July 10, 1951 H. H. HARTWELL 2,559,955

PROJECTILE

Filed Nov. 26, 1946

FIG. 2

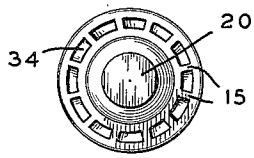


FIG. 3

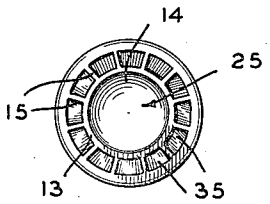


FIG. 5

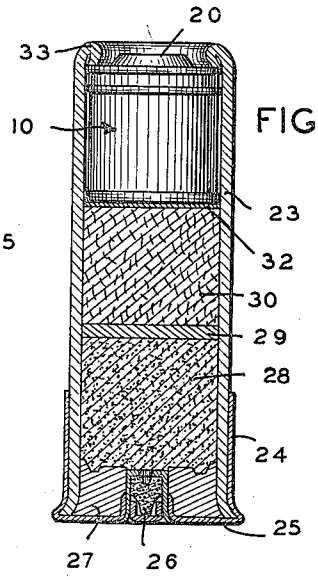


FIG. 1

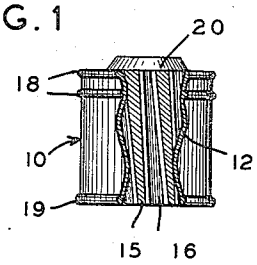


FIG. 7

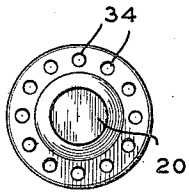
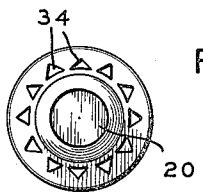


FIG. 8



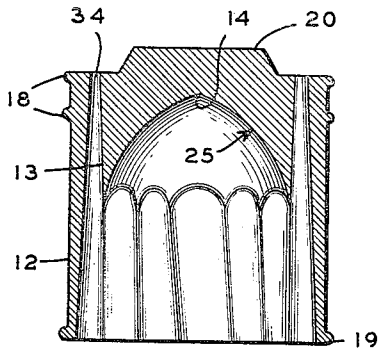


FIG. 6

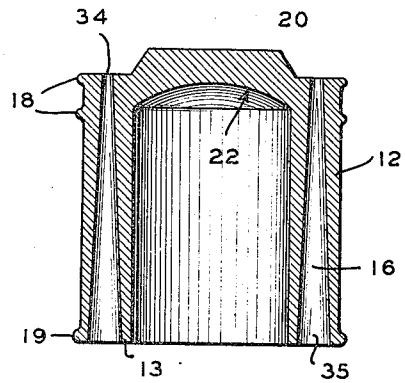


FIG. 4

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PROJECTILE

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4 Claims. (Cl. 102—51)

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This invention relates to projectiles and more particularly to projectiles designed for use in smooth bore weapons or projecting means.

It has been customary, in order to impart a rotary motion to a projectile in flight, to provide rifling on the interior of the barrel from which the projectile is fired. However, in some types of smooth bore weapons, such as shotguns, mortars, smooth barrel cannon and the like, the projectile when fired would oftentimes turn end over end and deviate from the preferred trajectory thus limiting the use of this type of weapon for relatively short ranges where extreme accuracy was not essential.

Some attempts have been made to provide projectiles for smooth bore weapons which will rotate in flight. Most of these have been constructed with exterior longitudinal helical grooves which by reason of the air passing therethrough would impart a rotary motion to the projectile.

Another structure which has been made in an attempt to meet this problem embodied an axial opening the length of the projectile whose defining surfaces included helical grooves.

The performance of these projectiles has not been entirely satisfactory. One reason advanced for this result is that the air, in passing by or through the projectile, has not been confined within the grooves. This objection is overcome by my construction.

It is an object of this invention to provide a projectile adapted for use in smooth bore weapons which when fired through the air will have a rotary motion so that it will approach the accuracy of a projectile fired from a rifled barrel.

