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MUZZLE DEVICE FOR SHOTGUNS

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Fig. 1

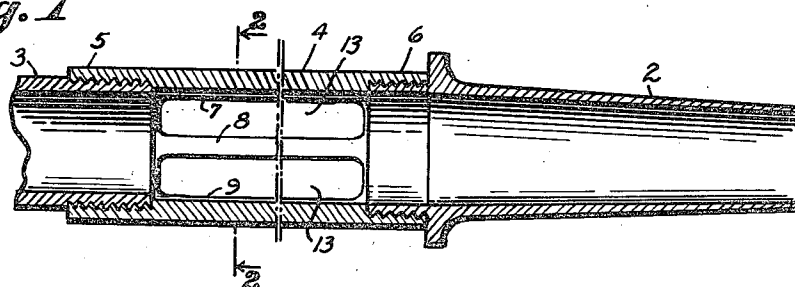


Fig. 2

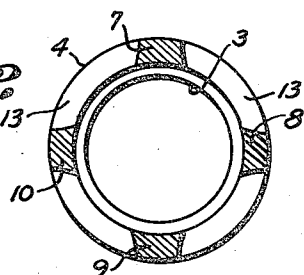


Fig. 3

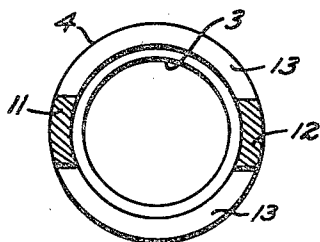
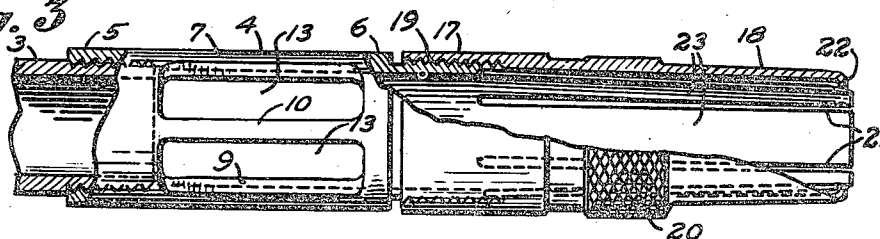


Fig. 5

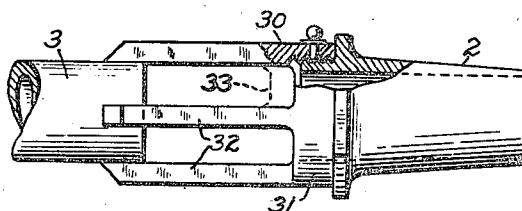


Fig. 4

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MUZZLE DEVICE FOR SHOTGUNS

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3 Claims. (Cl. 42-79)

1

This invention relates to a muzzle device for shotguns and more specifically to a device capable of releasing the greater portion of the gases of explosion quickly to the atmosphere prior to acting upon the shot column to give the desired choke effect, the invention having for its object to provide a device which is simple in construction, efficient in use, and less costly to manufacture 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 and shown applied to the muzzle of a shotgun barrel;

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

Fig. 3 is a view partly in longitudinal section illustrating a modification of the device shown in Fig. 1;

Fig. 4 is a view illustrating a further modification of the device; and

Fig. 5 is a transverse sectional view of a modification of the construction of the connector illustrated in Fig. 1.

According to heretofore known constructions there has been provided an expansion chamber the internal diameter of which has been considerably greater than the bore of the gun barrel whereby the gases of explosion leaving the muzzle of the barrel have been permitted positive expansion within said chamber in a direction lateral to the common axis of said barrel and chamber. In such constructions the wall of the expansion chamber has been provided with a longitudinal series of apertures through which the expanding gases may pass successively to the atmosphere, said apertures being spaced longitudinally of the chamber to give a valving effect upon said gases in their forward travel in the chamber. Said devices have been equipped with choke tubes or the like at the forward end of the expansion chamber. However, such devices have been costly to manufacture and have been found to be not entirely satisfactory for various reasons including the inability to exhaust the expanding gases sufficiently fast enough to prevent deleterious effects thereof on the shot column. By this present invention these objectionable features

2

are overcome as will be pointed out hereinafter.

According to this invention there is provided a choke tube 2 or similar construction which is joined in any suitable manner to the muzzle end of a shotgun barrel 3 by an interposed connector 4, in Figs. 1 and 3 the joints between the barrel, said connector and said choke tube being indicated as screw threads. The internal diameter of this connector is greater than the bore of the barrel.

