July 1, 1947. R. FINK ET AL 2,423,090

CONTROLLABLE GLIDING ATTACHMENT FOR BOMBS

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Fig 1

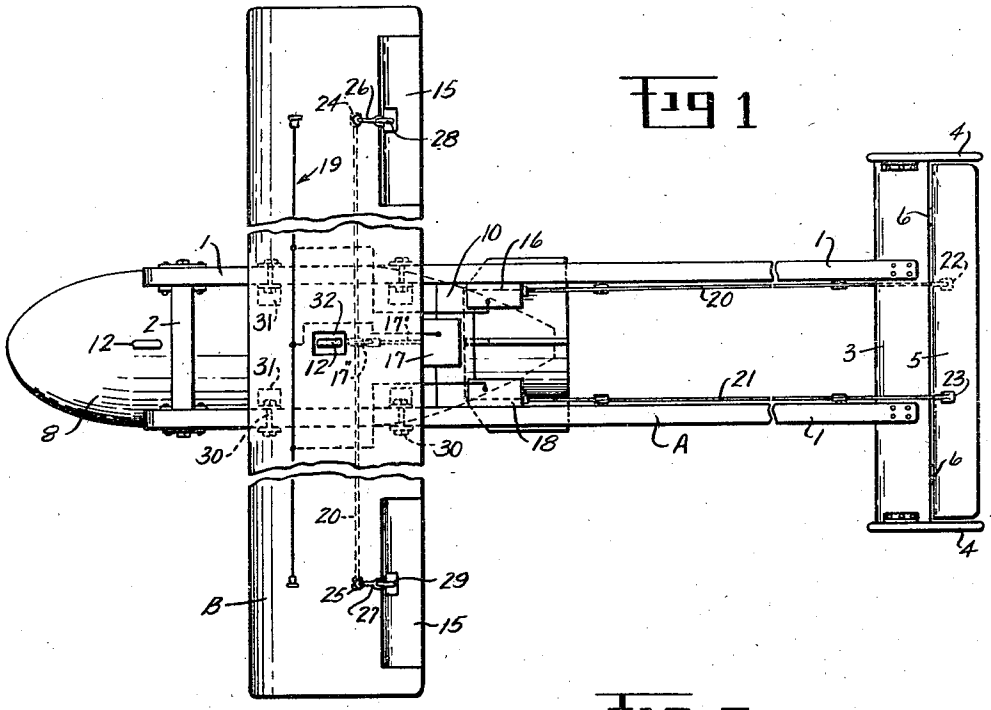
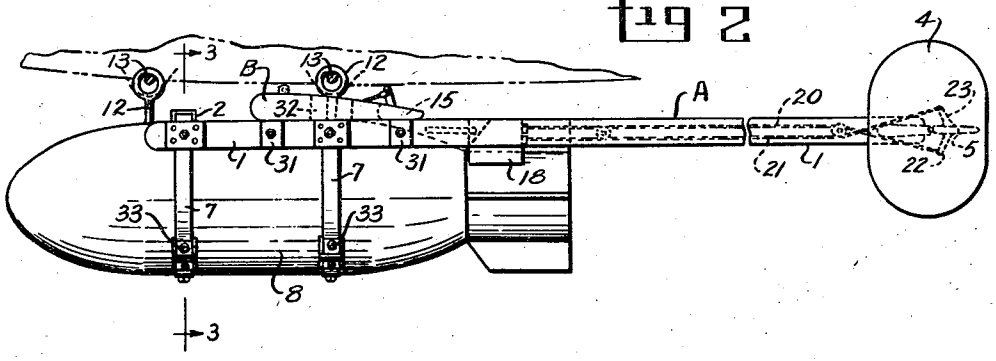


Fig 2



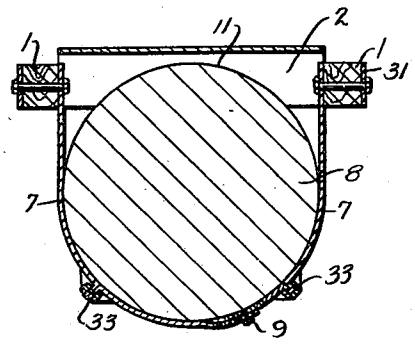


Fig 3

INVENTORS
GEORGE V. HOLLOMAN
RUDOLPH FINK
CHARLES L. PAULUS
By Joseph Ch. Hazell and Wade Hoon
ATTORNEYS

