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E. W. BRANDT

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BLADED PROJECTILE

Filed Oct. 24, 1930

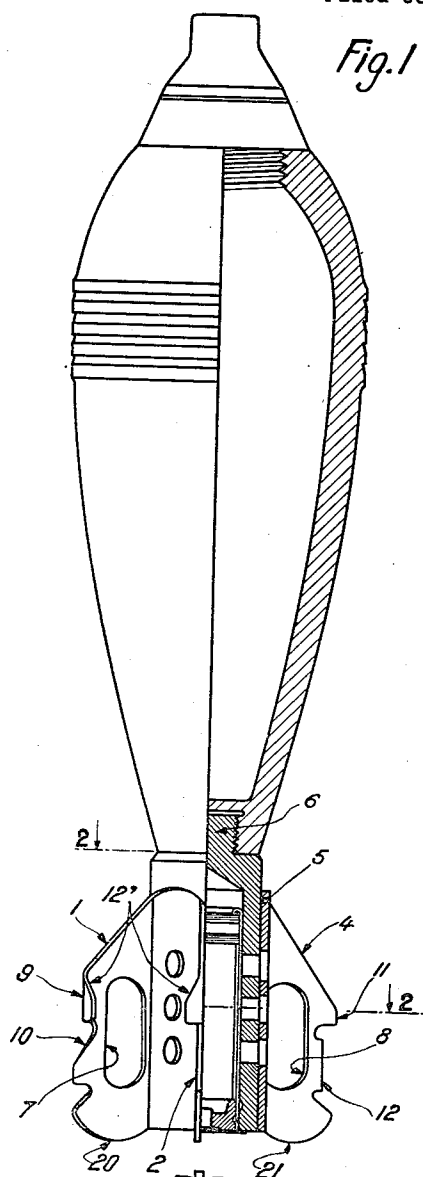


Fig. 1

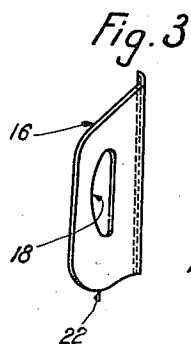


Fig. 3

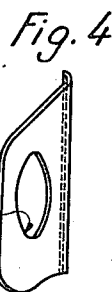


Fig. 4

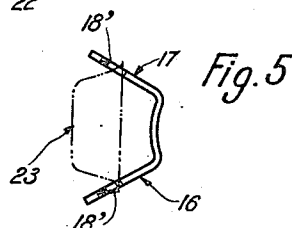


Fig. 5

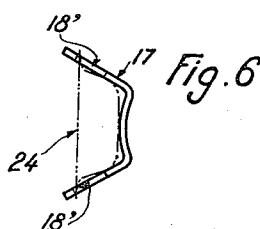


Fig. 6

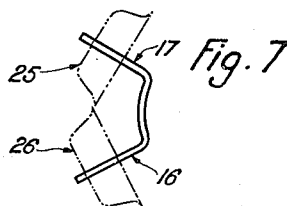


Fig. 7

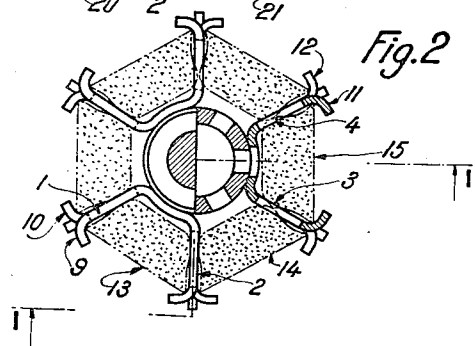


Fig. 2

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UNITED STATES PATENT OFFICE

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BLADED PROJECTILE

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This invention relates to improvements in bladed projectiles, and more particularly to projectiles of this type intended to be fired from smooth bore guns, in which the firing is effected by a striker acting on a cartridge carried by the projectile itself.

