Oct. 4, 1949. L. S. COTTEN 2,483,402

ANTIAIRCRAFT TARGET

Filed Dec. 12, 1944 4 Sheets-Sheet 1

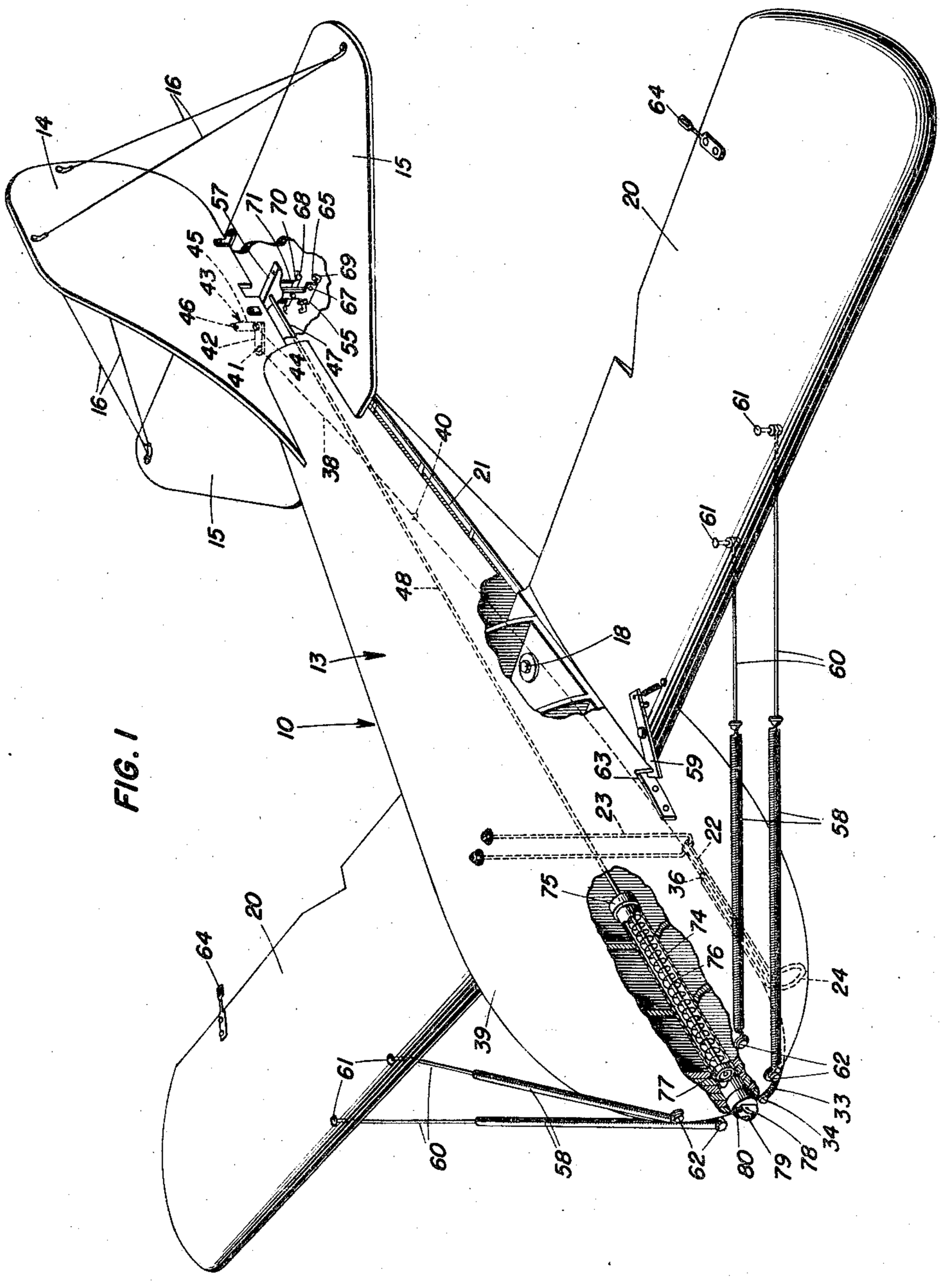

FIG. 1

