one side surface or face such as 46 which is oblique to the axis of the cylinder, it will be seen that the widths of the cylindrical surfaces 43, 44 and 45 are different, decreasing also in the direction of the path of the projectile. Preferably it is the rear face such as 46 of each rib which is made oblique (though the front face may be similarly formed), the obliquity being conical or of other formation but in any event pitched or directed forwardly and inwardly of the cylinder, whereby the forwardly moving gases are not completely checked by such rear face but are permitted easement into the chamber space ahead of the rib. However, at the foremost rib 42 the projectile creates a substantial gas seal with the rib surface 45 when the projectile is passing through said rib, and consequently practically all forward movement of gas is stopped here.

The forward end of this device has its inner wall surface 47 forwardly and inwardly directed to terminate in the projectile opening 48 just slightly greater than the diameter of the projectile to also create a substantial gas seal when the projectile is passing therethrough. A relatively large port 49 is provided in the upper wall portion of the cylinder 5 between the foremost rib 42 and the projectile opening 48, and a similar port 50 is provided to the rear of and adjacent the rearmost rib 40. Between each two ribs there is provided a port of smaller area in the upper wall of the cylinder as indicated at 51, and the bottom wall portion of the cylinder is imperforate.

According to Fig. 10 there is a somewhat similar construction, the chief difference being in the fact that two similar large rear ports 55 are provided instead of the single rear port 50 shown in Fig. 9, in order to permit the escape of a larger quantity of gas and so reduce the amount of gas to be valved down by the intermediate ports 51.

According to Fig. 11 the single rear large port 50 is provided adjacent the rearmost rib 40, but a relatively small forward port 60 is provided in the place of the large forward port 49 shown in Figs. 9 and 10. Also, there are but two ribs pro-

vided in this construction and between them there is provided a single large port 61 of substantially the same area as the rear port 50. Thus, the modifications shown in Figs. 10 and 11 are capable in different manners of effecting the release of substantially the same quantities of gas by the arrangement of port "valving" illustrated, clearly indicating the necessity of relatively wide latitude in the protection of the principles of this invention.

The construction of Fig. 12 is similar to that of Fig. 9 insofar as the ribs and ports are concerned, but the forward end of the cylinder 5 is provided with a cylindrical inner wall surface 65 instead of the forwardly and inwardly directed wall surface 47 shown in Fig. 9. The diameter of the cylindrical surface 65 is just slightly greater than the diameter of the projectile, and the length thereof is substantially from the forward port 49 to the end of the device, the purpose of this cylindrical projectile tube or opening being to establish a gas seal of longer time duration, when the projectile is passing therethrough, than was the case with the construction shown in Fig. 9.

In Fig. 13 there is illustrated a modification utilizing a single annular rib flanked forwardly with a large upper port 49, and rearwardly with a smaller upper port 51, this arrangement particularly lending itself to a condition of reduced powder charge, i. e., relatively low gas pressures, the larger port being provided for positively valving down the pressure to an amount incapable of "cocking" the projectile while passing through the opening 48.

Therefore, from the constructions shown in Figs. 9 to 13 it will be seen that the large rear port (or ports) such as 50 and/or 55 will valve off or relieve the major gas pressure to prevent the building-up of undesirable pressure in the gun barrel. The large forward port (or ports) such as 49 facilitate the release of gas not already exhausted by the other ports and, since the projectile (or projectiles such as shot pellets if and when this construction is applied to a device for a shot-gun) tends to seal the muzzle of the device when passing through the projectile opening, the gas is thus more readily exhausted through a large port instead of going forward through the muzzle or projectile opening, thereby resulting in increased efficiency of the device. The number and size, as well as the locations, of the ports may be varied for different installations including variance of powder charge. The determining factor is in the principle of valving-off substantially all of the gas without a build-up of back pressure in the barrel. The intermediate ports, either large or small, may be provided at any and all points where peak pressures occur. The constructions of Figs. 9 and 10 are well adapted to handle usual pressures generated by the propellant gas and projectile for normal installations. However, it is known that certain other installations will require the release of the propellant gas at various points along the longitudinal extent of the device at the points where peak pressures occur. It is conceivable that there may be differences in ammunition for the same caliber gun, i. e. there may be a difference in the powder charge and the weight of the projectile, wherefore it is to be understood that this invention is flexible in order to cover generally such differences.

In low pressure guns a "dead end" expansion chamber, such as illustrated in Fig. 12, can be

used, and the gas is reacted out of the ports. However, in high pressure guns a "dead end" alone would create such a terrific impact of forwardly moving gas that the Charpy blow would be materially increased, resulting in a greater strain to the metal of the device, and the report would be more unpleasant to the firer. Therefore, it becomes highly necessary and essential to provide fractional and positive valving of the gases by the ribs in conjunction with the ports. In gas porting devices for shotguns, constructions similar to those shown in Figs. 9 to 13 may be utilized, but it is preferable in such usage to place the ports in both the top and bottom wall sections of the cylinder.

