Dec. 19, 1939. C. F. LAMBERT 2,184,145

BOMB TAIL

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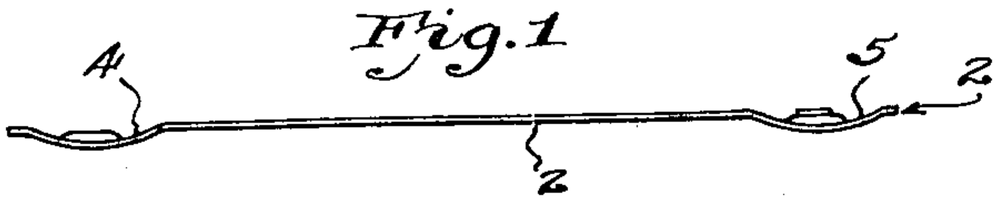
Fig. 1



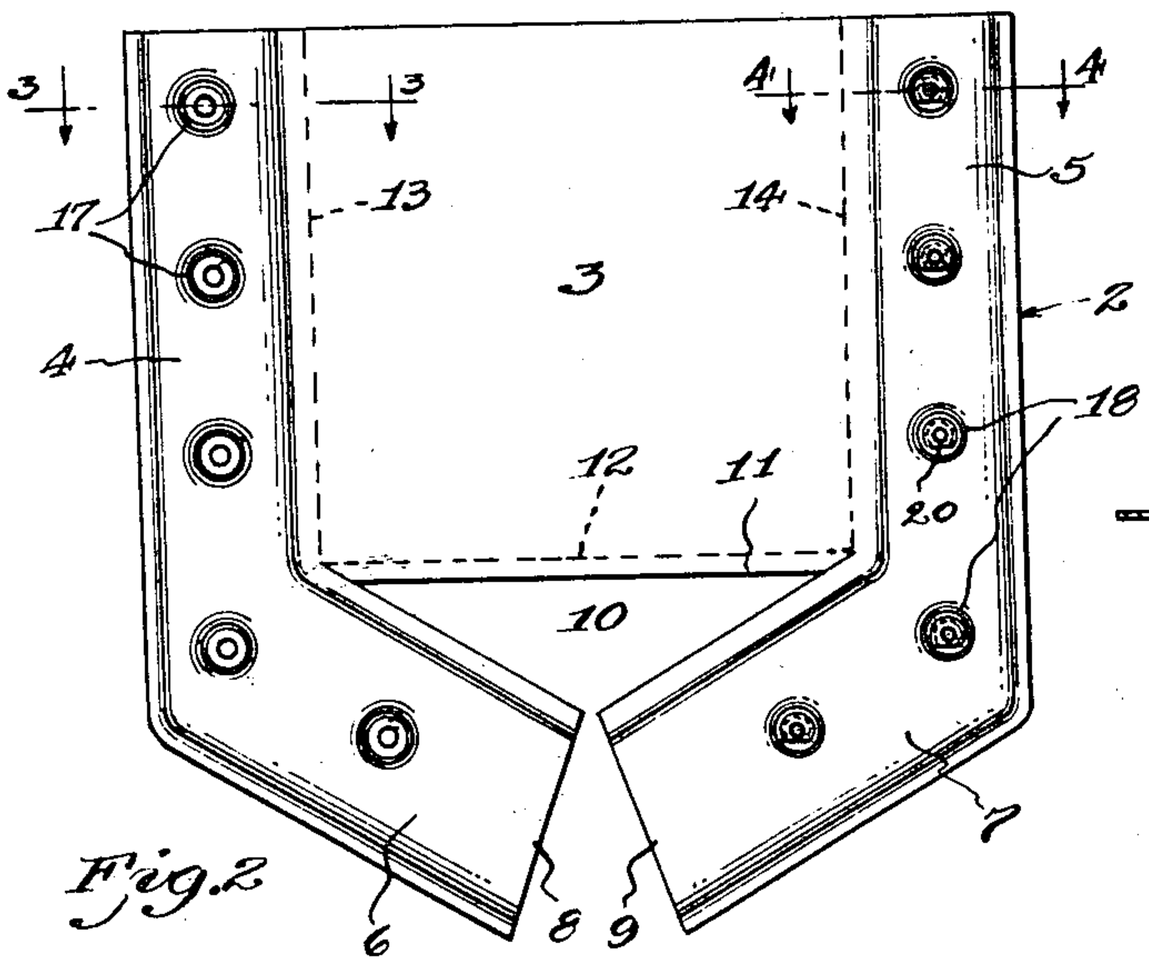


Fig. 2

Fig. 3

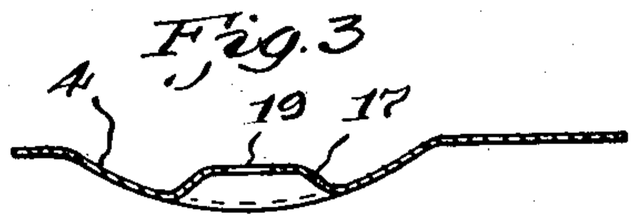


Fig. 4

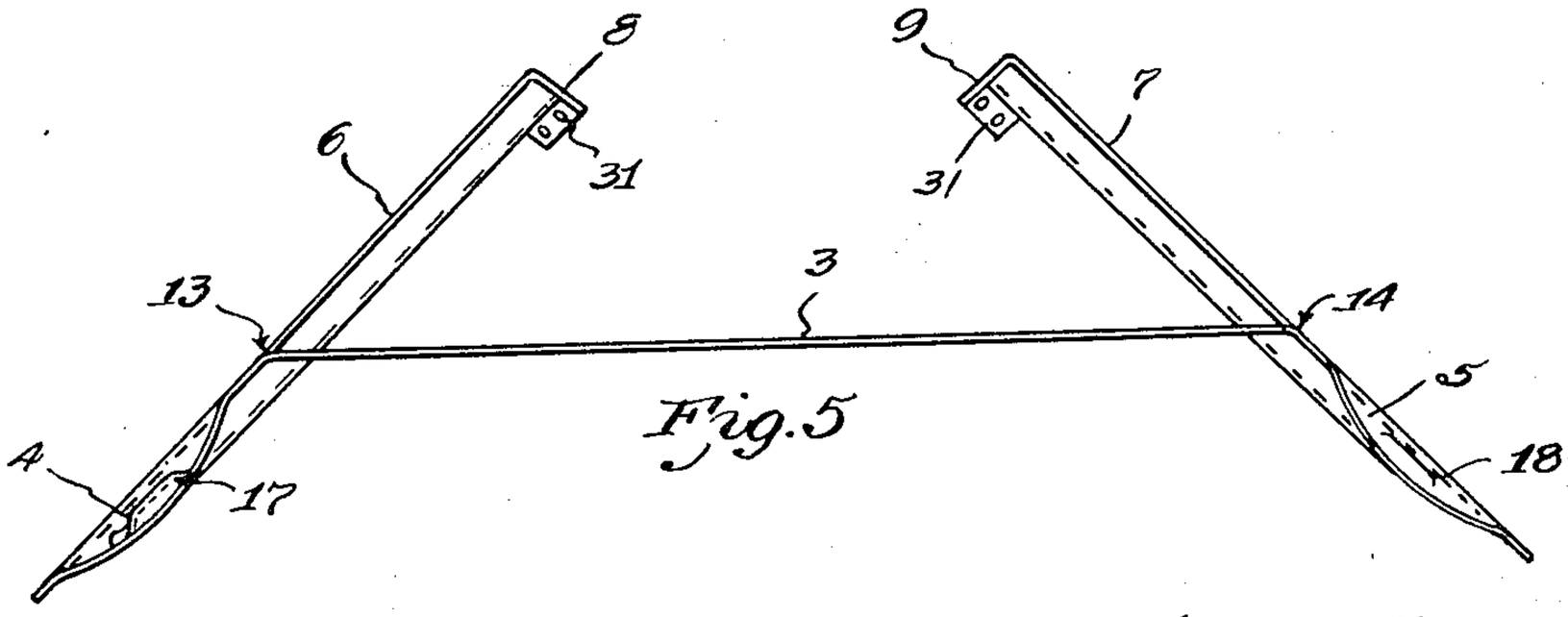


Fig. 5

Fig. 6

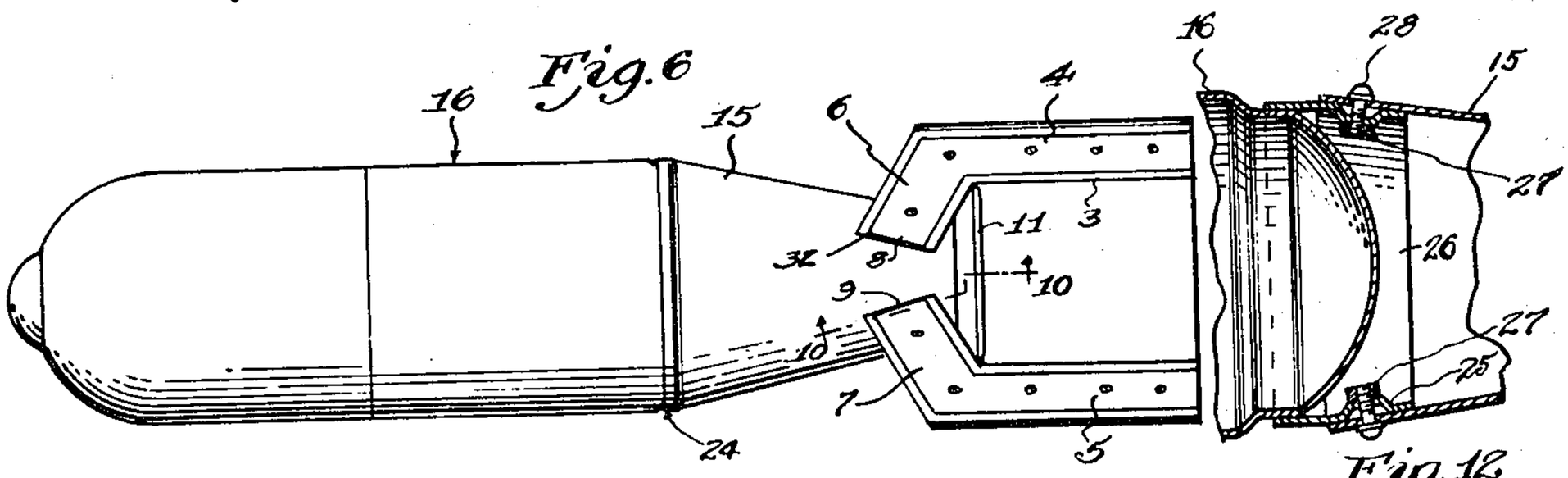


Fig. 12

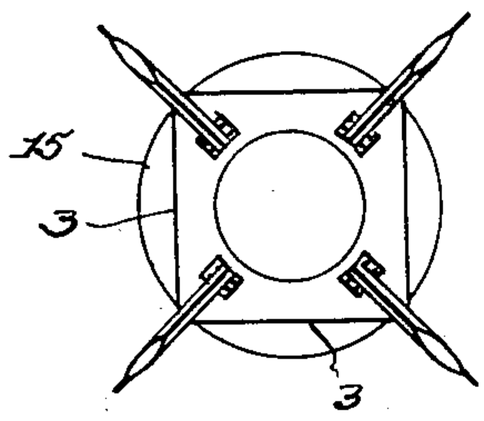


Fig. 7

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Fig. 8

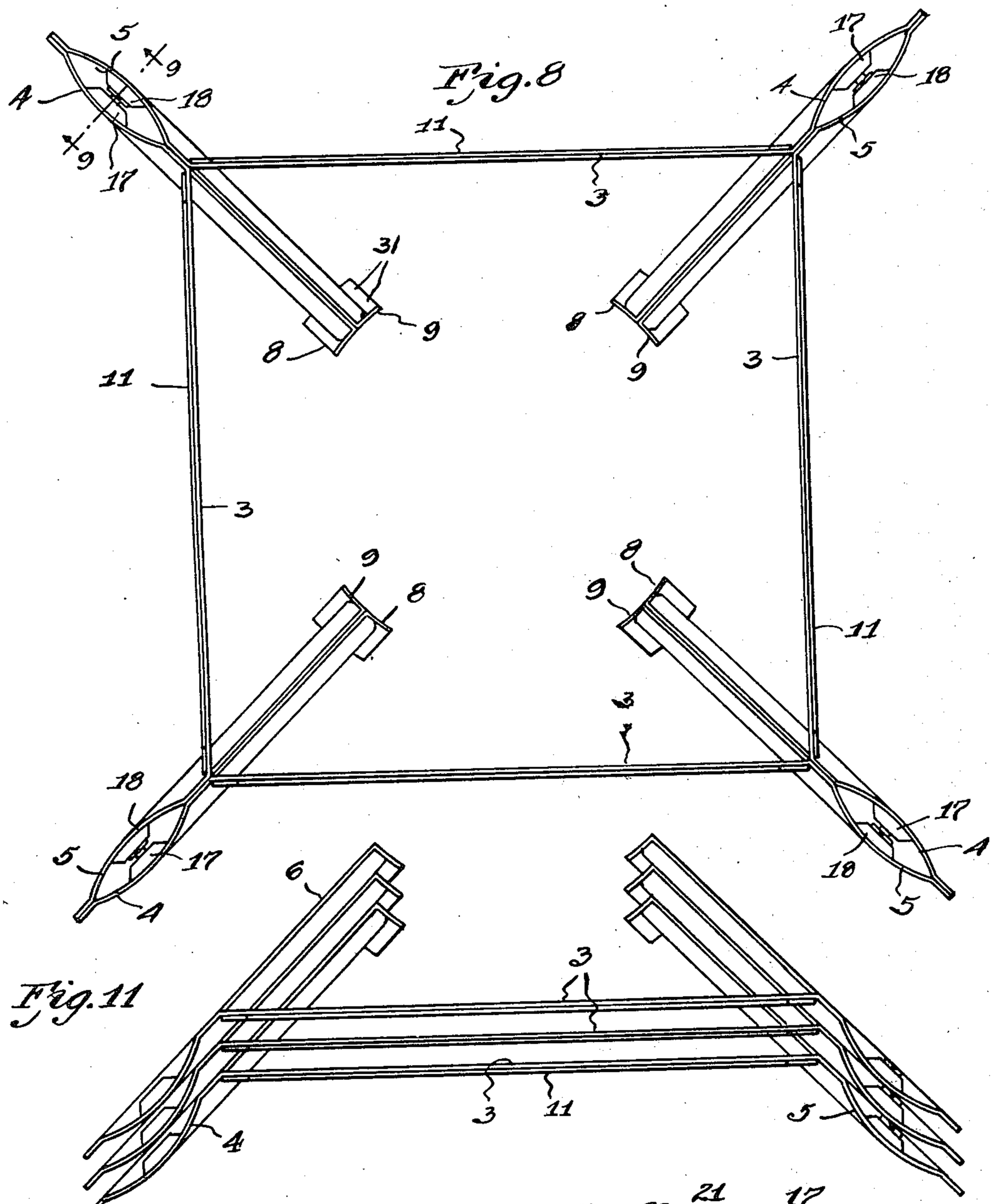

Fig. 11

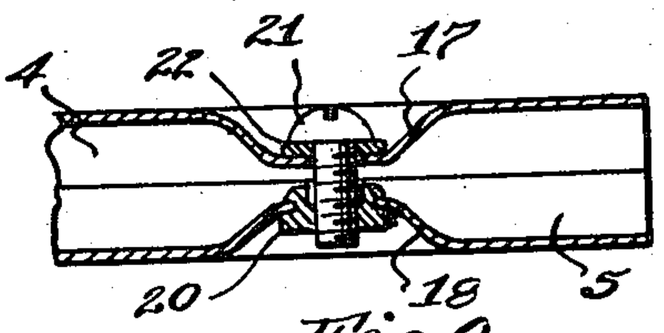

Fig. 9

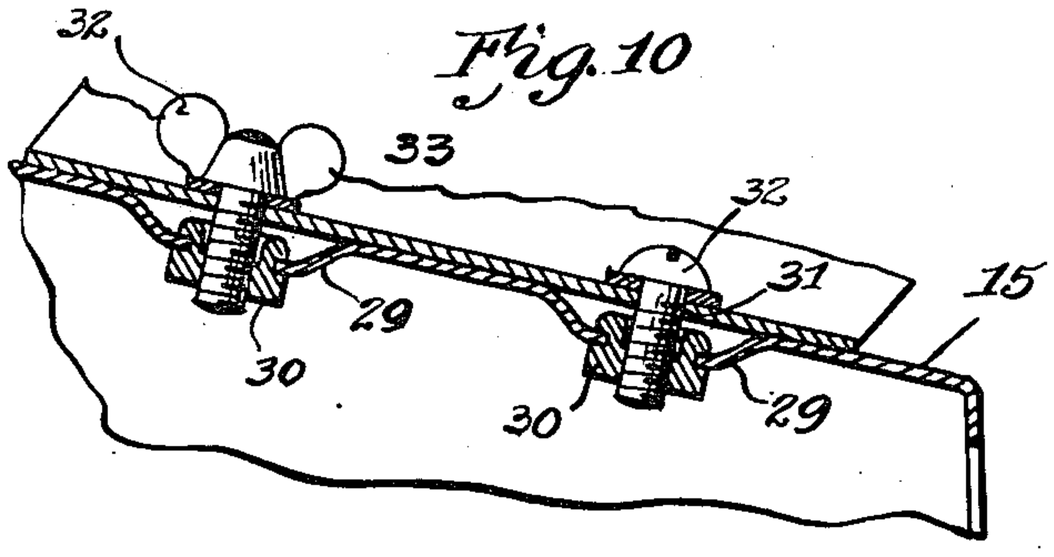

Fig. 10

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UNITED STATES PATENT OFFICE

2,184,145

BOMB TAIL

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Application January 22, 1936, Serial No. 60,161