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ANTIAIRCRAFT TARGET

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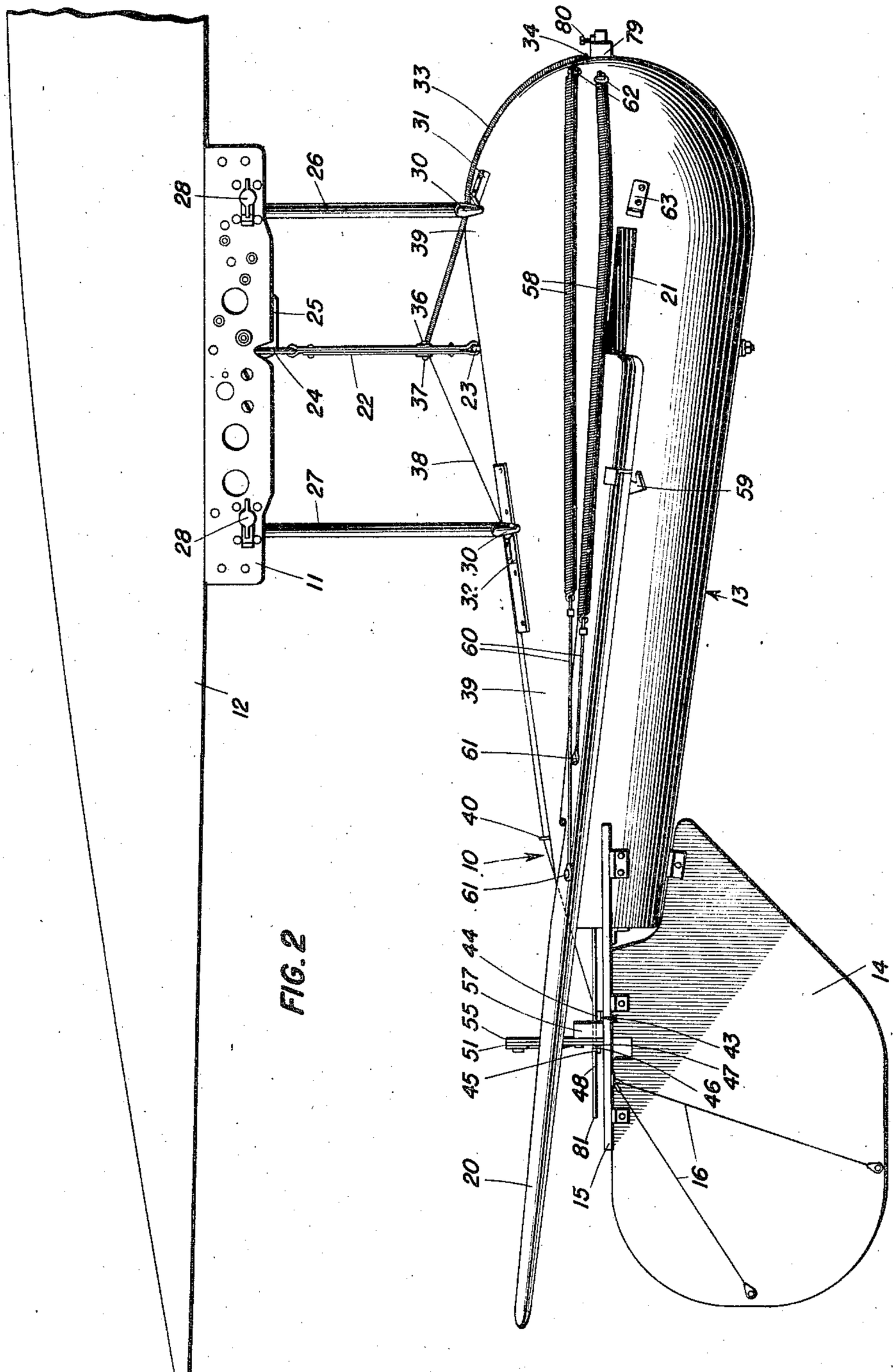