It is to be understood that the number, shape, and spacing of the ribs from each other, as well as the number, shape, spacing, and area of the ports associated with said ribs, may be varied in order to so control the heavy gas pressure as to prevent the said pressure from building-back undesirably or hazardedly into the barrel and/or breech of the gun. Therefore, the constructions shown in the drawings are by way of example only.

What is claimed is:

1. In combination with a shotgun barrel through which shot as well as powder and shot wads are projected by the gases of explosion of a powder charge, a chamber mounted on the muzzle of the barrel for receiving the gases of explosion as well as the projected shot, said chamber comprising a hollow cylindrical casing having its axis concentric with the axis of the barrel, the inner diameter of said casing being greater than the bore of the barrel, said casing thereby forming a chamber space to permit expansion of the gases therein, the wall of said casing having longitudinally spaced apertures to release a portion of the expanded gases of explosion laterally of the casing, said wall also provided with a plurality of separated substantially similar annular, radially inwardly extending ribs providing a projectile opening in each rib, said ribs forming separate subdivisions of the expansion chamber, at least one rib disposed between two of said longitudinally spaced wall apertures, and the projectile opening through each rib formed of a diameter such as to provide a substantial gas seal with the projected powder and shot wads as the wads pass the ribs, the rear face of each rib so sloped forwardly and inwardly to said projectile opening as to turn such stray shot, as may impinge thereagainst, inwardly toward the axis of the shot column.

2. A device for attachment to the forward end of a shotgun barrel for porting the gases of explosion received from the barrel and for receiving shot as well as powder and shot wads projected through the barrel by the gases of explosion of a powder charge, said device comprising a hollow cylindrical member to be concentric with the axis of the barrel when attached thereto, the inner diameter of said member being greater than the bore of the barrel, said member thereby forming a chamber space to permit expansion of the explosion gases received therein, the member having wall portions so formed that when the member is attached to the shotgun barrel the side wall portions of said member will be imperforate and the top and bottom wall portions thereof will each have longitudinally spaced apertures for releasing a portion of the expanded gases of explosion laterally of the member, said member also provided with a plurality of separated annular,

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radially inwardly extending ribs, each rib providing a projectile opening, said ribs forming separate subdivisions of the expansion chamber, at least one rib disposed between two of said longitudinally spaced wall apertures, and the projectile opening through said ribs formed of a diameter such as to provide a substantial gas seal with the projected powder and shot wads as the wads pass the ribs, the rear face of each rib so sloped forwardly and inwardly to said projectile opening as to turn such stray shot, as may impinge thereagainst, inwardly toward the axis of the shot column.

3. A device for attachment to the forward end of a shotgun barrel for porting the gases of explosion received from the barrel and for receiving shot as well as powder and shot wads projected through the gun barrel by the gases of explosion of a powder charge, said device comprising a hollow generally cylindrical member having an internal diameter greater than the bore of the gun barrel to thereby provide a chamber space to permit the expansion of the explosion gases received therein, the member having wall portions so formed that when the member is attached to the shotgun barrel the side wall portions of said member will be imperforate and the top and bottom wall portions thereof will each have a plurality of apertures for releasing a portion of the expanded gases of explosion laterally of said member, at least two of said apertures being disposed on opposite sides of a longitudinal axial plane of said member and being intercepted by a common transverse plane at right angles to the axis of said member, said wall also provided interiorly thereof with an annular, radially extending rib forming separate subdivisions of the expansion chamber, said rib disposed between two of said apertures and the opening through said rib formed of a diameter such as to provide a substantial gas seal with the projected powder and shot wads as the wads pass said rib, the rear face of said rib so sloped forwardly and inwardly to the projectile opening as to turn such stray shot, as may impinge thereagainst, inwardly toward the axis of the shot column.

4. A device for attachment to the forward end of a shotgun barrel for porting the gases of explosion received from the barrel and for receiving shot as well as powder and shot wads projected

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through the barrel by the gases of explosion of a powder charge, said device comprising a hollow generally cylindrical member to be concentric with the axis of the barrel when attached thereto, the inner diameter of said member being greater than the bore of the barrel, said member thereby forming a chamber space to permit expansion of the explosion gases received therein, the member having wall portions so formed that when the member is attached to the shotgun barrel the side wall portions of said member will be imperforate and the top and bottom wall portions thereof will each have longitudinally spaced apertures for releasing a portion of the expanded gases of explosion laterally of the member, said member also provided with an annular, radially inwardly extending rib providing a projectile opening, said rib forming separate subdivisions of the expansion chamber, said rib disposed between two of said longitudinally spaced wall apertures, and the projectile opening through said rib formed of a diameter such as to provide a substantial gas seal with the projected powder and shot wads as the wads pass the rib.

RICHARD M. CUTTS.

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