Renewed October 20, 1939

11 Claims. (Cl. 102—2)

This invention relates to a bomb tail and more particularly to a knock-down bomb tail assembly.

Heretofore it has been the practice to weld the bomb tail housing and the tail vanes as an integral part of the bomb. The stowage of the complete bomb, including the tail assembly as an integral unit, has presented a serious problem not only in the space such complete assembly takes in bomb stowage ammunition depots and aboard airplane carriers or other battleships but also in the size of the heavy magazine compartment used for stowing the bomb units.

It is an object of the present invention to provide a bomb tail assembly, or what may be termed a "knock-down assembly" whereby the parts forming the tail assembly may be nested so as to materially reduce the overall space heretofore necessary for the stowage of the complete bomb unit. Bomb stowage space in heavy armour plate magazines is at a premium whether on board ship or in ammunition depots; by nesting the "knock-down" parts making up the tail assembly, in the manner herewith disclosed, it is possible to materially reduce the size of the armour plate magazine compartments, or greatly increase the number of bomb units that may be stowed in the compartments now in use. Other features have to do with the fabrication and manner of attaching the bomb tail housing; the fabrication, manner of nesting and manner of assembly of the bomb tail vanes to provide a sturdy, easily assembled unit; and other specific details and assembly features as will be more clearly set forth in the specification and claims.

In the drawings:

