Sept. 20, 1960 C. K. BRUST 2,953,377

HIGH SPEED EXTERNALLY CARRIED TOW TARGET

Filed June 8, 1956

3 Sheets-Sheet 1

Fig. 1

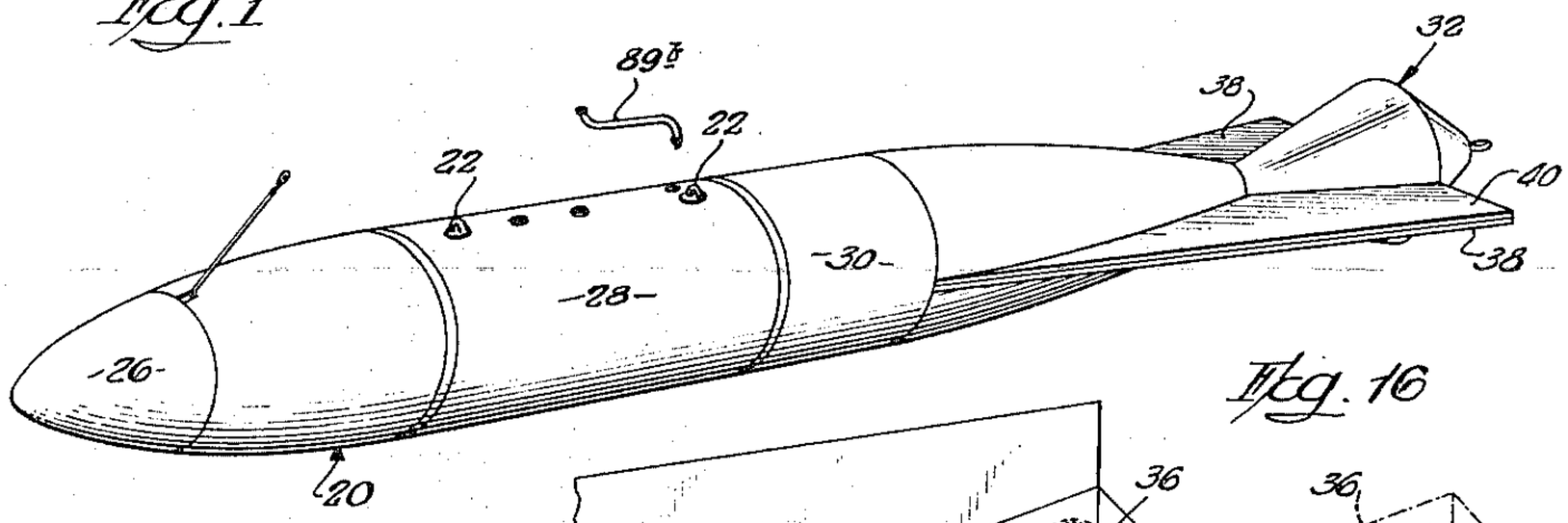


Fig. 16

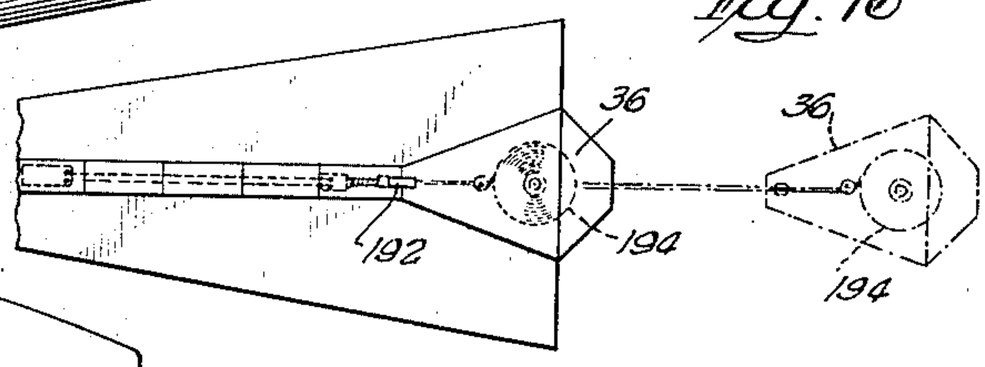


Fig. 2

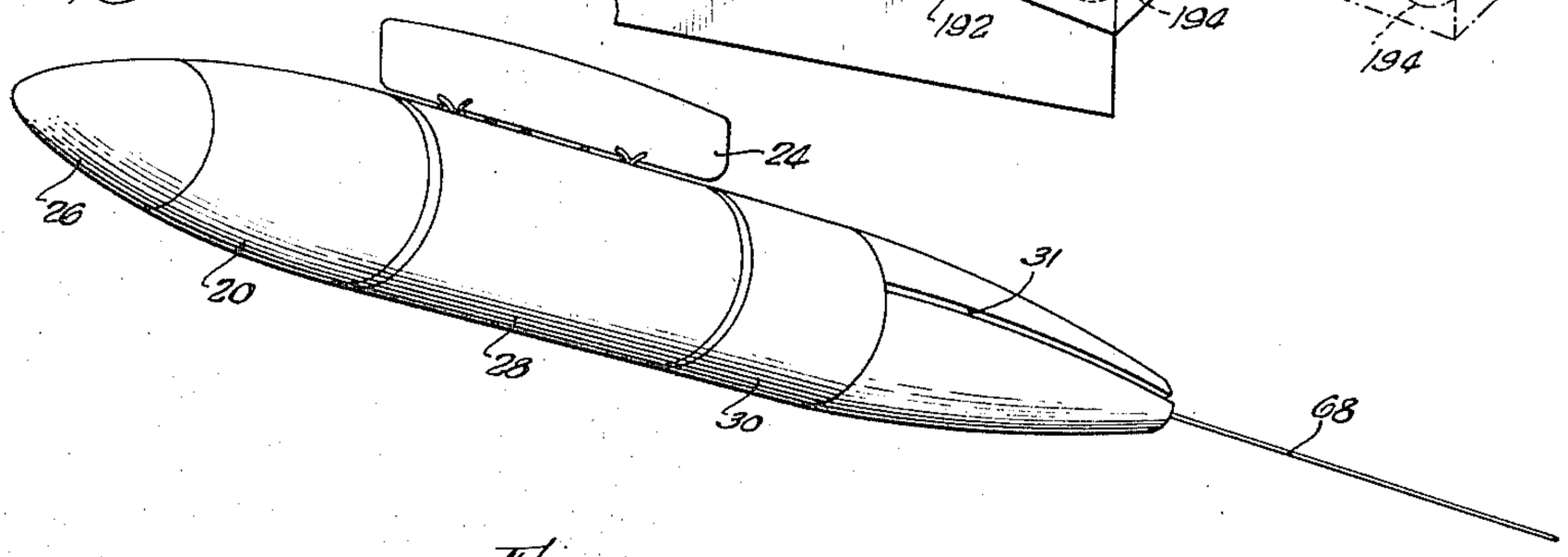


Fig. 3