For the purpose of increasing the range of these projectiles to a greater or smaller extent, it is known to employ one or more so-called relays or additional charges, disposed between the blades of the blading and ignited by the cartridge gases issuing through perforations provided in the tail of the projectile. This method is, however, limited at an early stage by the number of spaces available, between the blades, for the accommodation of said additional charges. Moreover, the irregular distribution of the additional charges may lead to the deformation of some of the blades. On the other hand, the individual charge in said additional charges cannot be increased beyond a certain limit without risking deformation of the blades by the effect of the powder gases, and, of course deviation of the projectile on its trajectory.

The present invention aims at obviating the foregoing drawbacks and increasing the range of the projectile, by the aid of a blading, particularly distinguished by the following features:

One or more passages are provided in the blades, which are uniformly distributed round the tail (for example, six blades at a relative angle of 60°).

The two edges of the blades comprise two or more tapered portions folded on both sides of the blade in such a way as to increase the peripheral stability and also to enable the additional charges to be attached on both sides of each blade.

In another embodiment, intended more particularly to be applied to projectiles of small calibre and low velocity, the attachment of the additional charges is effected by the aid of suitably shaped passages provided in the blades, the folded portions which are without any noteworthy effect on the stability by reason of the low velocity, being omitted in this instance.

These arrangements present, in particular,

the advantage of rapidly equalizing the efforts exerted on both sides by the powder gases contained in the additional charges, and thus eliminating all risk of deformation of the blades, so that more powerful additional charges can be employed and greater ranges consequently obtained.

The invention also enables a larger number of additional charges to be mounted on the projectile and thus still further increase its range. It also assures the simultaneous ignition and complete combustion of all the additional charges, and consequently maximum precision of aim. The form and arrangement of the blades enables their number to be reduced, thus simplifying manufacture while obtaining unimpeachable stabilization.

Other advantages and special features of the invention will appear from the following description with reference to the accompanying drawing, which illustrate diagrammatically, two embodiments of the invention, given solely by way of example.

In said drawing,

Fig. 1 represents, partly in elevation and partly in axial section along the line 1—1 of Fig. 2, a projectile comprising a blading in accordance with the invention;

Fig. 2 is a cross section of the tail of the blading, along the line 2—2 of Fig. 1;

Fig. 3 is a modified blade, preferably applicable to projectiles of low velocity; and

Figs. 4 to 7 represent various methods of attaching the additional charges.

The projectile of the invention (Figs. 1 and 2) comprises, at the rear, a blading composed of a certain number of blades, such as 1, 2, 3, 4 . . . (six in the example shown) distributed uniformly and secured in known manner round the perforated tail 5, which is mounted on the projectile by means of its threaded extremity, 6 or in any other way.

Perforations or gaps, such as 7, 8, provided in the blades offer free passage to the gases liberated by the powder of the additional charges, whilst obviating all risk of deformation of the blades under the unequal pressures acting on their two surfaces. On the other hand, the ignition is transmitted in-

stantly from one to other of the chambers formed between each pair of blades, thereby assuring perfect combustion of the powder in the relays, and therefore great precision of range.

It will be evident that several passages might be provided in place of one, but it is, nevertheless, preferable to reduce their number to a minimum, with a view to lessening the eddies set up by the contact of the streams of air with the edge of each passage, the result of such eddies being to retard the forward movement of the projectile.

As shown in Figs. 1 and 2, each blade is provided, in the peripheral region, with a certain number of parts which are turned over, longitudinally, on either side of the blade (9, 10 for blade 1; 11, 12 for blade 4). The overturned portions are preferably tapered off, as shown, and are designed so as to prevent eddies.

By means of these multiple folds, it is possible, with a smaller number of blades as compared with the earlier models, and therefore with a smaller lateral and longitudinal stabilizing surface, to obtain the same stabilizing effect as before, the overturned parts constituting peripheral surfaces which, owing to the velocity of the projectile, operate in a zone of high stabilizing action.