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CONTROLLABLE GLIDING ATTACHMENT FOR BOMBS

Rudolph Fink and George V. Holloman, Fairfield, and Charles L. Paulus, Dayton, Ohio

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1

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

Our invention relates to improvements in glide bombs, and more particularly, to the employment of detachable gliding means adapted to be secured to standard size bombs for converting the same into gliding bombs, and has for one of its objects, the provision of an inexpensive, compact, and readily storable gliding structure which may easily and quickly be assembled, and secured to a standard aircraft bomb.

Another object is to provide a gliding structure for bombs which is adapted to be made in units, such as a wing assembly, and a combined tail and bomb supporting structure, including flight control features, so that the same might not only be more economically manufactured, but may be more readily and conveniently packed for shipment and storage, and adapted to be quickly assembled for use, and easily secured to the bomb, without modification of the bomb or its supporting structure.

A further object is the arrangement of the gliding structure with respect to the supporting means on the side of a standard bomb and the releasable connections for securing the bomb to the bombing plane so that the gliding surface or wing member of the attachment will lie between the bomb and the lower surface of the wing of the bombing plane when the bomb is secured in the usual manner, and will be close to said latter surface.

A still further object is the provision, in a bomb supporting glider structure, of dirigible flight control members or surfaces, which may be operated by radiant energy such as light waves, radiant heat or infra-red rays, ultra-violet waves, electro-magnetic waves, sound waves, or other remote control radio frequency operated means, or by automatic control operating devices mounted on the bomb gliding attachment and arranged to control the glide of the bomb to a target after release from an aircraft.

Other and further objects and advantages of the invention will appear in the following specification, reference being had to the accompanying drawing, in which

Fig. 1 is a top plan view with our improved gliding attachment showing the same secured to a standard or conventional bomb.

Fig. 2 is a side elevation of the structure shown in Fig. 1, a portion of the aircraft supporting structure or wing for the bomb and the bomb

2

securing means thereon being shown in dotted line.

Fig. 3 is a vertical sectional view taken on the line 3—3 in Fig. 2.

Referring to the drawing, A indicates a supporting structure in the form of a relatively thin, rectangular frame, composed of longitudinal members or booms 1—1, secured together adjacent the front ends by the cross member 2. A cross member is secured to the rear ends of the boom member 1, as seen in Fig. 1 of the drawings, and is of a relatively thin section and constitutes a horizontal stabilizer member 3.

The stabilizer 3 extends laterally beyond the sides of boom members 1 and has secured thereto the vertical rudder members 4. An adjustable horizontal rudder 5 is secured at 6 to the stabilizer members 3 and extends between the two vertical rudders 4.

Depending from the lower face of the frame A, as seen in Figs. 2 and 3 are bomb securing means 7, consisting of straps or bands adapted to be clamped around a standard bomb, as indicated at 8. In order to make the device adaptable for bombs of different sizes or weights, we provide adjusting means, as indicated at 9, to vary the length of the strap members 7. A second cross member 10 is secured to the boom members 1 intermediate the ends of the frame A, and this cross member and the cross member 2 at the forward portion of said frame are recessed, as at 11, to receive the cylindrical surface of the bomb.

Referring generally to the bomb structure, which is conventional, this consists of an elongated body, somewhat tapered at its front and rear ends, with a cylindrical intermedial portion having supporting members 12 projecting therefrom, and designed to engage the customary bomb release supports or brackets 13 on the under side of the wing or other supporting structure of the plane.

The gliding surface for the bomb consists of a unitary wing member B, detachably secured to the upper face of the frame A opposite the bomb securing means 7. This wing unit is provided with aileron members 15 pivotally secured to the trailing edge of the wing in a somewhat conventional manner.

For the purpose of controlling the glide of the bomb from its released position to a target, we provide a plurality of radiant energy controlled devices indicated diagrammatically by 16, 17 and 18. These devices may be any well-known conventional type such as disclosed in Sperry Patent 1,792,537 or Hammond Patent 1,818,708

and are connected to any suitable conventional antenna or other radiant energy receiving means on the gliding structure, such as indicated at 19 in the drawing. The control devices 16 and 18 are operatively connected by flexible connectors 20 and 21 to the arms 22 and 23 on the horizontal rudder member 5.