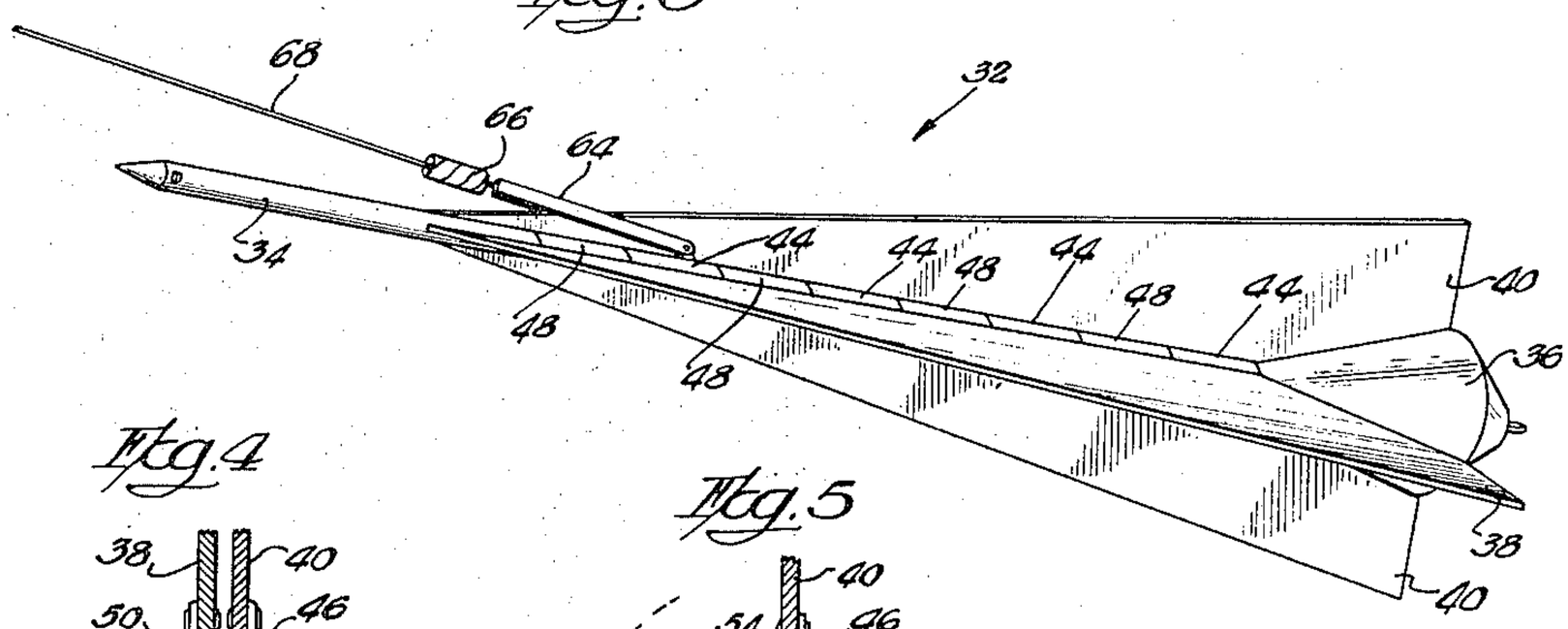


Fig. 4

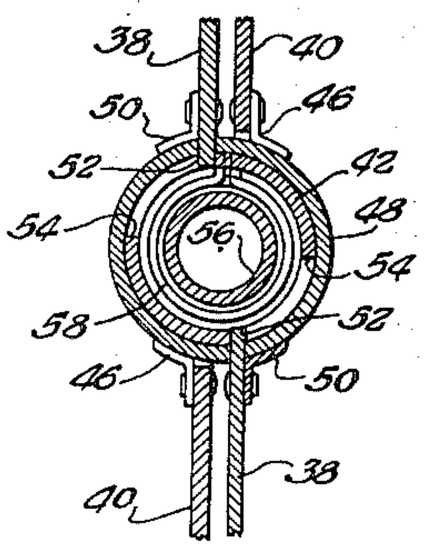
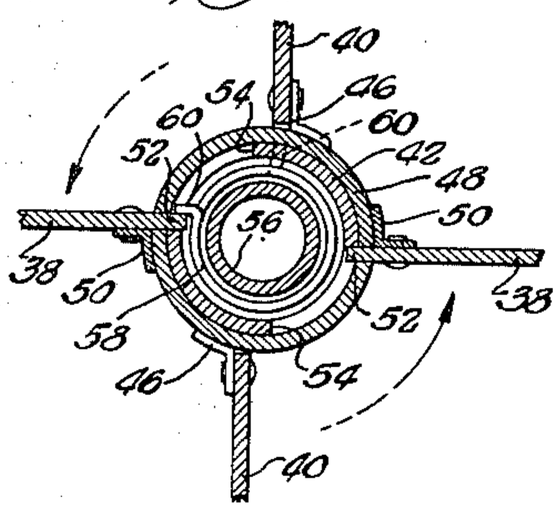