FIG. 2

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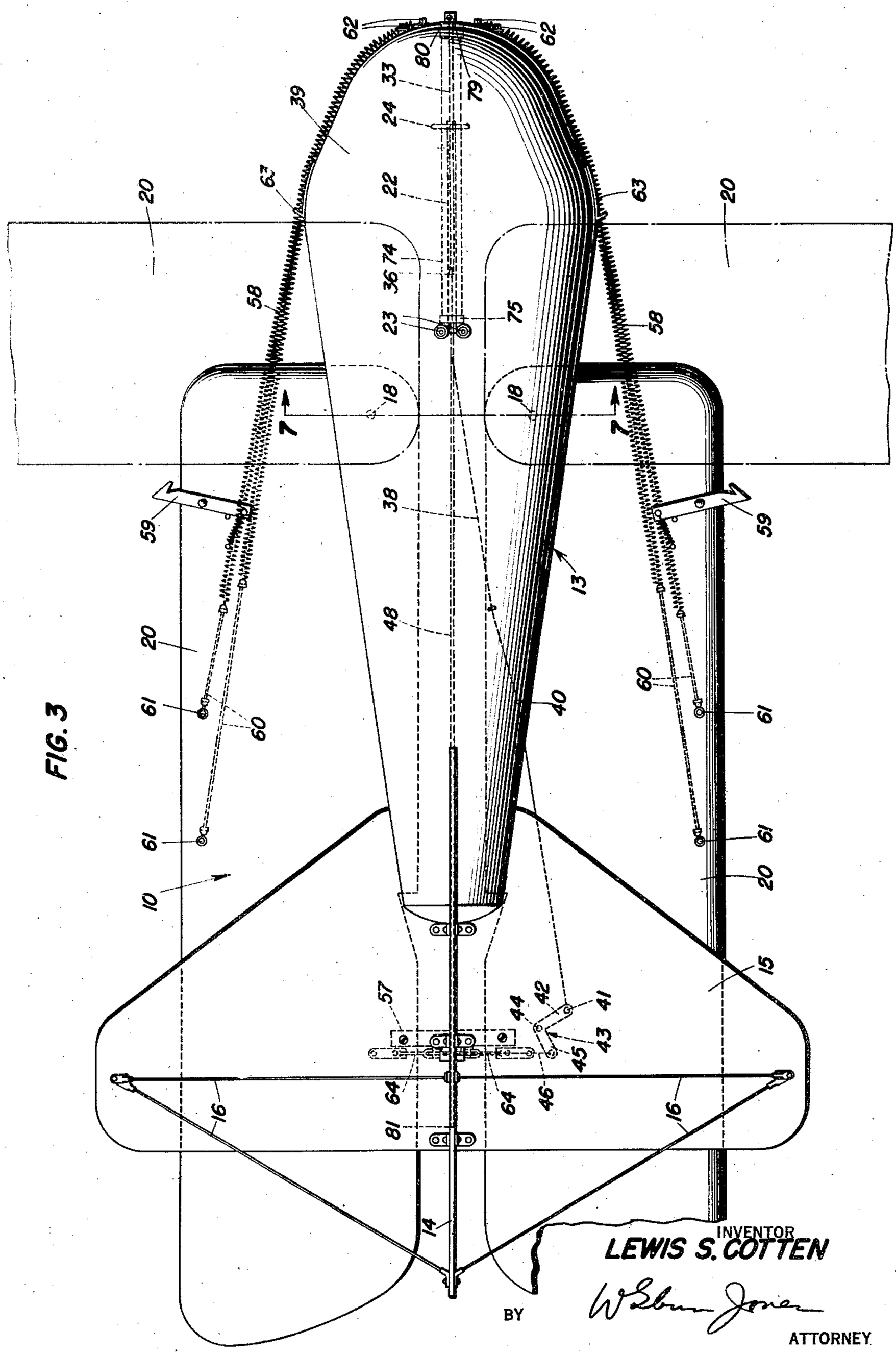
FIG. 3