The conventional radio control device 17, also mounted on the frame unit of the gliding structure, when energized, operates an actuating rod 17' connected to an arm 17'' on a shaft 20 journaled longitudinally in said structure. Suitable arms 24 and 25 extend in opposite directions from the ends of the shaft 20, and have link members 26 and 27 pivoted thereto. The other ends of the link members 26 and 27 are connected to arms 28 and 29 on the ailerons 15. Impulses of proper frequency, which are received by the control device 17, cause longitudinal movement of the rod 17' in one direction or the other and corresponding stabilizing control movements of the ailerons 15.

The conventional radio controlled surface actuating control devices 16, 17 and 18 are carried by the supporting frame structure A and may preferably be mounted on the shelf or cross member 10, intermediate the front and rear ends of said frame.

By constructing our gliding attachments in two units, namely, the supporting frame unit structure A and the gliding wing unit structure B, a plurality of the gliding attachments may be shipped with groups of these two elements detached and stacked, and each pair of the units may be readily assembled in the field by bolting the wing structure to the upper face of the supporting frame structure A in any conventional manner, as by bolt fasteners 30, carried in brackets 31, which are secured to the lower face of the wing structure and pass through the longitudinal boom members 1.

In the embodiment of our invention, as seen in the drawings, the wing unit member B is provided with an opening 32 therethrough to permit passage of the rear bomb support 12 therethrough.

In constructing the gliding attachment, the wing unit B is preferably made of thin, light material, such as plywood, and has sufficient supporting area and proper airfoil section adaptable for gliding purposes in accordance with the weight of the largest bomb used. The unitary supporting frame A is also preferably made of wood or other inexpensive material, including the longitudinal boom members 1—1, while the bomb engaging and securing strap members 7—7 are preferably of thin flat metal and are connected to the boom members 1.

In the application of the attachment to a bomb, the wing unit B is first secured to the supporting frame unit A, and then placed on top of the bomb with the hangers or supporting members 12 projecting from the bomb extending upwardly intermediate the boom members 1, the rear hanger 12 passing through the aperture 32 in the wing. The strap members 7—7 may then be passed around the bomb and secured together by any suitable means such as by bolts 33. The bomb and its attached gliding structure may now be elevated into engaging position and connected to the bomb release brackets 13 on the plane.

It should be observed from the drawings that the gliding wing unit structure for the bomb, when in position, lies between the bomb and

the lower surface of the wing or other bomb supporting structure of the plane, and close to the latter, while the supporting frame A for the gliding attachment is secured to the bomb on one side thereof, below the gliding wing unit for the attachment. When the bomb is released at a considerable elevation, its glide angle can be determined and controlled so that it can be accurately directed by any conventional radiant energy operated sending apparatus to the target, regardless of the shifting of the target in an attempt to avoid the bomb's contact therewith.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a dirigible gliding attachment, for a conventional aircraft bomb having a supporting means projecting laterally from one side of the bomb, adapted to be releasably secured to an aircraft for release from an elevated position, said attachment comprising a rigid substantially rectangular flat frame-like structure composed of a pair of elongated spaced side by side frame members connected together by cross-frame members at their front and rear ends, one of said cross-frame members having adjustable glide control surfaces thereon, strap members depending from the lower side of the frame-like structure, adapted to be clamped around said bomb to support the bomb between the elongated spaced side frame members during the flight, with the bomb positioned in engagement with said cross-frame members and the laterally projecting supporting means on the bomb disposed between the two elongated side frame members, a unitary gliding airfoil wing structure adapted to be secured to said frame-like structure opposite to one of said supporting strap members, said wing structure having an opening therethrough for receiving said bomb supporting means therethrough, and means for adjusting the glide control surfaces carried by said frame-like structure.

