Feb. 17, 1959 G. A. LYON 2,873,674

BOMB TAIL CONSTRUCTION

Filed Dec. 11, 1953

Fig. 1

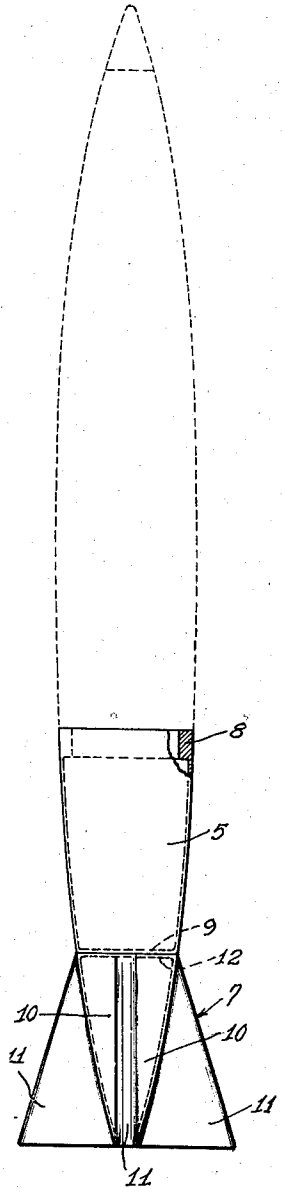


Fig. 2

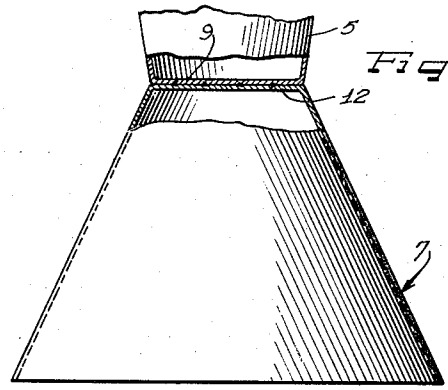


Fig. 3

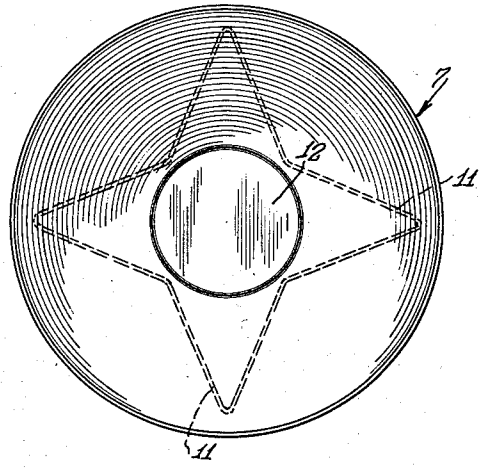
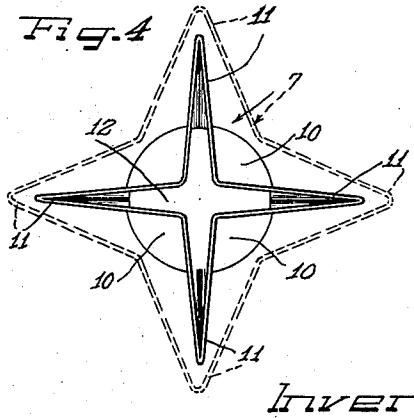


Fig. 4



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2,873,674

BOMB TAIL CONSTRUCTION

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1 Claim. (Cl. 102—2)

The present invention relates to improvements in aerial bombs for military use and more particularly relates to streamlined bombs of the low drag type.

Heretofore in bomb construction it has been customary to produce the various tubular portions of the bomb from a plurality of assembled parts, or from flat material bent into tubular shape and butt-welded along the meeting edges. Especially in the tail structure, including the guide fins has presented considerable problem in construction, usually consisting of a plurality of fin members attached to a tail piece or to fin spars assembled in the desired tail formation.

An important object of the present invention is to effect substantial reduction in the number of individual parts going into the structure at the tail end portion of an airplane-type aerial bomb.

Another object of the invention is to provide a tail fin and spar structure of improved construction.

A further object of the invention is to provide an improved method of making a combined tail fin and spar structure for aerial bombs from a single piece of material.

Still another object of the invention is to provide an improved rear end assembly for aerial bombs.

It is another object of the invention to provide an improved method of making a rear end assembly for aerial bombs.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a small scale, more or less schematic illustration of a low drag aerial bomb embodying features of the present invention;

Figure 2 is a larger scale fragmentary side elevational view, partially in section, showing the cone skin or rear chamber portion of the bomb and the tail section of the bomb before formation of the tail section into fin and spar form;

Figure 3 is a rear end view of the tail member of Figure 2; and

Figure 4 is a rear end view of the tail member following collapsing and shaping thereof into fin and spar form.