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ANTIAIRCRAFT TARGET

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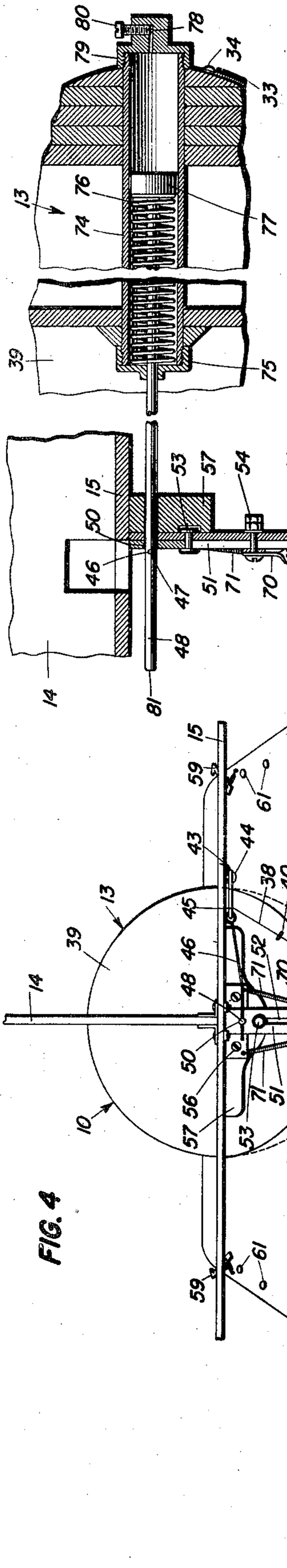