Fig. 5



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HIGH SPEED EXTERNALLY CARRIED TOW TARGET

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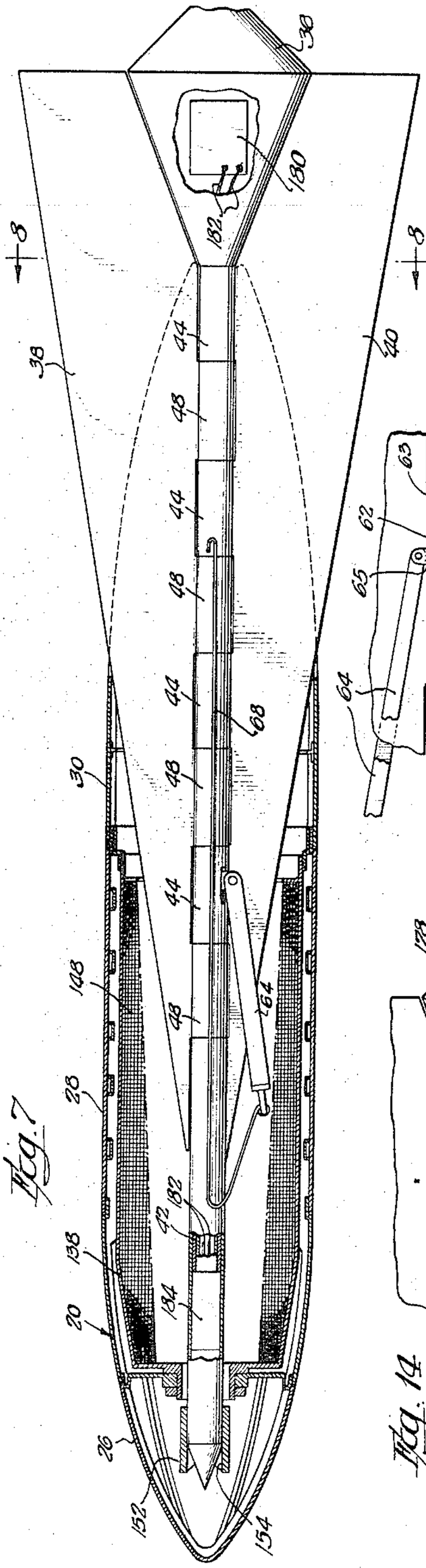

