

PATENT SPECIFICATION

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DRAWINGS ATTACHED



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(54) FIN ASSEMBLY FOR FIN-STABILISED PROJECTILES

(71) We, OY TAMPELLA AB, a Finnish Company of Tampere, Finland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a fin assembly for fin-stabilised projectiles, particularly for fin-stabilised launcher grenades and the like.

The fins on fin-stabilised mortar grenades and the like generally have a tubular carrier, from whose circumferential surface the fins, extending parallel to the axis of the carrier tube, extend radially. The number of fins varies from eight to ten over the circumference of the carrier tube. Generally, the fins have a cross-sectional surface which tapers in an outward direction; the fins, seen in cross-section, can be provided with a thickened portion at the outer end. The lateral surfaces at the fins are flat. The contour of the lateral surface of the fins is designed in a number of ways, so that the fin surface projects forwards relative to the outer fin edge. Attempts have been made to obtain certain aerodynamic effects by placing incisions in the shoulder surface, which is raised in a forward direction. No effective or appreciable improvement in the aerodynamic properties of the fins or of the projectile fitted with these fins is obtainable with known fin constructions.

The object of the invention is to make a fin assembly for fin-stabilised projectiles, particularly for fin-stabilised launcher grenades and like projectiles, the design of which ensures increased strength of the fins on the one hand, and stabilising aerodynamic properties on the other. The fin assembly according to the invention, comprises a carrier tube from which fins extend radially, the cross-sectional surface of said fins being formed so as to taper outwards, and the side surfaces of the fins being equipped with radially-alternating hollows and ridges extending parallel to the longitudinal axis of the carrier tube.

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Such a design of the cross-section of the fin has a particular kind of undulating contour, enables increased robustness of the fins, particularly at the outer zones. The pin becomes more resistant, so that it is sure to withstand the high-pressure combustion gases generated during firing, without being deformed. At the same time the longitudinally-extending ridges and hollows on the side surfaces of the fins have a stabilising effect on the gas and air flow. There are provided for these gas and air currents guide-paths which direct the flow along the fin assembly axis. This results in a stabilising effect not only for the fins but also for the air or gases flowing past the fins. The occurrence of vibrations in the airflow and on the fins is securely avoided. Any vibrations already in existence are transferred into undisturbed paths. The greater robustness and resistance of the fins, in conjunction with the stabilising action on the gas or air flow has advantageous results on the trajectory of the projectile while still in the barrel and during its flight. The projectile's trajectory is stabilised, so that the projectile leaves the barrel in a stable condition, and flies along a stable and undisturbed trajectory.

Preferably, each fin has a shoulder portion extending over at least half the fin length from a forward rounded portion, the ridges and hollows only beginning at a predetermined distance from the frontal shoulder portion. Such extreme backward-extending increase in the fin height results in considerably improved gas or air flow contributing to prevention of the occurrence of vibration on the fins. In this way, the resistance and robustness of the fins is additionally increased. Further, the fins can extend inwards and backwards from their maximum height at a gentle slope; the hollows and ridges on the sides of the vanes can in this case terminate at a distance from the rear edge of the vane.

Seen in cross-section, the hollows are advantageously formed as recesses, extending

in a slow curve, which are appropriately in close juxtaposition, so that the ridges are simply crest lines between adjacent hollows. The width of the hollows should be relatively large, so that it is sufficient if only a few hollows, e.g. three of this type, are distributed over the height of the vane. The carrier tube may be shorter than the fin length; the fins can project at both ends beyond the carrier tube.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawing, in which:—

Fig. 1 shows a fin assembly for fin-stabilised projectiles according to the invention, diagrammatically, partly in elevation and partly in section.

Fig. 2 shows diagrammatically the fin assembly in Fig. 1 in the direction of arrow II—II, partly in elevation and partly in section.

Fin assembly 1 has a carrier tube 2 for mounting on the tailpipe of a fin-stabilised projectile and a number of fins 3, eight fins in the example shown, which extend radially from the circumference of the carrier tube 2. Each fin 3 is provided on its side surface with hollows 4, 5 and 6 extending parallel to the carrier tube's longitudinal axis, and ridges 7 and 8 between said hollows. The fin 3 itself has a frontal shoulder portion 9, which extends outwards and sharply backwards from a short forward rounded portion 10. The frontal surface 9 extends over at least half and as far as three-quarters of the fin length. There follows a relatively short edge 11 defining the greatest height of the fin and which extends parallel to the longitudinal axis of carrier tube 2, whence the fin edge extends height inwards and backwards in a gentle slope 12 to the rear end of the fin. At both ends, the fin projects beyond the length of carrier tube 2 by a determined proportion. At the rear end, fin 3 is provided with an oblique portion 13 extending to the carrier tube 2.

Seen in cross-section, hollows 4, 5 and 6 are of a shallow arcuate form, the intermediate ridges 7 and 8 being substantially the crest lines of the juxtaposed shallow arcs. The outer ridge 14 may be kept slightly wider. More than three hollows may also be provided on each side of fin 3, e.g. four to six hollows. The width of the hollow may not be less than a certain proportion, so that aerodynamic effect of direction of the passing gas or air flow is not impaired. It is appropriate to have the number of hollows restricted to a few of relatively large width in relation to the fin height. The hollows advantageously begin and end at a predetermined distance from the forward edge 9 and the rear edge 3, re-

sulting in improved resistance of the fin itself.

Seen in cross-section, the fins 3 extend slowly towards the forward shoulder surface 9 in a slight wedge shape, the side surfaces of fin sections 3a, seen in cross-section, tapering sharply and extending in an arcuate form. The portion 3b of the fin projecting beyond the length of the carrier tube 2 may likewise taper backwards. Seen in cross-section, the fins may taper outwards to a predetermined degree. The carrier tube and the fins may be integral with one another. Fin assembly 1 advantageously consists of a light metal alloy.

WHAT WE CLAIM IS:—

1. A fin assembly for fin-stabilised projectiles, comprising a carrier tube from which fins extend radially, the cross-sectional surface of said fins being formed so as to taper outwards, and the side surfaces of the fins being equipped with radially-alternating hollows and ridges extending parallel to the longitudinal axis of the carrier tube.

2. A fin assembly according to claim 1, wherein each fin has a shoulder portion extending over at least half of the fin length from a forward rounded portion.

3. A fin assembly according to claim 1 or 2, wherein the edge of each fin extends from its maximum height in a backward direction, and at a gentle inclination, and the hollows and ridges end at a predetermined distance from the rear edge of the fin.

4. A fin assembly according to any one of claims 1 to 3, wherein the hollows seen in cross-section, are formed as shallow arcuate recesses, and the ridges are crest lines between adjacent hollows.

5. A fin assembly according to any one of claims 1 to 4, wherein the section of each fin, seen in longitudinal section, has slowly tapering sections at the front and rear.

6. A fin assembly according to any one of claims 1 to 5, in which three to six hollows are distributed over the height of each fin.

7. A fin assembly according to any one of claims 1 to 6, wherein the carrier tube is shorter than the length of each fin and each fin extends beyond the carrier tube at both ends.

8. A fin assembly for fin-stabilised projectiles, substantially as hereinbefore described with reference to the accompanying drawing.

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