Fig. 1 is an end view of one of the bomb tail vanes in the first step of its fabrication.

Fig. 2 is a plan view of the vane shown in Fig. 1.

Figs. 3 and 4 are sectional views taken on lines 3—3 and 4—4 of Fig. 2, respectively.

Fig. 5 is an enlarged end view, similar to Fig. 1, but showing the forward legs of the vane bent to final shape.

Fig. 6 is an elevation of a bomb unit showing the tail vanes detachably secured to the tail housing.

Fig. 7 is an end view of the bomb unit shown in Fig. 6 and illustrating particularly the arrangement of the tail vanes to form the complete tail vane structure.

Fig. 8 is an enlarged detail view showing the vane parts assembled together to form the complete tail structure.

Fig. 9 is a sectional view taken on line 9—9 of Fig. 8 illustrating the method of securing two of the tail vanes together and the method of streamlining.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 6 illustrating one manner of removably securing the tail vanes to the tail housing.

Fig. 11 illustrates the method of stacking the tail vanes together.

Fig. 12 is a fragmentary sectional view illustrating the preferred manner of detachably securing the tail housing to the bomb proper.

The main features of the bomb tail structure as embodied in the present invention, as distinguished from vanes of the prior art welded directly to the tail housing, are compactness, strength, and ease of assembly. The design of the tail vanes is such that they may be stowed in a comparatively small space as compared to the space required for an assembled vane, and this structure, which permits easy nesting, also insures an extremely sturdy tail vane structure when assembled.