FIG. 6

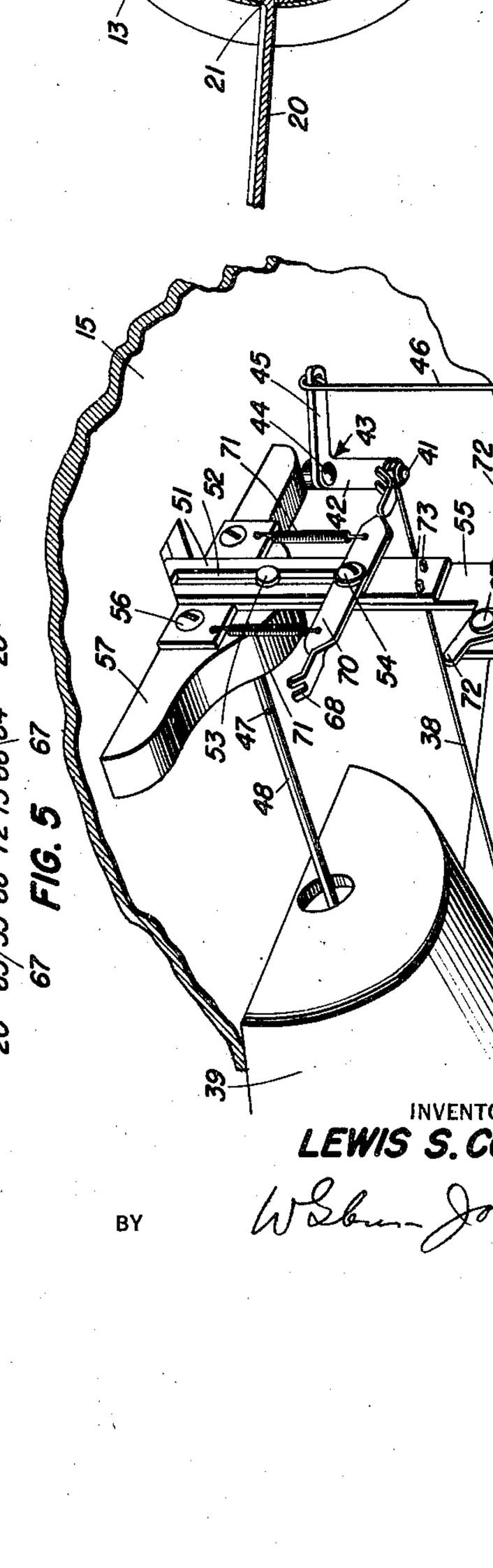

FIG. 7

FIG. 5

FIG. 4

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UNITED STATES PATENT OFFICE

2,483,402

ANTIAIRCRAFT TARGET

Lewis Stevens Cotten, United States Navy

Application December 12, 1944, Serial No. 567,879

4 Claims. (Cl. 273—105.4)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to an anti-aircraft target and has for an object to provide a target adapted to simulate the dive bombing tactics of an airplane so that anti-aircraft gunners may shoot at the target in order to improve their gunnery and enable them to make a better defense against enemy aircraft in the act of dive bombing.

A further object of this invention is to provide a dive bomber simulating target which is comparatively inexpensive to manufacture and assemble and which may be released by a friendly aircraft so as to afford target practice to anti-aircraft gunners while the friendly aircraft has time to get out of range of the guns before the target is fired upon. It is quite customary for target practice to be provided to anti-aircraft gunners by means of a target sleeve towed behind a friendly aircraft, but such a sleeve provides a target simulating level flight and previous to this invention there has been no satisfactory target for simulating the action of a dive bomber approaching a defended area. The sleeve target cannot be used for such purpose because if the friendly aircraft were to attempt to tow the sleeve in a dive, the friendly aircraft would be in the line of fire between the guns and the target, making it impossible to practice on such a towed sleeve target. With this invention, however, a diving target is provided which may be released from the friendly aircraft and dive toward the defended area while the friendly aircraft leaves the target area in safety.

A still further object of this invention is to provide an anti-aircraft target which is comparatively inexpensive so that there is not much expense when the target is hit and destroyed, but which, if not hit and destroyed, may be recovered and used over and over again until it is destroyed by a hit.

With the foregoing and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter described and illustrated in the drawings in which:

Fig. 1 is a perspective view of the target of this invention in gliding position.

Fig. 2 is an elevational view of the target of this invention mounted in carrying position on the bottom of an aircraft.

Fig. 3 is a plan view of the target with the wings in retracted position when the target has just been dropped.

Fig. 4 is a tail end view of the target with the wings in retracted position.

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Fig. 5 is an enlarged fragmentary perspective view of the wing releasing operating details.

Fig. 6 is a sectional fragmentary view showing the wing timing mechanism, and

Fig. 7 is a sectional view on line 7—7 of Fig. 3.

There is shown at 10 the anti-aircraft target of this invention which is adapted to be carried by the external bomb rack 11 of an airplane 12 for launching in the target practice area.

This target 10 includes a fuselage 13 provided with a fixed tail means consisting of a fixed rudder 14 and a fixed elevator 15 having bracing wires 16. Pivotally secured within the fuselage 13 by means of pivot bolts 18 are retractable wings 20 adapted to be held in retracted position in the slots 21 in the sides of the fuselage 13 while the target is being carried and during the first fifteen to twenty seconds after the target is released, and then the wings 20 are automatically moved by the timing mechanism of this invention from the retracted position shown in Figs. 2 and 3 to the extended gliding position shown in Fig. 1.

When carried by the aircraft 12, the target 10 is normally in what might be considered the upside down position, in as much as both the tail rudder 14 and the wings 20 point downwardly rather than upwardly as in the normal appearance of an aircraft. In this position the fuselage 13 is secured to the aircraft bomb rack 11 by means of a rigid metal strap 22 pivoted on a staple 23 secured through the bottom of fuselage 13. The other end of the strap 22 is provided with a hitch ring 24 by means of which it is held by a releasing hook 25 in the bomb rack 11 of the aircraft 12.