Fig. 7

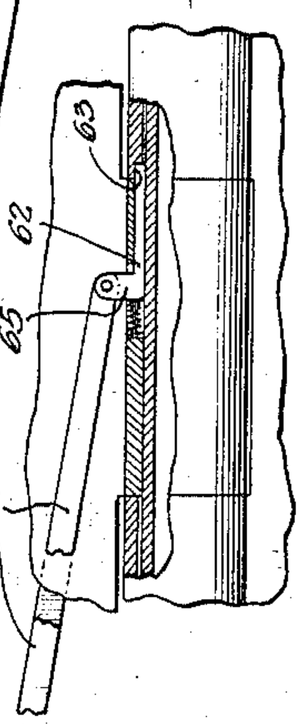

Fig. 5A

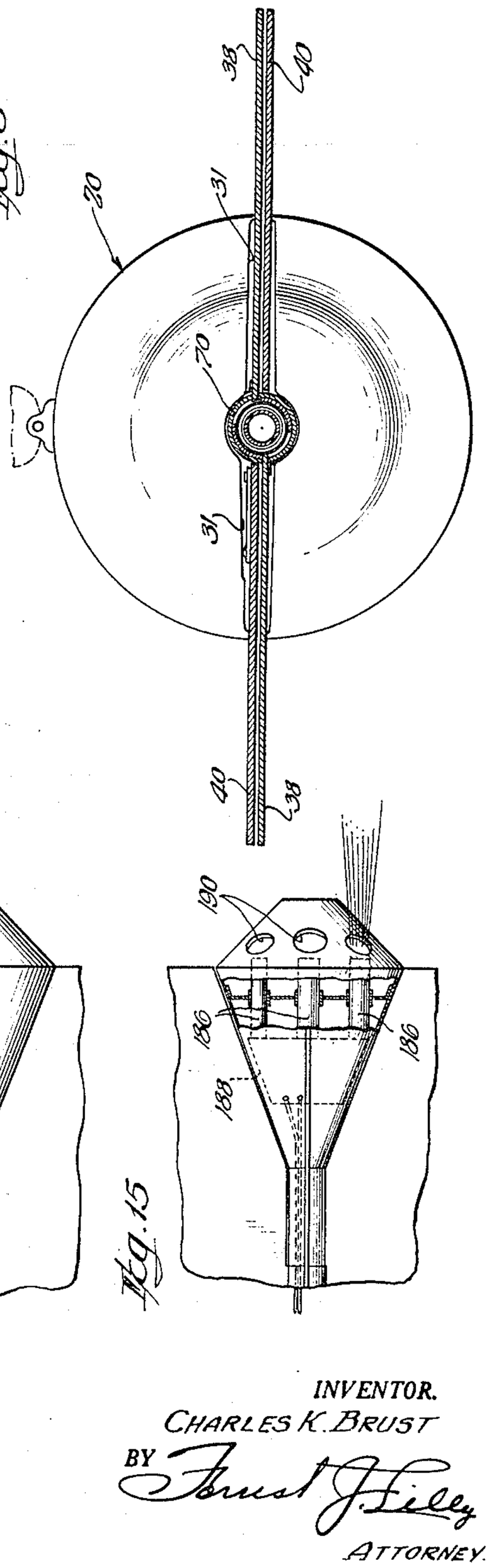

Fig. 8

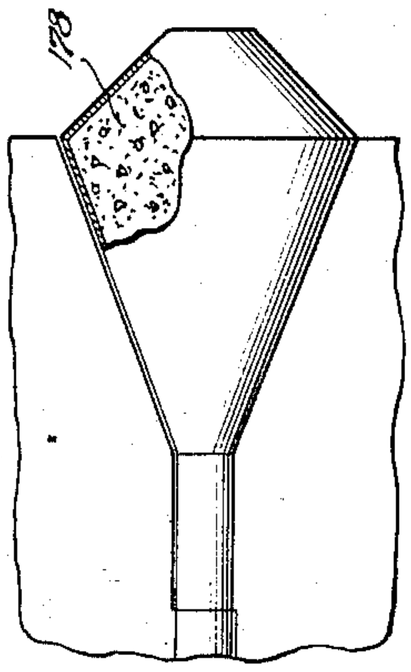

Fig. 14

Fig. 15

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Fig. 6

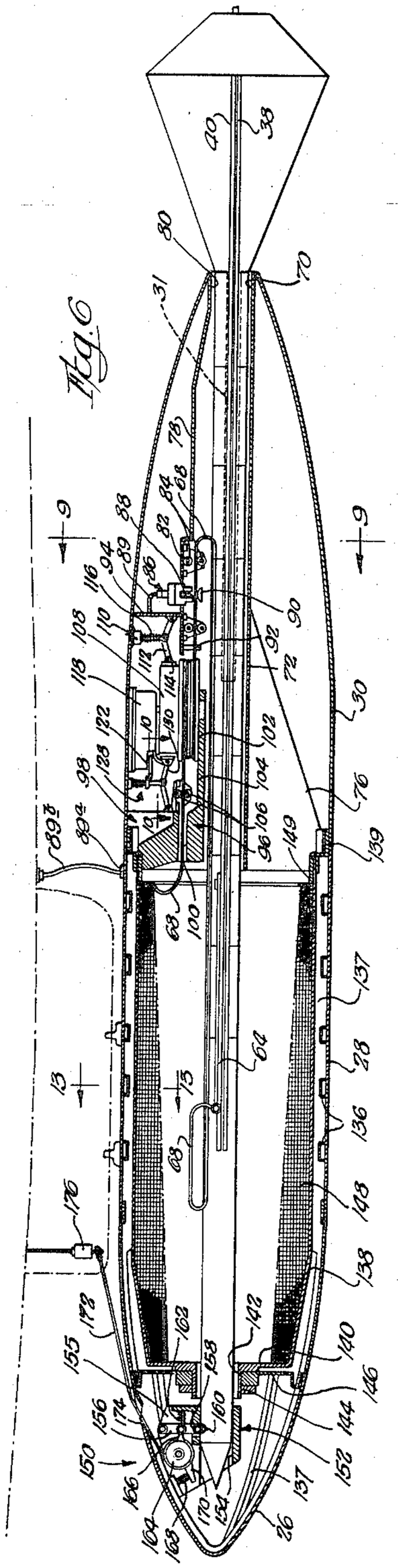

Fig. 9

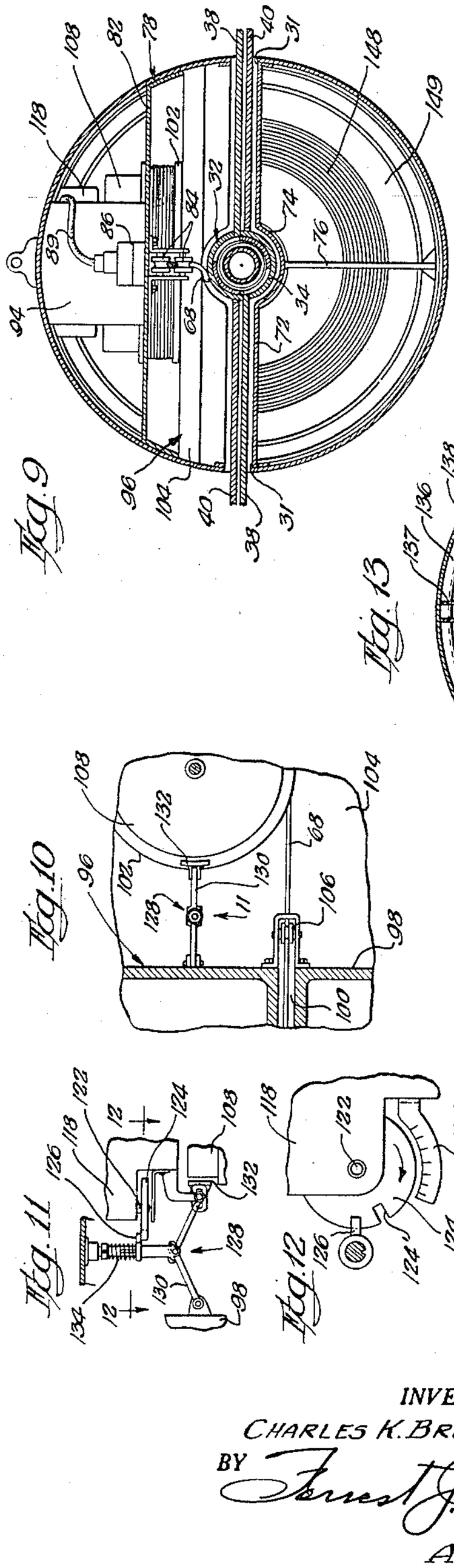

Fig. 13

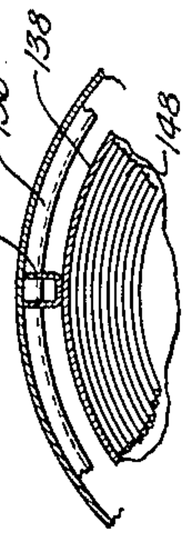

Fig. 10

Fig. 11

Fig. 12

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HIGH SPEED EXTERNALLY CARRIED TOW TARGET

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19 Claims. (Cl. 273—105.3)

This invention relates to tow targets such as are used in aerial gunnery practice and particularly to a high speed tow target which may be carried aloft by standard aircraft capable of mounting of carrying external stores without the necessity of employing special pickup equipment or procedures.