My knock-down tail vane is preferably formed from four pieces of metal each stamped out and fabricated identically. In Figures 1 and 2, I have illustrated the first step of stamping out the tail vane, which may be generally designated 2; and this first stamping preferably takes the form of a flat web or reinforcing portion 3, a channel portion 4 on one side of the web and a channel portion 5 on the other side of the web, and leg members 6 and 7, extending inwardly and terminating in attaching flanges 8 and 9. A portion between the web 3 and the legs 6 and 7 is cut away to leave a triangular opening 10. In further fabricating this sheet metal vane, the front edge 11 is turned over along the dotted line 12 so as to reinforce the web, and the side sections including the channel 4 and the leg 6 and the channel 5 and the leg 7 are bent along lines indicated by the dotted lines 13 and 14.

The manner of bending the side sections about the lines 13 and 14 is best illustrated in Fig. 5, where the entire side sections are bent, as a plane, to an angle of about 45° relative to the web portion 3; the attaching flanges 8 and 9, being preferably formed in arcuate shape so as to cooperate with the conical shape of the tail housing 15, of the bomb unit 16.

Fastening portions 17 are stamped out along the channel 4, and fastening portions 18 along the channel 5. The fastening portions 17 are merely struck-up embossed portions with an aperture 19 adapted to receive a bolt; and the fastening portions 18 are similarly struck-up embossed portions but are provided with clinch-on

nuts 20 of any standard type. As best shown in Figure 2 the clinch-on nuts may be of the plain D type, but it will be sufficient here to state that any type of clinch-on nut may be used which is adapted to be clinched into place in an aperture so as to be prevented from rotating.

As above stated, all the tail vanes are constructed exactly as shown in Figure 5 with the result that the angularly extending leg portions 6 and 7 of respective vanes may be matched together and easily assembled, as best shown in Figure 8, whereby the respective web portions 3 form a square. The respective reinforcing channels 4 and 5 of adjacent tail vanes will be accurately matched together by the registering of the attaching portions 17 with attaching portions 18, as best shown in Figure 9. The embossed portions 17 and 18 are of such depth that the head of a bolt 21 when inserted through a lock washer 22, and engaged in the clinch-on nut 20, will lie beneath the plane or contour formed by the matched portions 4 and 5.

The conical tail housing 15 may be welded to the bomb proper 16 as at 24, or preferably as shown in Figure 12, the tail housing 15 may be removably secured to the bomb by forming a series of punched embossed portions 25, around an extension member 26, on the bomb. These embossed portions 25 may be provided with clinch-on nuts 27. The enlarged end of the housing 15 may be provided with a series of apertures adapted to match with the embossed portions 25 and to receive bolt members 28.

As best shown in Figure 10, the smaller end of the housing 15 is provided with a plurality of apertured embossed portions 29 fitted with clinch-on nuts 30 and the embossed portions 29 are so positioned and arranged that when the assembled bomb tail such as shown in Figures 6, 7 and 8 is moved over the end of the housing 15, the apertures 31 in the members 8 and 9 will register with the embossed portions 29. It will thus be obvious that it will be an easy matter to insert a slotted bolt 32 or a wing bolt 33 through the apertures 31 into threaded relationship with the clinch-on nuts 30.

It will thus be seen that the tail vanes which form a considerable part of the bomb unit as a whole, may be fabricated from four identical parts, all made from the same die, such as shown in Figure 5. These parts, forming the tail vanes, may be nested together and stowed in armour plate magazines, and, as illustrated in Figure 11, at least sixteen of these members may be stacked in the same space required for one assembled tail member such as shown in Figure 8. In assembling the vanes preparatory to placing the bomb in a bomb carrier, it will be an easy matter to assemble the various elements, such as shown in Figure 8 and insert the bolts in position by means of a screw driver or other tool. The matched channel members 4 and 5, held together by the bolts 21, together with the reinforcing webs 3, will produce a very strong and rigid structure which will withstand the terrific wind pressure encountered when airplanes are traveling 150 miles per hour and over.

The assembled bomb tail unit when moved over the end of the housing 15 is rigidly secured to the housing by passing bolts through apertures 31 in the members 8 and 9 and threaded into the clinch-on nuts 30 of the tail housing 15. When the separate bomb tail is used such as shown in Figure 12, this may be first secured to the bomb in the manner illustrated in Figure 12. When separate bomb tail housings 15 are utilized, it will be seen that these may be nested together in much the same manner as the tail vanes, so that the complete bomb tail assembly parts may be so nested that at least four knock-down assemblies may be stowed in the same space formerly required for one bomb tail unit formed as an integral part of the bomb.