A further object of this invention is to provide a projectile particularly adapted for use in a shotgun shell which when it is discharged will overcome its tendency to turn end over end and deviate from the preferred trajectory by reason of having a rotary motion imparted to it.

Another object of this invention is to provide a projectile particularly adapted for use in a shotgun shell which is easy and inexpensive to make and is well adapted for the use of hunters of game and which is adapted for use with the standard shell and gun.

Further objects and advantages of this invention will become apparent in the following specification taken in conjunction with the accompanying drawing, wherein:

Fig. 1 is a side elevation of a projectile of this type with a portion cut away showing the longitudinal air passages or ducts therein;

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Fig. 2, an end view of the front end or nose of said projectile;

Fig. 3, an end view of the base of said projectile;

Fig. 4, a longitudinal section of the device shown in Fig. 1;

Fig. 5, a section of a conventional shotgun shell showing the projectile mounted therein;

Fig. 6, a longitudinal section of a modification;

Fig. 7, an end view of the nose end of a projectile having ducts of circular cross section; and

Fig. 8, an end view of the nose end of a projectile having ducts of triangular cross section.

Referring to the drawings, the projectile 10 is comprised of a cylindrical outer wall 12 and an inner cylindrical wall 13 having a common axis 14 and connected by longitudinally extending vanes or partitions 15. The vanes 15 are substantially straight but are inclined to the axis 14 of the cylinders and may be thicker in cross section at the front or nose end of the projectile and taper to a lesser cross section at the rear or base of the projectile in order to facilitate casting of the projectile. The inner and outer cylinder walls 13 and 14 may likewise be tapered if desired to facilitate casting. Air passages or ducts 16 are thus formed between the partitions 15 and the inner and outer cylindrical walls. Said ducts are of smaller cross section near the front end of the projectile, tapering to a larger cross section at the base of the projectile, and are at an angle to the common axis of the two cylinders thus providing a helical path for air flowing through the passages 16. The invention is not limited to the use of vanes and cylinder walls of varying cross section, however, as these may be of uniform cross section, if desired.

A pair of rings or ridges 18 and a single ring or ridge 19 are formed integral with the outer cylindrical wall 12 in order to insure closer contact between the projectile and the barrel of the gun and to prevent or minimize the passage of explosive charge around the outside of the outer wall during movement through the gun. In addition, the ridges will "wipe" down to the choke diameter of the barrel at the muzzle end, thus decreasing the hazard of the barrel's bursting, which would be greater if the projectile were of the ridge diameter. It is evident that any desired number of ridges may be employed, and at various positions with respect to the outer cylindrical wall.

A nose 20 which may extend back into the inner cylindrical wall 13 is provided for the front end of the projectile. Said nose is of dome shape

and is concave as at 22. The leading end of the body has a transverse wall which has a flat annular portion which serves as a pressure surface for guiding air into the passages 16. The rear end of the projectile is open.

Referring to Fig. 5, a conventional shotgun shell is shown with an embodiment of the present invention affixed thereto. The shell may be of the conventional type and is comprised of a cardboard outer cylindrical wall 23 which is enclosed at its base for added strength by a brass wall 24 having a base 25. Firing cap 26 is positioned at the center of the base by means of a metal plug 27. A powder charge 28, cardboard disc 29, felt wadding 30, and cardboard disc 32 are also shown. In place of the usual shot or other type of projectile commonly used, the projectile 10 of the present invention is positioned in the front end of the shell and is held in place by means of the crimping 33 of the cardboard container 23.

It is preferable that the nose 20 of the projectile not extend as far as the end of the cardboard container 23 for the reason that when in use in the magazine of a gun it would otherwise contact the primer or firing cap of the shell ahead of it and might cause an undesired explosion.

When the shell is fired the ridges 18 and 19 will "wipe" on the inner wall of the gun barrel thus assuring close contact between the projectile and said barrel. As the projectile leaves the gun in flight, air will enter ducts 16 through the openings in the nose end of the projectile 34 and pass through the ducts and leave the projectile by means of the openings 35 at the base of said projectile. In passing through the ducts 16 the air will impart a rotary motion to the projectile by reason of the ducts being at an angle to its axis and providing a helical path for the flow of air.

