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BULLET DECELERATOR
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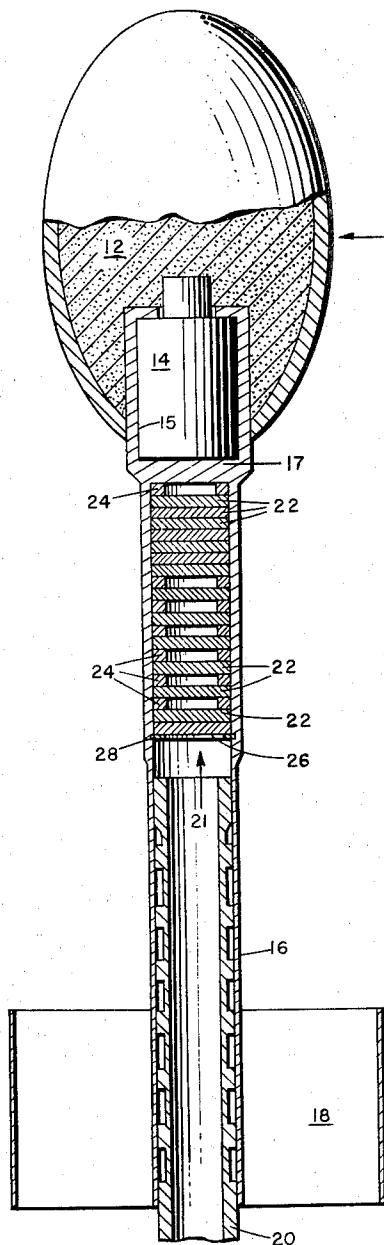


Fig. 1.

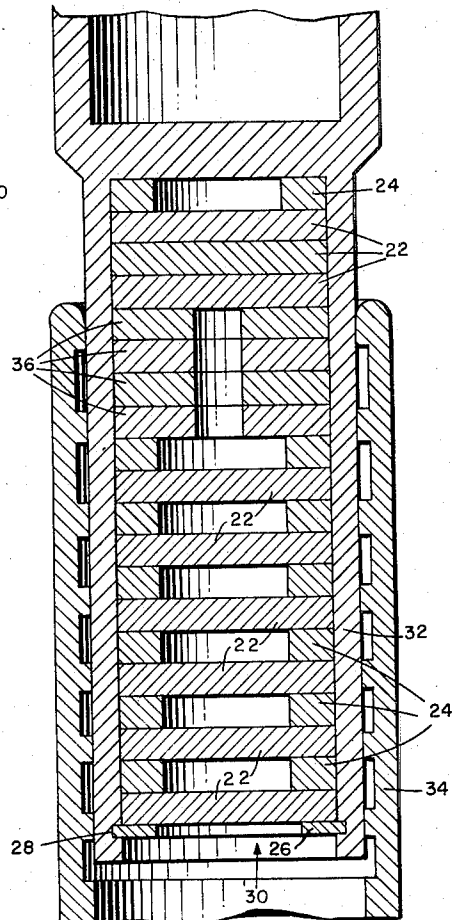


Fig. 2.

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BULLET DECELERATOR

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1 Claim. (Cl. 102—65.2)

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

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This application is a continuation-in-part of application Serial No. 584,155, filed May 10, 1956, now abandoned.

This invention relates to an improved bullet decelerator and stopper which can be inserted into the tube of a rifle grenade so as to permit the launching of the rifle grenade with a regular ball, incendiary, or steel-jacketed ammunition, rather than special blank cartridges.

At present, rifle grenades are launched by attaching a launcher to a conventional rifle, placing a grenade with a tube snugly on the launcher, loading the rifle with a special grenade (blank) cartridge and firing the cartridge. It is especially desirable that a grenade be able to be launched without resorting to use of such special blank cartridges. This is firstly because the blank cartridge is a special item which must be supplied to the troops. Secondly, disastrous results occur if regular steel-jacketed ammunition is used with grenades designed to be fired by this special blank ammunition.

The prior art has tried to solve this difficult problem of adapting rifle grenades so that they can be launched by regular steel-jacketed ammunition. One solution has been to embody bullet decelerators in the grenade tube. This has been done by tapering the bore in the rifle grenade tube and using flat discs to decelerate the bullet. The forces produced by the bullet punching through the discs transmit enough velocity to drive the grenade. These discs present flat vertical surfaces to the rotational axis of the bullet. This shape and positioning of the discs are most desirable because jacketed bullets have very little tendency to deflect from these flat surfaces. For example, U. S. Patent No. 1,900,790 discloses a tapered tube which has a series of spaced flat discs which act as described above.

One of the main drawbacks of the tapered tube and vertical disc arrangement illustrated in the above-mentioned patent is that because the bullet diameter is larger than that of the tube, the bullet impacts with the walls of the grenade tube during its passage therethrough. Since the bullet is fired at high velocity, this impact with the wall of the tube frequently causes the wall to crack or split lengthwise. Often the split or crack so formed is large enough to permit the bullet to pass angularly out through the tube wall causing a change in flight direction as well as loss of velocity to the grenade.

The improved bullet decelerator and stopper in accordance with this invention overcomes the problem of the bullet passing out angularly through the tube wall. This is accomplished by utilizing a grenade tube having a diameter greater than that of the bullet with an improved bullet decelerator and stopper. A series of relatively thin flat discs and washers, which are alternately stacked together in the grenade tube, form this improved

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bullet decelerator. The discs serve to drive the grenade when they are struck by the bullet and the washers guide the bullet substantially axially through the tube. If the washers are cracked by grazing impact of the bullet, the crack so formed is not transmitted to the tube and extends only for the width of one washer. Thus, there will be no cumulative cracking effect of the tube, which was common in known prior art decelerators.