It will be seen that the annular formation of the side walls 6 and 7 of each individual vane, and the annular formation of the walls of the tail housing 15 is not only conducive to nesting of the parts in a very compact space, but when nested together, this annular formation of the nested parts adds materially in maintaining the parts in their stowed position. It will also be seen that because of the design of the individual vane units, as best shown in Figures 5 and 8, the channel portions and web portions all cooperate to form an unusually strong assembly structure.

What I claim is:

1. A knock-down bomb tail assembly, comprising four vane members, identically fabricated, each having a web portion and vane side walls formed angularly thereto and extending from both sides thereof, whereby the individual vane members may be nested to conserve space, and fastening means for securing the similar vane side walls together as an integral unit and to a bomb housing.

2. A knock-down bomb tail assembly, comprising four vane members, each having a web portion and vane side walls formed angularly thereto, whereby the individual vane members may be nested to conserve space and a tail housing removably secured to the bomb proper, fastening means for securing the vane members together as an integral unit and to the tail housing, and depressions in said vane members for receiving and positioning said fastening means.

3. A knock-down bomb tail assembly, comprising four sheet metal vane members, each having a web portion and vane side walls formed angularly thereto and extending from both sides thereof, whereby the individual vane members may be nested to conserve space and a tail housing removably secured to the bomb proper, and fastening means for securing the vane members together as an integral unit and to the tail housing.

4. A knock-down bomb tail assembly, comprising four vane members, each having a web portion and vane side walls formed angularly thereto, whereby the individual vane members may be nested to conserve space, and fastening means for securing the vane side walls together as an integral unit and to a bomb housing, the fastening means in one vane side wall comprising clinch-on nuts adapted to receive bolts inserted through the side wall of an adjacent vane.

5. A knock-down bomb tail assembly, comprising four vane members, each having a web portion and similar vane side walls formed angularly thereto, whereby the individual vane members may be nested to conserve space and a tail housing removably secured to the bomb proper, and fastening means, some of which are in the form of clinch-on nuts, for securing the vane members together as an integral unit and to the tail housing.

6. A bomb tail assembly comprising a plurality of vane members, each vane member comprising a web portion and channel side portions, the channel side portions of adjacent vane members

being fastened together to form an integral tail assembly.

7. A knock-down bomb tail assembly comprising a plurality of vane members, each vane member comprising a web portion and channel side portions, the channel side portions of adjacent vane members being fastened together to form an integral tail assembly, said channel side portions being formed at an angle relative to the web whereby the vane members may be nested together to reduce stowage space.

8. A knock-down bomb tail assembly, comprising a plurality of vane members, each having a web portion and vane side walls formed angularly thereto, whereby the individual vane members may be nested to conserve space and a tail housing removably secured to the bomb proper, and fastening means for securing the vane members together as an integral unit and to the tail housing, one vane side wall in each vane member being provided with clinch-on nuts receiving fastening means inserted through apertures in an adjacent vane side wall.

9. A knock-down bomb tail assembly, comprising a plurality of vane members, each having a web portion and vane side walls formed angularly thereto, whereby the individual vane members may be nested to conserve space and a tail housing removably secured to the bomb proper, and fastening means for securing the vane members together as an integral unit and to the tail housing, one vane side walls in each vane member being provided with clinch-on nuts receiving fastening means inserted through apertures in an adjacent vane side wall, and clinch-on nuts formed as a part of said tail housing for receiving fastening means carried by the vane members.

10. A knock-down bomb tail assembly, comprising four vane members, each having a web portion and vane side walls formed angularly thereto and extending in opposite directions therefrom, whereby the individual vane members may be nested to conserve space, and fastening means for securing the vane members together as an integral unit and to a bomb housing.

11. A knock-down bomb tail assembly, comprising four vane members, each having a web portion and similar vane side walls formed angularly thereto, whereby the individual vane members may be nested to conserve space and a tail housing removably secured to the bomb proper, and fastening means for securing the vane members together as an integral unit and to the tail housing.

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