Secured to the bomb rack 11 are the customary bomb carrying sway braces 26 and 27 of a length and size suitable for carrying the target 10. The sway braces 26 and 27 are secured at 28 in the bomb rack 11 in the customary manner and at their other ends are provided with the usual sway preventing fingers 30 which are adapted to fit up against the target fuselage 13, the fuselage being provided with chuck blocks 31 and 32 cooperating with the fingers 30. As will be apparent, when the hook 25 is operated in the customary manner from within the aircraft 12, it will release the hitch ring 24 of the metal strap 22, thereby enabling the target 10 to fall away from the aircraft 12.

The nose end of the target 10 may be weighted if desired, and in any case, the negative angle of incidence of the wings 20 even though retracted and the tail surfaces of the rudder 14 and ele-

vator 15 will cause the target to assume a diving position of probably about 80°, thereby taking it quickly away from the path of the aircraft 12 while the target 13 dives downwardly enabling the gunners to practice shooting thereat. As the target dives in an earthward direction, it attains an approximate speed of about 200 knots until the wings 20 are released from the retracted position of Fig. 2 to the gliding position of Fig. 1, causing the target to pull out of the dive and glide toward the earth.

The wings are released from the retracted to the gliding position by means of the timing mechanism shown generally in Fig. 6, operating the wing releasing mechanism shown generally in Figs. 4 and 5. A coil spring 33 is anchored at one end 34 adjacent the nose of the target fuselage 13, the other end of the spring 33 being anchored at 36 to the metal strap 22. Secured at 37 to the other side of the strap 22 is a timing wire 38 which passes through a guide loop 40 and terminates at the end 41 of one arm 42 of a bell crank 43 pivoted at 44 to the fixed elevator 15.

When the target 13 is being carried by the aircraft 12, the spring 33 and the timing wire 38 both pass under the fingers 30 of their sway braces 26 and 27. But this is immaterial due to the yielding fabric 39 of which the fuselage 13 is constructed, it being observed from Fig. 7 that the fabric 39 is placed about a series of longerons 49 suitably curved to thereby provide the fuselage. Obviously, as soon as the target is released, the coil spring 33 pulls the supporting strap 22 about its staple 23 toward the nose of the target and simultaneously pulls the timing wire 38 causing the bell crank to rotate about its pivot 44.

Secured to the other arm 45 of bell crank 43 is a timing pin 46 whose end is pulled out from a transverse hole 47 in the timing rod 48. When the wings are held in retracted position, the wing holding and releasing mechanism is in the position shown in Fig. 4 with the timing rod 48 extended through a hole 50 in a plate 51. This plate 51 is provided with a guide slot 52 enabling the plate 51 to slide vertically within the limits permitted by a guide pin 53 and a finger pivot 54 extending through the guide slot 52 and anchored in an H plate 55 secured at 56 to a bracket 57 mounted on the tail elevator 15, the bracket 57 and H plate 55 being provided with suitable aligned holes permitting the timing rod 48 to extend therethrough and through the hole 50 of the plate 51 when it is in the position shown in Fig. 4.

The wings 20 are each provided with two tension coils 58 and tension straps 60 secured at one end to anchoring pins 61 in the wings 20 and at their other ends to anchor pins 62 near the nose of the fuselage 13. These springs tend to swing the wings 20 about their pivot bolts 18 from the retracted position within the fuselage slots 21 of Fig. 2 to the extended position shown in Fig. 1. When the wings 20 are moved to the advanced position, spring held pawls 59 latch to the J hooks 63 secured to the sides of fuselage 13 and assist the coils 58 in holding the wings 20 in the extended position.

The wings 20 are held in the retracted position, before the timing mechanism is operated, by means of loops 64 secured to the rear edges of the wings 20, which loops 64 cooperate with hooks 65 having pivoting slots 66 for pivotally securing them by means of pivots 67 to the bottom of the H plate 55. After the hook ends 69 of hooks 65 are passed through the loops 64, they are passed over the bifurcated ends 68 of fingers 70 pivoted on the finger pivot 54 and pulled by springs 71, whose other ends are anchored to the top end of H plate 55. The other ends of hooks 65 terminate in toes 72 which are adapted to abut against the bottom of bosses 73 on the slide plate 51.