A general object of this invention is to provide a bullet decelerator which can be used with present grenades and fuzes.

Another object is to provide a rifle grenade which may be launched by all types of ammunition including metal-jacketed and incendiary ammunition as well as by special grenade ammunition.

More specifically, it is an object of this invention to provide an improved bullet decelerator which orients the bullet in its passage through the tube and prevents the bullet from passing angularly through the walls of the grenade tube.

Another object is to provide a test device for subjecting objects to high acceleration.

Still further objects are to achieve the above with a device that is sturdy, simple and reliable, yet cheap and easy to manufacture.

The specific nature of the invention as well as other objects, uses and advantages thereof will clearly appear from the following description and from the accompanying drawing, in which:

Fig. 1 is a cross-sectional view of a rifle grenade with a bullet decelerator in accordance with this invention.

Fig. 2 is a fragmental cross-section of a modified form of the device in a rifle grenade.

As seen in Fig. 1, a conventional rifle grenade comprises the grenade proper 10 containing an explosive charge 12, a fuze 14 in the well 15 which is separated from tube 16 by bulkhead 17, and fins 18 on the tube. It is shown on a conventional launcher 20.

One form of this invention involves lengthening tube 16 and inserting a bullet decelerator stack 21 comprising coaxial discs 22 and washers 24 in it. The stack as shown consists of a washer 24 seated against the bulkhead 17, followed by seven discs 22, followed by six pairs of washers and discs, followed by a disc, all snugly retained by ring 26 in seat 28.

I have obtained good results using titanium discs and washers. I have also successfully used aluminum and cold-rolled steel, particularly using steel discs and aluminum washers. Although the bullet decelerator stack adds weight to the grenade, this is compensated for by the transfer of energy to the grenade from the momentum of the bullet. The bullet in contained in the stack, coming to rest in the seven forward discs.

This same bullet decelerator stack can be used in test devices: If it is desired to study the effect of acceleration on an object, the object may be inserted in the wall 15, or substituted for grenade proper 10 and subjected to acceleration by firing a bullet into the stack 21.

Fig. 2 shows a modified form of the invention. In it a bullet decelerator stack 30 is contained in a tube 32 of a rifle grenade (the grenade proper is not shown in this view) which is adapted to fit within a launcher 34 which would be designed for the system. The tube 32 must be sufficiently thick to prevent the tube 32 from locking to the launcher 34.

The stack 30 consists of seven washers 24, nine discs 22 and four washers 36. The inside diameter of the washers 36 is slightly less than that of the bullet to be stopped. The stack is arranged in the following sequence: one washer 24 at the forward end of the tube, three discs 22, four washers 36 and six pairs of washers

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24 and discs 22 all snugly retained by ring 26 in seat 28. The inclusion of the washers 36 change the deceleration characteristics of the bullet in this area.

Discs 22 and washers 24 are stacked together in tube 16, as shown in Figs. 1 and 2, and form a compact bullet decelerator. The bores of the washers 24 and the discs 22 are coaxial with respect to the longitudinal axis of tube 16, and the widths of the washers and discs are substantially equal. In a preferred embodiment, the width or thickness of the washers and discs is approximately one-fifth the length of the elongated bullet fired into the grenade tube 16. The inner diameter or bore of the washer is preferably approximately one and a half times that of the bullet diameter.

When the bullet is fired into the tube 16, it is usually deflected from its axial course after it penetrates a disc 22. Since the washers 24 and discs 22 are alternately stacked together and since they are relatively thin with respect to the length of the bullet, the bore of a washer upon receiving a grazing impact from the deflected bullet will act to reorient the bullet so that it can strike the next disc substantially centrally thereof. This is because the bullet tends to follow a path of least resistance. The grenade is thereby driven in the same direction since the bullet is always guided by the washer bores substantially axially through the tube 16.

An important advantage of the embodiments herein described is that even though the bullet in its passage through tube 16 will graze the bores of washers 24, causing breaks or cracks to occur in the washers, any cracks or breaks so formed will be limited to the thickness of the washer and will not be cumulative.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction, materials, and arrangement within the scope of the invention as defined in the appended claim.

I claim as my invention:

A bullet decelerator for use in propelling a grenade,

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comprising: a cylindrical tube having one end fixed to the grenade, said tube having a bore extending longitudinally therein, adapted to receive an elongated bullet driven axially into said bore, a closure for said bore at the grenade end of said tube, a stack of cylindrical discs and washers alternately arranged within the tube bore, one end of said stack contacting said closure, said cylindrical discs and washers having outer diameters substantially equal in size, said diameters being slightly less than the diameter of said tube bore, said discs and washers being coaxial with said tube bore, each disc and washer having flat opposite end surfaces which are perpendicular to the longitudinal axes of said tube bore, said opposite flat surfaces defining the thickness of each disc and washer, the end surfaces of each washer contacting end surfaces of successively stacked discs, the thickness of said washers being approximately the same as the thickness of said discs, each washer having a coaxial bore therethrough, the bore diameter of each washer being approximately one and a half times that of the diameter of a propelling bullet fired axially into said tube bore, said discs and washers having a thickness substantially less than the length of said propelling bullet, said discs upon receiving an impact from said bullet transmitting the propelling force of said bullet to said tube thereby propelling said grenade, the defined relationship between said discs, washers, and propelling bullet being such that the washers maintain the bullet in its axial movement in said tube preventing said bullet from deflecting and penetrating said tube while said bullet is penetrating said discs.

References Cited in the file of this patent

UNITED STATES PATENTS

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1,900,790	Brandt	Mar. 7, 1933
2,713,262	Webster	July 19, 1955