A low drag bomb, as shown in Fig. 1, embodying the present invention comprises a bomb head shown in phantom outline in Fig. 1, to which is attached a rear chamber or cone skin portion **5** carrying a finned tail portion **7**. The entire assembly is of generally cigar-shape, streamlined elongated construction to afford minimum wind resistance when launched from a high speed bombing plane.

In a preferred construction, the rear chamber or cone skin portion **5** comprises a generally conically, truncated shell which is adapted to be drawn in one piece from suitable rolled metal slab such as steel of appropriate grade and gauge. At its forward, wider mouth portion, the member **5** is provided with an internally thickened

annular shoulder collar portion **8** which may be threaded or otherwise machined for assembly with other components of the bomb included in or as a part of the rear end of the bomb head member. From the mouth of the member **5** it tapers toward a rear end or base wall **9** which may provide a bulkhead or partition, or part of such a bulkhead or partition between the member **5** and the tail section or structure **7**.

According to the present invention, the tail structure **7** is also, at least primarily, constructed from a single piece of material such as suitable grade and gauge steel, finally shaped to provide a rearwardly tapered tail spar portion **10** and a uniform series of tail fins **11** which project radially to a sufficient extent beyond the main diameter of the bomb to serve effectively in guiding the bomb head-on in flight.

In making the tail section **7**, the metal blank from which it is fabricated is first shaped by any suitable method such as press-drawing into substantially frusto-conical shape substantially as shown in Figs. 2 and 3 to provide a flaring rearwardly opening side wall and a forward smaller diameter end wall **12**. In a preferred form, the end wall **12** may be of substantially the same diameter as the cone skin end wall **9** and disposed in face to face concentric abutment therewith and welded or otherwise secured thereto whereby to cooperate in providing a double thickness bulkhead or partition. It will be understood, of course, that the end walls **9** and **12**, may be secured together while the tail member is still in the generally bell shape shown in Figs. 2 and 3 or assembly may be effected following final shaping of the tail member.

From the generally bell shape, the tail member **7** is symmetrically contracted along longitudinal lines into generally starshape cross-section as shown in dash outline in Figs. 3 and 4. The points of the star formation provide the vanes **11**, with the points of the star provided by longitudinally extending ribs having their rear extremities drawn in only a short distance from the original rear end perimeter as occasioned by necessary contraction resulting from the substantially inwardly pressed portions of the member intermediate the fin ribs. In completing the fin formation, the portions intermediate the fin ribs are contracted toward one another until the rear end extremity portions thereof are in close proximity concentrically about the axis of the member and defining therebetween a diameter which is only a fraction as great as the front end diameter of the tail member. Moreover, during the final contraction, the material between the fin ribs is fashioned to provide generally lance-head shaped, outwardly convex, complementary segmental reinforcing and bracing panels providing the struts **10**. The relationship of the struts **10** and the sides of the fin ribs **11** is such as to maintain the collapsed fin rib side walls substantially against spreading apart. This result is attained substantially by virtue of the rigid structure of the strut panel portions **10** and the rigid manner in which they extend from the base wall **12**. As will be noted on comparison of Figures 1 and 4, the panels **10** are of greatest width at their junctures with the base wall **12** and are substantially rigidified by being on a peripheral curve at their juncture with the base wall while the panels **10** converge toward the rear end of the tail construction. By preference the external shape of the struts is complementary to the external taper of and coactive in general continuation of the longitudinal taper line of the cone skin member **5**, as best seen in Fig. 1. In the completed tail fin member **7**, the rear extremities of the fins may be closed off or may be left open as desired.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

In a bomb structure, a cone skin shell member of substantially cup shape having a rear wall and a side tubular wall projecting forwardly therefrom on a symmetrical taper and having forward end means for attachment to a body shell, and a generally cup-shaped tail fin member comprising a one-piece sheet metal structure having a forward base wall attached concentrically to said cone skin shell base wall, said tail fin member having an elongated rearwardly projecting side wall collapsed toward the axis of the tail member and providing radial fins projecting substantially beyond the diameter of said tail fin member end wall and converging thereto, with generally lance-shaped segmental intermediate strut portions converging rearwardly from the diameter of said end wall

and maintaining the fins against spreading open, said segmental strut portions conforming symmetrically to the taper of the cone skin shell to effect a streamlined relationship toward a point of convergence beyond the rear end of the assembly.

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