In the form of the invention shown in Figs. 1 through 4 the air passages 16 extend from the nose of the projectile to its base. In a modification of the invention shown in Fig. 6, however, the inner cylindrical wall does not extend completely to the base of the projectile but instead extends through only a portion thereof from the nose end. The dome of the nose may be arched as shown at 22 in the embodiment in Fig. 4 or have a greater concavity as shown at 25 in Fig. 6, depending on the weight and balance characteristics that it is desired the projectile embody. In this modification the air passages are closed on all sides through a portion of the projectile, and open on one side below the termination of the inner cylindrical wall. The vanes may taper down in height to become flush with the base of the outer cylindrical wall if desired.

It has been found that the flight characteristics of the modifications of the invention shown in Figs. 4 and 6 are not the same but that the accuracy achievable by each does not vary appreciably. The projectile shown in Fig. 6 by reason of its air passages not being closed completely therethrough and by reason of having a larger opening in its base is subjected to a lesser amount of drag in flight and thus is better adapted for certain types of hunting.

It is to be understood that this invention is not limited to any particular shape of cross section of the air passages or ducts but may include ducts of substantially square or rectangular cross section as shown in Figs. 2 and 3 or circular cross section or triangular cross section as shown in Figs. 7 and 8, or any other cross section which is desired. It is also to be understood that the invention is not limited to use in projectiles for shotguns but may be equally well used in projectiles for other smooth bore weapons, such as mortars where it is desirable to impart a rotary motion to the projectile in flight.

It will be noted that the ducts or passages 13 and 16 are formed adjacent the periphery of the projectile and therefore give a greater turning moment to the projectile than ducts positioned close to the axis of the projectile.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A projectile comprising a hollow cylindrical body closed at one end by a transverse wall and open at the other end, said transverse wall having a flat annular portion adjacent the periphery and a central portion having an outwardly extending nose, passages extending from said flat annular portion to the open end of said body adjacent the periphery thereof and being substantially straight and spaced from and inclined relative to the axis of said body, said passages being open at both ends thereof whereby air passing through said passages as said projectile travels through the air causes said projectile to rotate about its axis, said flat annular portion serving as a pressure surface for guiding air into said passages.

2. A projectile comprising a hollow cylindrical body closed at one end by a transverse wall and open at the other end, said transverse wall having a flat annular portion adjacent the periphery and a central portion having an outwardly extending nose, passages extending from said flat annular portion to the open end of said body adjacent the periphery thereof and being substantially straight and spaced from and inclined relative to the axis of said body, said passages being open at both ends thereof whereby air passing through said passages as said projectile travels through the air causes said projectile to rotate about its axis, said flat annular portion serving as a pressure surface for guiding air into said passages, said cylindrical body having circumferential ridges at each end thereof of soft material whereby the gun projecting said projectile will not be damaged by any inaccuracies in the bore thereof.

3. A projectile comprising a hollow cylindrical body closed at one end by a transverse wall and open at the other end, said transverse wall having a flat annular portion adjacent the periphery and a central portion having an outwardly extending nose, passages extending from said flat annular portion to the open end of said body adjacent the periphery thereof and being substantially straight and spaced from and inclined relative to the axis of said body, said passages being open at both ends thereof whereby air passing through said passages as said projectile travels through the air causes said projectile to rotate about its axis, said flat annular portion serving as a pressure surface for guiding air into said passages, said passages opening into the hollow cylindrical body intermediate the ends thereof and said passages having a partially closed conformation from said intermediate area to the open end of the body.

4. A projectile comprising a hollow cylindrical

body closed at one end by a transverse wall and open at the other end, said transverse wall having a flat annular portion adjacent the periphery and a central portion having an outwardly extending nose, passages extending from said flat annular portion to the open end of said body adjacent the periphery thereof and being substantially straight and spaced from and inclined relative to the axis of said body, said passages being open at both ends thereof whereby air passing through said passages as said projectile travels through the air causes said projectile to rotate about its axis, said flat annular portion serving as a pressure surface for guiding air into said passages, said passages being closed and continuous throughout the length of said projectile.

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