The connector as illustrated in Figs. 1 and 3 comprises two collar-like members 5 and 6, one at each end thereof, said members connected by two or more longitudinal members such as ribs, in Figs. 1, 2 and 3 there being indicated four ribs 7, 8, 9 and 10, and in Fig. 5 there being shown only two ribs 11 and 12, it being understood that said ribs may be of equal or unequal cross-sectional area in the same device. These longitudinal connecting members or spacers may be variously formed and may comprise bars, rods, strips which are welded, soldered, or otherwise secured to the choke device and/or the barrel (as indicated in Fig. 4), in contradistinction to the illustrated ribs which preferably are integral with the members 5 and 6. These ribs or other spacers may be of any desired lengths and extend approximately the full distance from the muzzle of the barrel to the choke tube, whereby the gases of explosion issuing from the barrel have immediate and nearly unobstructed lateral passage to the atmosphere. However, due to this rapid exhaust of the gases, the entire overall length of the connector may be reduced materially, and be made far less than the length of the heretofore provided expansion chambers, resulting in a considerable saving in weight.

It thus results that said gases have little or no effect upon the pellets of the shot column nor upon the powder wad after they leave the choke device, and consequently the damaging effect in prior known constructions, of the laterally expanding gases in the confined expansion chamber, is avoided. That is to say, the utility of the gases of explosion, in projecting the shot column forwardly in the barrel, stops at the muzzle of the barrel where the force of said gases is dissipated by the immediate lateral release (under expansion) of the gases to the atmosphere, and the shot column can continue its forward travel unimpeded except for the action thereon by the wall of the choke tube. In other words, substantially little gas enters the choke as compared to the amount of gas entering said tube in prior constructions using an expansion chamber, and

3

due to the almost instantaneous and complete lateral release of the propellant gases, the shot wad rapidly loses its forward velocity and hence trails the shot column so as to be out of contact therewith, thereby preventing any "pan-caking" effect upon the shot column after leaving the choke device.

In the formation of the plurality of spacers, it is a feature that, transversely of the connector, the total area of all the spacers shall be equal to or preferably less than the total area of the open spaces such as 13 disposed between said spacers, as a result of which substantially all of the gases of explosion may have immediate and rapid exhaust to the atmosphere, with no material confinement thereof as in the case of prior constructions having a definite chamber.

To the forward collar 6 of the connector there is suitably secured a choke device such as the tube 2, threads being provided in the case where interchangeable choke tubes are desired, each tube being of a different choking effect, this construction being illustrated in Fig. 1. On the other hand, in Fig. 3 there is shown a construction wherein the connector is provided at its forward end with a variable choke device generally identified by the numeral 17 comprising a tapered sleeve 18 which may be rotated on the threads 19 as by the knurling 20 provided on the exterior surface of said sleeve. In this construction the connector may be appreciably lengthened at its forward end to fit within said sleeve, and a plurality of longitudinally extending slots 21 are formed in such extending portion, to permit transverse contraction of said extending portion when said sleeve is rotated thereabout.

That is to say, the interior surface of sleeve 18 is tapered, and said sleeve is inturned at its extreme forward end as indicated at 22 and provided with a bevelled inner surface as shown, whereby when the sleeve is rotated to move it longitudinally of the connector, the inturned end of said sleeve will ride the bevelled surface of said connector and thereby force inwardly the segments such as 23 formed by the slots 21 to increase the amount of choke provided by said segments, said segments yielding due to the formation of said slots therein. Thus, various degrees of choke may be obtained covering a range of from wider than the bore of the gun barrel to diameters which are less than said bore.

The construction shown in Fig. 4 is a modification of that shown in Figs. 1 and 3 in that, instead of the connector 4 comprising ribs which are integral parts of the connector and formed as by cutting out the material of the connector to form the open spaces 13, a connector 30 is provided comprising an annulus or collar 31 carrying rearwardly extending and parallel rods, bars, strips or similar elements generally identified as by the numeral 32 which may be integrally formed with said collar or secured thereto as by welding or soldering, the rearmost ends of said elements slipped over the outer surface of the muzzle end of the barrel 3 and secured thereto as by welding or soldering, the collar 31 and/or the forward ends of said elements being appropriately secured to the choke tube 2 as by the screw threads shown.

The lengths of said elements in any of the illustrated constructions may be equal or unequal, the unequalness thereof being indicated by the dotted line 33. That is to say it may be found desirable to provide a connector which

4

is adapted in some degree to provide a desired lateral movement of the muzzle end of the barrel. In such case the material of the collar 31 may be extended rearwardly to such a position as indicated by the dotted line 33 in order to provide an inner curvilinear wall surface against which the expanding gases may exert a force to move the muzzle in the desired lateral direction, or two adjacent spacers may be interconnected by a wall at any part of their lengths, the corresponding spaces opposite said wall surface being left entirely open. This same result may also be obtained by increasing the width, in a circumferential direction of the connector, of the upper or lower (according to the desired direction of lateral movement) elements 32 to provide an increased inner surface of said elements as compared to the corresponding inner surfaces of the opposite elements.

