

Sept. 5, 1961

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HIGH VELOCITY, FIN STABILIZED PROJECTILE, RIFLED
BARREL GUN SYSTEM
Filed May 28, 1956

2,998,780

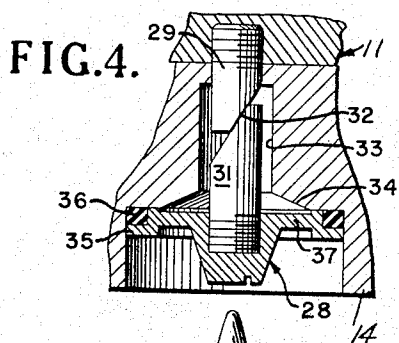
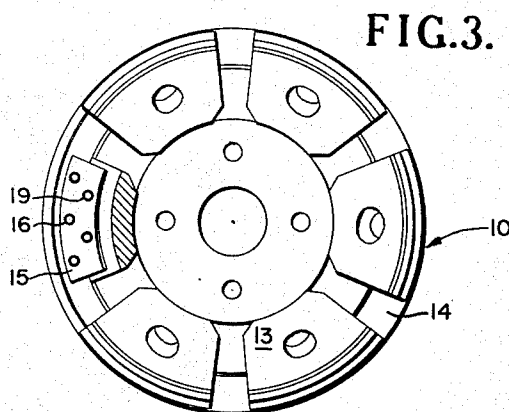
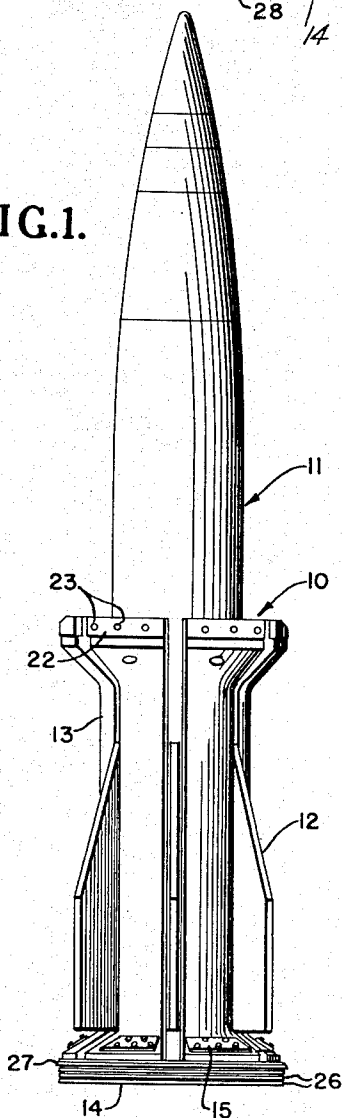
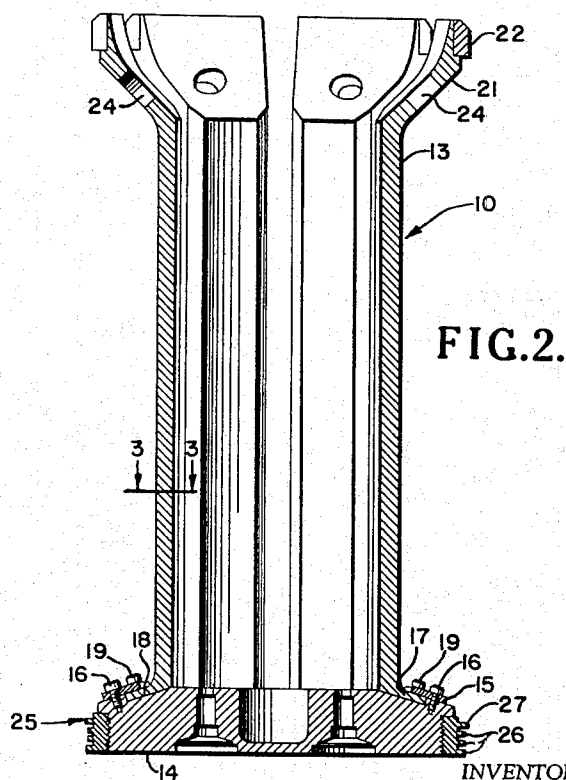


FIG. 1.



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HIGH VELOCITY, FIN STABILIZED PROJECTILE, RIFLED BARREL GUN SYSTEM

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Filed May 23, 1956, Ser. No. 587,910

6 Claims. (Cl. 102-93)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America without the payment of any royalties thereon or therefor.

This invention relates to a sabot for a projectile and more particularly to a sabot for a fin stabilized projectile adapted to withstand rough handling and the action of the gun ramming mechanism as the round is loaded into the gun.

In sabots heretofore devised it has been the usual practice to employ these mechanisms with low velocity smooth bore guns. Such sabots were not suitable for use with sub-caliber fin stabilized projectiles whereby the projectiles are fired from conventional rifled guns at high velocity at a zero or low spin as the projectile leaves the muzzle of the gun.