2. In a dirigible gliding attachment for a conventional aircraft bomb having a plurality of supporting means projecting laterally from one side of the bomb in longitudinally-spaced relation to each other and adapted to be releasably secured to an aircraft for release from an elevated position, said attachment comprising a rigid substantially rectangular flat frame-like structure composed of a pair of elongated spaced side by side frame members connected together by cross-frame members at their front and rear ends, one of said cross-frame members having adjustable glide control surfaces thereon, strap members depending from the lower side of the frame-like structure and connected to each of the spaced side by side frame members, adapted to be clamped around said bomb to support the bomb between the two elongated spaced side frame members during flight, with the bomb positioned in engagement with at least one of said cross-frame members, and the laterally projecting supporting means on the bomb projecting through the frame-like structure between the two elongated side frame members, a unitary gliding air foil wing structure adapted to be secured to the spaced side by side frame members of said frame-like structure opposite one of the bomb securing strap members, said wing structure having an opening therethrough for receiving one of said bomb supporting means therethrough, and means for adjusting the glide control surfaces carried by such frame-like structure.

3. A gliding attachment for a conventional

aircraft bomb which is designed to be suspended in a substantially horizontal position from an airplane by longitudinally spaced hangers projecting laterally from the side of the bomb, said attachment including a flat elongated frame composed of laterally spaced side by side boom members, cross members secured to the spaced boom members between the same in spaced relation to each other at the forward portions of the boom members, bomb clamping means depending from the lower sides of the boom members adjacent the cross members for clamping and seating the bomb rigidly against said cross frame members with the hangers of the bomb extending through the space between the boom members to points above the upper sides thereof, a connecting glide angle determining member secured across the rear ends of the boom members having an adjustable flight control surface thereon for determining the glide path of the attachment when released from the airplane, means on the said frame and connected to the flight control surface for adjusting said flight control surfaces to change the glide path of the attachment, an elongated glide wing structure rigidly secured transversely across the upper sides of the boom members, above the bomb clamping means, on the side of the frame opposite from the bomb clamping means, whereby the aircraft bomb may be clamped rigidly against said cross members with the longitudinal axis of the bomb in a vertical plane midway between the boom members and in a horizontal plane substantially parallel to the boom members with the spaced hangers from the bomb projecting upwardly through the flat elongated frame to points beyond the upper surface of the transverse glide wing structure, for suspending the bomb with the gliding attachment mounted thereon, to the bomb shackles of the aircraft.

4. A gliding attachment for standard aircraft bombs comprising a pair of elongated boom members disposed in horizontally spaced side by side relation having bomb supporting portions at their front end portions, cross members disposed between the boom members, in spaced relation to each other, at the front end portions of the boom members, rigidly securing the boom members together at the bomb supporting portions thereof, said boom members extending rearwardly, materially, beyond said bomb supporting portions, a transverse glide-control member connecting the rear ends of the boom members together having a glide control surface, to determine the glide path of the attachment and the bomb carried thereby, a glide wing structure secured transversely across said boom members above said bomb supporting portions, intermediate the spaced cross members, longitudinally spaced bomb clamping band members extending transversely between the boom members, each band member having its opposite ends secured to the boom members at the bomb supporting portions thereof for rigidly clamping the conventional aircraft bomb against said cross members with the longitudinal axis of the bomb disposed in substantially parallel relation to the boom members.

5. A gliding attachment for standard aircraft bombs comprising a pair of elongated boom members disposed in horizontally spaced side by side relation having bomb supporting portions at their front end portions, cross members disposed in spaced relation to each other, between the front end portions of the boom members, to rigidly secure the boom members to each other at the bomb supporting portions of the boom members, said boom members extending rearward, materially, beyond said bomb supporting portions, a transverse connecting member rigidly securing the rear ends of the boom members to each other, an adjustable glide angle determining member thereon for determining the glide path of the attachment and the bomb carried thereby, a glide wing structure secured transversely across both boom members at longitudinally spaced points on said bomb supporting portions of the boom members, at least one of said cross members having the lower side thereof, facing away from said glide wing structure, shaped to substantially conform to the cross-sectional contour of the bomb, at the point of contact of the bomb with the cross member when the bomb is secured to the attachment, and a bomb encircling and clamping band for the bomb having each end secured to one of the boom members at said bomb supporting portion of the boom members and projecting laterally from said boom members in a direction away from said glide wing structure, for rigidly clamping the conventional aircraft bomb against said cross members with the contacting side of the bomb disposed in the bomb conforming portion of the aforesaid cross member.

RUDOLPH FINK.
GEORGE V. HOLLOMAN.
CHARLES L. PAULUS.

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