It may be mentioned here that the folded parts 9, 10, 11 and 12 displace the stabilizing action in the direction of the periphery of the blading, without, however, retarding the projectile to the exaggerated degree that would result from the employment of a complete crown or arch, as has already been proposed for certain types of bladed projectiles. Moreover, the bent portions 9, 10, 11, 12 serve for the attachment of the additional charges, such as 13, 14, 15, which can thus be secured on both sides of each blade, so that a maximum number of additional charges can be mounted with a minimum number of blades. It is for this reason that the device shown, comprising only six blades, enables six additional charges to be attached, instead of four in the case of certain earlier models which, nevertheless, comprised eight blades. An important increase of range is thus practicable. Each blade may also be made relatively thick, thereby offering greater resistance to deformation without affecting the weight of the projectile.

In another embodiment (Fig. 5) of the invention, the blades 16 are provided with passages 18 of suitable shape for the attachment of the additional charges indicated by the dotted lines. This last type of blading is more particularly intended for projectiles of small calibre and low velocity, in which the surfaces of peripheral stabilization may be omitted without inconvenience, since, in this case the entire surface of the blades is situated in the really effective zone of action.

The free edges of the blades are rounded off as shown at 20, 21 (Fig. 1) or 22 (Fig. 3), to facilitate handling the projectiles and their conveyance, if desired, in the gunners' pouches.

The modified form of perforation 18' shown in Fig. 4 enables the additional charges 23, 24 to be placed in one or other of the two opposite positions indicated by dotted lines at 23 (Fig. 5) and 24 (Fig. 6). The additional charges may also be disposed across the blades, at 25, 26, as shown in Fig. 7.

It is self-evident that the present devices have been described and represented solely by way of explanation, and without being restrictive, and that various structural modifications may be introduced therein without departing from the spirit and scope of the invention as defined in the appended claims.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A projectile for smooth bore guns, comprising a body, a plurality of stabilizing blades mounted at the rear of the body, each blade comprising at least one perforation, and propulsion charges each extending through the perforation of at least one blade and held in position by the walls of said perforations.

2. Projectile for smooth bore guns, comprising a body, a plurality of stabilizing blades mounted at the rear of the body, each blade comprising at least one perforation, and a plurality of propulsion charges each of which is located in the perforation of a blade and extends for substantially equal distances at each face of the blade and is maintained in position by the wall of said perforation.

3. Projectile for smooth bore guns, comprising a body, a perforated tubular tail fastened at the rear of the body, a primary propulsion charge in said tail, a plurality of radial stabilizing blades disposed uniformly about the periphery of said tail, each blade comprising at least one perforation, and oppositely and peripherally folded portions at its free edge for producing a substantially uniform stabilizing action, and a plurality of auxiliary propulsion charges located between the blades in alignment with said blade perforations and held in place between said blades by the folded portions thereof.

4. Projectile for smooth bore guns, comprising a body adapted to fit the bore of the gun, a perforated coaxial tubular tail fastened at the rear of the body, a primary propulsion charge in said tail, a plurality of stabilizing blades attached to said tail and disposed uniformly about the axis of the body and tail and extending substantially radially between perforations thereof and having their outer edges of diameter not greater than the diameter of said body, each blade having

at least one perforation therethrough for permitting the passage of propulsion gases at the moment of firing whereby to eliminate inequalities of pressure on the two faces of each blade and thus prevent its deformation, each
5 blade also having at least one pair of oppositely directed peripherally extending portions at the free edge and of diameter not greater than the diameter of said body for compensating the loss of operating area due
10 to said blade perforation, and a plurality of additional propulsion charges extending into the perforations of two adjacent said blades and held in position by adjacent said peripheral portions thereof.

15 In witness whereof I have hereunto set my hand.

EDGAR WILLIAM BRANDT.

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