The sabot of the present invention possesses all of the advantages of the sabots heretofore devised and none of the foregoing disadvantages. In accordance with a preferred embodiment of the invention there is provided a sabot constructed and arranged to receive and securely hold a fin stabilized projectile therein in such manner that the fins are protected from damage during handling, shipment, and loading of the projectile into the gun, the device also having new and improved means for maintaining the sabot and projectile in a predetermined position within the gun during the ramming operation and for preventing appreciable spin to be imparted thereto during the travel of the sabot through the rifled bore of the gun.

This desirable result is achieved by the several new and improved features incorporated in the sabot structure, all of which will be more clearly apparent as the description proceeds.

One of the objects of the invention is to provide a new and improved sabot for a fin stabilized projectile of sub-caliber size from a conventional rifled gun.

Another object is to provide a sabot for a sub-caliber fin stabilized projectile whereby the projectile may be fired at high velocity from a conventional rifled gun.

Still another object is to provide a sabot for a sub-caliber fin stabilized projectile which permits restraint in the gun chamber or bore to position properly during ramming and which does not impart a substantial spin to the projectile as the sabot passes through the bore of the gun.

A still further object is to provide a sabot for a fin stabilized projectile for firing from a conventional rifled gun which guides the projectile through the bore of the gun as the gun is fired without imparting rotative movement thereto and which is disengaged from the projectile as the projectile travels beyond the field of the explosive blast.

Still another object is to provide a sabot of the character disclosed which will be economical to manufacture, rugged and reliable in operation.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

FIG. 1 is a view in elevation of the device of the instant

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invention having a fin stabilized projectile secured thereto; FIG. 2 is an enlarged view in section of the device of FIG. 1 with the projectile removed;

FIG. 3 is a plan view of the device of FIG. 2; and

FIG. 4 is an enlarged view partially in section of the separable bolt structure for clamping the projectile to the base of the sabot.

Referring now to the drawing on which like numerals of reference are employed to designate like parts throughout the several views and more particularly to FIG. 1 thereof there is shown thereon a sabot in accordance with a preferred form of the invention indicated generally by numeral 10 and having a projectile 11 provided with a plurality of fin stabilizing elements 12 secured thereto, the projectile being mounted within the sabot and releasably secured thereto. A plurality of longitudinal members 13 are secured to a base 14 as by the plates 15 secured to the base 14 by the bolt 16. The lower portion of each of the longitudinal members or petals 13 is flanged outwardly substantially as shown, the flange portion 17 having a bearing surface for engagement with a complementary conical surface 18 formed on the base 14 and held securely thereagainst by the plate 15. Each of the plates 15 is bolted to the associated petal 13 as by the bolts 19 which pass through the plate 15 and are threaded into the flange portion 17. By this arrangement the elongated members or petals 13 are maintained securely bolted to the base of the sabot in such manner that the upper or forward ends thereof are securely held in mutually spaced adjacency to provide a rigid structure suitable for loading into the gun.

The upper or leading end portion of each of the petals are flared outwardly at an angle, the outwardly flared portions 21 each being provided with an arcuate bearing member 22 or bourrelet secured thereto as by the screws 23 whereby the sabot slides easily within the bore of a conventional rifled gun. Each of the flanged portions 21 is provided with an aperture 24 for release of the gases escaping past the base of the sabot as the gun is fired and thereby reducing the gas pressure between the end portions of the sabot as the gun is fired sufficiently to prevent distortion of the sabot by lateral inward pressure thereof which otherwise might cause the bearing members 22 to bind against the bore of the gun during travel therethrough.

Threaded exteriorly about the base 14 is an annular stop member 25 having a plurality of circular fin portions 26 formed thereon for engaging the bore of the gun to provide a bearing surface therewith sufficient to properly guide the sabot during travel therethrough and to seal the base of the sabot thereto sufficiently to prevent excessive leakage of the propellant gas as the propellant charge is fired. There is also provided on the stop member 25 an additional fin portion 27 of greater diameter than the fin portions 26 for engagement with the discontinuous surface at the rear of rifling within the gun thereby to stop the sabot at a predetermined position within the gun and hold it securely during the ramming operation. The stop member 25 is composed of soft metal such, for example, as soft steel whereby the fin portion 27 is sheared as the sabot suddenly moves forward within the gun barrel in response to the explosion of the propellant charge and the sabot, therefore, is thus prevented from being brought into locking engagement with the rifling of the gun whereby the sabot and projectile carried thereby leave the muzzle of the gun with substantial zero spin velocity.