In heretofore known constructions a large percentage of the recoil reduction was effected by the expansion of the gases within a chamber, which resulted directly in the slowing down of the forward velocities of the said gases. The expanded gases were then reacted through ports in the wall of said chamber. An additional percentage of recoil reduction was obtained by the impact of the forwardly and outwardly moving gases against the forward surfaces of said ports, which percentage could be made greater by increasing the number of ports and hence the total area of said forward impact surfaces. In said prior constructions the total of the port areas was always kept within certain limits in order that the expanded gases could be valved under positive pressures through the ports in the chamber.

According to this present invention all of the gases are exhausted immediately to the atmosphere upon leaving the gun barrel, due to the absence of the expansion chamber as heretofore known, and the choke device is secured to the gun only by a plurality of spacers such as the ribs or other members illustrated. Thus there is no valved or impeded release of the gases under pressure to the atmosphere through a series of ports over a protracted ballistic time interval. Thus the recoil reduction effect obtained by this invention is due to the glancing impact and friction of the shot column on the inner surface of the choke tube.

This invention is not to be confused with prior disclosures showing an expansion chamber, because the connector 4 or 30 comprises only the necessary spacing elements for joining the choke device with the barrel and hence intentionally have a minimum total of internal surfaces serving to retain or obstruct the gases. In other words, by this invention the purpose is to release the expanding propellant gases laterally to the atmosphere as quickly as possible. This construction provides an immediate gas release effect, in contradistinction to my prior patent teachings which jointly combine the principles of gas impact, and gas reaction, over a protracted ballistic time interval.

Further, this construction provides a definite sequence of ballistic effects, in the serial order of (1) shotgun barrel (handling a plurality of shot pellets as a unit column), (2) means for releasing practically all of the propellant gases in a lateral direction immediately upon their leaving the barrel, and (3) a choke device forward of said means for rectifying of choking the shot column after the deleterious effects im-

5

parted thereupon by the propellant gases and the powder wad. As to item (1) the pressure of the gases in the barrel is very great, and the powder wad tightly contacts the rear of the confined shot column, this tight contact being still in effect when the column and wad leave the muzzle of the barrel. With respect to the means constituting item (2) the great pressure of the propellant gases is still a factor at the barrel end of said means wherefore said wad is driven into the rear of the shot column to produce a "pan-caking" or mushroom (broadening) effect upon said column. Said means is of such open construction that substantially all of the gases are permitted immediate lateral expansion to the atmosphere with coincidental high turbulence within said means. Further, the propellant gases have an extremely high forward velocity (pressure), which together with said turbulence causes the gases to operate upon the wad with the result that said wad unconfined in said means is enlarged, torn and otherwise deformed from its original shape so that it offers increased resistance to its imparted forward movement. As to item (3) the "pan-caked" column in passing through the choke device is rectified and brought down to the desired diameter for flight, and the enlarged and malformed wad is further retarded by its frictional contact with the choke device, thereby drifting backward with respect to said column, thus permitting the "choked" column to fly unimpeded to the target. Consequently it is an important feature that item (3) be the last in this series of effects and that item (2) definitely be so open as to exhaust substantially all of the propellant gases laterally and immediately.

It is obvious that those skilled in the art may vary the details of construction and combinations of parts without departing from the spirit of this invention wherefore it is desired not to be limited to the exact foregoing disclosure except as may be required by the claims.

What is claimed is:

1. A muzzle device for mounting on the barrel of a shotgun in spaced relation thereto, said device comprising a plurality of spaced parallel rods disposed in a cylindrical plane, said rods being entirely separated from each other at one end thereof, an annular collar, the other ends of said rods each being secured to said collar, the distance between adjacent rods, measured

6

arcuately in said cylindrical plane, being greater than the correspondingly measured dimension of a rod, said rods adapted to be secured to the external surface of the gun barrel at the separated ends thereof, and said collar adapted to support a choke member, said barrel, muzzle device and choke member all being in axial alignment.

2. The structure of claim 1, said collar having a portion thereof extended rearwardly toward said barrel when the device is attached to the latter, whereby some of said rods are of unequal length resulting in a lateral movement of the muzzle end of the shotgun when fired.

3. In a pattern control device for mounting on the barrel of a shotgun, a connector comprising a plurality of parallel rods disposed in a cylindrical plane to be secured at their inner ends over the muzzle of the gun with the axis of said plane coincident therewith, the inner diameter of said connector being in excess of the inner diameter of the gun barrel, an annular collar connecting the outer ends of said rods, the distance circumferentially between adjacent rods being greater than the correspondingly measured dimension of a rod, and said collar adapted to support a choke member in axial alignment with said connector.

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