With this wing holding and releasing mechanism in the position shown in Fig. 4, the fingers 70 tend to hold the hooks 65 so that the hook toes 72 press against the slide plate bosses 73. With the timing rod 48 in position through the slide plate aperture 50 and held there by the timing pin 46, the guide plate 51 cannot move and the hooks 65 are thus held against movement along their slots 66 and about their pivots 67, thus holding the wings 20 in retracted position in spite of the tension of the coils 58. When the timing rod 48 is withdrawn from the slide plate hole 50, the slide plate 51 is free to move and the tension of the springs 71, assisted by the tension of the coils 58, causes the hooks 65 to rotate and slide about their pivots 67 withdrawing the hook ends 69 from the loops 64 and releasing the wings 20 for movement to their extended position.

The timing rod 48 extends through the fuselage 13 and into a timing cylinder 74 extending through the nose of the fuselage 13. The cylinder 74 is provided with a cap 75 at one end through which the timing rod 48 extends. Cap 75 provides a base for a coil spring 76 tending to force a gland or plunger 77 secured to the front end of rod 48 toward the nose end of cylinder 74. The nose end of cylinder 74 is closed by means of a cap 79 provided with a vent 78 and a vent adjusting screw 80 exterior of the nose. By rotating the screw 80, the size of the vent 78 may be adjusted, thereby determining the time that it takes for air within the cylinder 74 between the gland 77 and cap 79 to escape and thus timing the movement of the timing rod 48 and enabling such timing to be adjusted as desired. The screw 80 is normally adjusted so that it takes about fifteen to twenty seconds for the tip end 81 of timing rod 48 to be withdrawn from the hole 50 of slide plate 51. When the timing rod tip end 81 is withdrawn from hole 50, the slide plate 51 is free to move, thus releasing hook 65 from the wing loops 20 and releasing the wings for movement to their extended position.

In operation, the timing mechanism must be set before the target 10 can be attached to the aircraft 12, preferably within a short while before. To set the timing mechanism the wings may be held in retracted position by a safety cable tied around the wings and fuselage. The timing rod 48 has its tip end 81 extended through the slide plate hole 50 and a wire is extended through the timing rod hole 47. By means of a stop watch, the screw 80 is adjusted until it takes the proper time, usually between fifteen and twenty seconds, for the timing rod end to be withdrawn from the sliding plate 51. After the screw 80 has thus been properly set, the timing pin 46 is placed through the timing rod hole 47 and the hooks 65 are placed through the loop 64 and against fingers 70 with the strap 22 held in the normal position shown in Fig. 2, in which position it is secured to the bombing hook rack 25 holding the target 13 against the sway braces 26 and 27 and the safety cable is removed.

On completing his run at the target area, the pilot releases the hook 25, thereby dropping the target 13. As the target 13 is dropped, the strap

22 is pulled forward by the coil spring 33 causing the timing wire 38 to rotate the bell crank 43 and withdraw timing pin 46, allowing timing rod 48 to be slowly moved forward by cylinder spring 76 against the air compressed within the cylinder by the gland 77 and which is escaping through the vent 78.

At the end of about fifteen to twenty seconds, the tip end 81 will move out of slide plate hole 50, whereupon the slide plate 51 is free to move and the bosses 73 will cease to hold the hook toes 72, permitting fingers 70 and the tension of the wing coils 58 to pivot the hooks 65 and withdraw them from the wing loops 64. Until this moment, the target will have been in a dive of about 80° at about 200 knots. When the wings 20 are thus released they are snapped forward until pawls 62 engage hooks 63 assisting the coils 58 in holding the wings 20 in extended position. With the wings 20 in extended position the target 13, if still undestroyed by the gunners' shooting at it, will glide out of the dive to a somewhat horizontal position and gradually glide to the ground where it may be recovered and used over and over again until it is finally destroyed by a hit from one of the guns.