The projectile 11 is secured to the base of the sabot by a plurality of shear studs, one end is threaded into a circular cap nut 28 and the other end threaded into the base of the projectile 11, FIG. 4. Each of the studs is composed of two elements 29 and 31 having tapered

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flat surfaces secured together at 32 by hard solder, for example, silver solder. The stud is disposed within said annular bore 33 of greater diameter than the stud and terminating at one end thereof in a conical surface 34 abutting a second bore 35 formed within which is disposed a gasket 36 for effecting a seal between the nut and the base 14 as the nut is tightened by a suitable tool. The nut is also provided with a weakened annular portion 37 whereby the central portion of the nut is driven forcibly inward by the explosion of the propellant charge sufficiently to break the soldered joint at 32 and disengage the end portion 29 of the stud from the other end 31 thereof and thereby disengage the means for clamping the projectile to the base of the sabot.

As the sabot and projectile leave the muzzle of the gun and pass beyond the field of the explosive blast, pressure of the air within the interior of the flared portion 21 of the sabot forces the petals 13 outwardly and simultaneously therewith applies a retardation force to the sabot sufficient for the projectile to be disengaged therefrom in free flight. When this occurs the sabot falls to the ground. The plates 15 are sufficiently rigid to maintain the elongated petals 13 in a fixed position during loading of the sabot into the gun. When the sabot has passed beyond the field of the explosive blast, however, the pressure of the air within the flanged portion 21 of the petals causes the petals to be bent outwardly and the projectile to be released therefrom without the application of a drag force on the projectile.

The petals or elongated members are composed of metal suitable for the purpose such, for example, as cast aluminum although, if desired, they may be formed from sheet aluminum by a stamping process. Also, if desired, the front bearing members 22 may be composed of a single band having weakened portions intermediate each adjacent pair of petals to provide added rigidity to the petal structure during loading of the fin stabilized projectile therein and subsequent handling, the band being weakened sufficiently to cause the band to be severed at each of the weakened portions in response to the pressure of the air within the flared portions 21 thereof as the sabot passes beyond the zone of the explosive blast.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

We claim:

1. A sabot for a fin stabilized projectile having a diameter less than the bore size of a rifled gun from which it is to be fired, comprising a circular base plate having an annular bearing surface of circumference slightly less than the bore of the gun, a plurality of longitudinal members individually and coaxially mounted on said base plate in a manner to form a hollow cylinder adapted to receive a projectile, a plurality of metallic arcuate band segments carried by each of said members respectively to form an annular flange on said cylinder, said flange having an outside diameter substantially equal to the bore of the gun from which the projectile is to be fired, and an annular upraised soft metallic lip secured to said base plate and having a diameter slightly greater than the bore of the gun whereby upon firing of the gun said lip is swaged and sheared off thereby allowing the bearing surface to pass slidably within the bore of the gun without locking engagement with the rifling thereof.

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2. A sabot for a sub-caliber fin stabilized projectile to be fired from a rifled gun comprising a circular base member, a plurality of elongated guide members, one end of each of said guide members being flanged outwardly, means for securing each of said outwardly flanged ends to said base member in annular array, each of said guide members being spaced from the immediately adjacent guide members sufficiently to allow sliding movement of a fin of said projectile, the other end of said guide members being flanged outwardly and provided with an arcuate bearing surface for engagement with the bore of the gun whereby the projectile is maintained in a position coaxial with the bore of the gun as the gun is fired, and means for releasably securing the projectile to the sabot.

3. A sabot according to claim 2 in which the last named means comprises a plurality of shearable studs threaded into the base of the projectile and a plurality of nut members threaded thereon and in engagement with a rear surface of said base, each of said studs comprising a pair of interconnected shearable faces intermediate the ends thereof.

4. A sabot in accordance with claim 3 in which each of the cup members comprises an enlarged annular disc having a weakened annular portion arranged coaxial therewith in such manner that the center portion of the nut member is driven inwardly by the force of the explosion sufficiently to shear said studs.

5. A sabot according to claim 4 in which each of the flange bearing portions of each of the longitudinal members is provided with an aperture for relieving pressure caused by escape of gases past the base of the sabot as the gun is fired.

6. A sabot for a sub-caliber fin stabilized projectile comprising a circular base member of slightly less diameter than the bore of the gun, an annular bearing member having a plurality of bearing fins circumferentially arranged thereon for sliding movement within the bore of the gun, a circular stop member formed integrally with said annular member and of greater diameter than the bore of the gun for maintaining the sabot in a predetermined position within the gun during a ramming operation, said stop member being composed of soft metal and adapted to be sheared and disengaged from the rifling of the gun as the sabot is moved from said predetermined position by the explosion of the propellant charge within the gun, a plurality of elongated members having flanged ends thereon, means for securing said elongated members to the base at one flanged end thereof in circular array in a manner to grip and guide a projectile therein, means for releasably securing the base to the base of the projectile, a bearing surface formed on the outer end portion of each of the other flanged portions of said elongated members for sliding engagement with the bore of the gun, each of said last named flange portions having a cup like interior surface whereby the flanged portions are bent outwardly by air pressure against the cup like surface during free flight of the sabot through the air and the projectile is disengaged therefrom.

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