Other modifications and changes in the number and arrangement of the parts may be made by those skilled in the art without departing from the nature of the invention, within the scope of what is hereinafter claimed.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. An anti-aircraft dive bomber simulating target comprising an aircraft simulating fuselage and tail means, wing members pivoted to said fuselage for movement between a retracted position along said fuselage for diving and an extended position for gliding, means movably attached to said target and adapted for releasably attaching said target to a launching aircraft, means normally urging said pivoted wing members to the extended gliding position, releasable means holding said wing members in the retracted diving position, a timing mechanism connected to said releasable holding means for releasing said means upon expiration of a predetermined time interval, means connecting said movable target attaching means and said timing mechanism for initiating operation of said timing mechanism upon movement of said target attaching means, and means connected to said target attaching means to move the same upon release of said target from the aircraft.

2. An anti-aircraft dive bomber simulating target comprising an aircraft simulating fuselage and tail means, wing members pivoted to said fuselage for movement between a retracted position along said fuselage for diving and an extended position for gliding, strap means pivoted on said target and adapted for releasably attaching said target to a launching aircraft, means normally urging said pivoted wing members to the extended gliding position, spring means for swinging said pivoted strap means upon detachment from the aircraft, releasable means holding said wing members in the retracted diving position, a timing mechanism connected to said releasable holding means for releasing said means upon expiration of a predetermined time interval, means connecting said pivoted strap and said timing mechanism for initiating operation of said timing mechanism upon movement of said pivoted strap, and means connected to said pivoted strap to move the same upon release of said target from the aircraft.

3. An anti-aircraft dive bomber simulating target comprising an aircraft simulating fuselage and tail means, wing members pivoted to said fuselage for movement between a retracted position along said fuselage for diving and an extended position for gliding, means attached to said target and adapted for releasably attaching said target to a launching aircraft, said target attaching means comprising a supporting strap pivotally secured to said target fuselage, said pivoted strap being adapted to be disposed substantially normal to said target fuselage when in supporting position, spring means for swinging said strap about its pivot upon detachment from the aircraft, means normally urging said pivoted wing members to the extended gliding position, releasable means holding said wing members in the retracted diving position, a timing mechanism connected to said releasable holding means for releasing said means upon expiration of a predetermined time interval, means connecting said pivoted strap and said timing mechanism for initiating operation of said timing mechanism upon movement of said pivoted strap, and means connected to said pivoted strap to move the same upon release of the target from the aircraft.

4. An anti-aircraft dive bomber simulating target comprising an aircraft simulating fuselage and tail means, wing members pivoted to said fuselage for movement between a retracted position along said fuselage for diving and an extended position for gliding, strap means pivoted on said target and adapted for releasably attaching said target to a launching aircraft, means normally urging said pivoted wing members to the extended gliding position, spring means for swinging said pivoted strap means upon detachment from the aircraft, releasable means holding said wing members in the retracted diving position, a timing mechanism connected to said releasable holding means for releasing said means upon expiration of a predetermined time interval, means connecting said pivoted strap and said timing mechanism for initiating operation of said timing mechanism upon movement of said pivoted strap, and means connected to said pivoted strap to move the same upon release of said target from the aircraft, said releasable holding means including hooks pivotally mounted on said target for engaging the wings in retracted position, and a slide plate for retaining said hooks in engaged position, said timing mechanism comprising a timing rod for engaging said slide plate, a timing cylinder receiving said rod and having a vent adjusting screw, a plunger on the end of said rod within said cylinder, a spring within said cylinder urging said plunger and rod toward a position of disengagement with said slide plate, said means connecting said pivoted attaching strap and said timing mechanism comprising a wire and connections including a pin extending through a hole in said timing rod and releasably retaining said timing rod against withdrawal from said slide plate, said slide plate being moved and said hooks being released from the outwardly urged wings upon disengagement of said timing rod from said slide plate.

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