In the form of aerial gunnery or missile firing practice with which this invention is concerned, the target is towed a safe distance behind a towing aircraft by means of a long cable or line attached to the aircraft and target. One general type of target for this purpose consists of a sleeve or cone of suitable fabric, such as nylon or canvas.

These fabric targets are advantageous since they may be accommodated to stowage within the air frame or in externally carried containers on the towing aircraft until the latter becomes airborne after which the targets may be released from the air frame or stowage containers for towing at the proper distance behind the aircraft.

Another type of target now in general use is the "Banner" type usually fabricated from loosely woven metallic threads (netting), which targets are generally rectangular in configuration and can be stowed, streamed, towed and released, and in some cases retracted, in a manner similar to the above mentioned sleeve or cone type target. The "Banner" target, as the name implies, gives the appearance of a banner or flag in flight, since it is flat and not circular in section as is the above mentioned sleeve.

Such targets are, however, not applicable to high speed aircraft because of their excessive drag and induced turbulence, and because "burbling" effects and flight conditions result in rapid destruction of the fabric of the targets. In addition, such targets do not track with the towing aircraft but rather follow a more sweeping flight curve with the result that firing practice on targets of this type is not effective to acclimate the gunners to firing against aircraft taking evasive actions.

To avoid these deficiencies of targets of this type, rigid, high speed tow targets, such as the well known dart type target, were developed. Dart type targets comprise an elongate body having a pointed forward end and mounting radial stabilizing fins in longitudinal planes thereof that give the target a generally dart like appearance. Also developed have been the winged type tow targets and rigid cone type, among others.

Because of the rigid, streamlined construction of targets of these latter types, their drag and induced turbulence is reduced to such a point that they are capable of being towed at high speeds by standard, high speed aircraft. Also, such targets are not subject to rapid destruction from "burbling" effects and flight conditions as are fabric targets. Perhaps a more important advantage of such high speed targets, however, is their aerodynamic stability and ability to track with the towing aircraft so that they may be caused to execute simulated evasive actions by proper maneuvering of the towing aircraft. Firing practice on these targets is, therefore, much more effective in acclimating gunners to actual aerial firing conditions. Also, these rigid high speed targets will, in

general, withstand greater usage and damage from gunnery or missile hits.

The use of rigid, high speed tow targets has in the past posed certain operational difficulties, however, relative to launching of the target. Thus, in one type of launching procedure, the target was picked up from the ground after the towing aircraft had become airborne by engagement of a tail hook or other means carried on the towing aircraft with an elevated cable on the ground to which the target was attached. Successful carrying out of such pickup procedures required the presence of a ground crew and substantial training of, and skill on the part of, the pilot of the towing aircraft as well as relatively complex pickup equipment. Moreover, more than one pass, at extremely low altitude, was often necessary to make a successful pickup.

Otherwise, such targets have been launched by laying or flaking out long lines of tow cable alongside a takeoff runway, one end of the tow cable being attached to the aircraft at the takeoff point, the other end being attached to the target. On takeoff, the tow line and target would simply be dragged down the runway by the towing aircraft, eventually to become airborne. This method also requires the use of considerable ground personnel, is frequently attendant by failures to launch due to extreme wear and abrasion on target tow cable and/or target and imposes certain hazards on typical aircraft in takeoff condition. These problems involved in the ground pickup or launching of tow targets are, in the case of aircraft carrier operations, exaggerated to the extent that such launchings are not presently considered as practical.

An object of this invention is the provision of a high speed tow target which is adapted to be carried aloft by the towing aircraft without the necessary of ground pickup equipment or procedures or particular modifications to standard service aircraft.

Another object is the provision of a high speed tow target which is stowed in an external storage container on the towing aircraft until the latter has become airborne and has arrived at the firing area and which may be thereafter released from the container for towing at the proper distance behind the aircraft.

Another object is a provision of a high speed, externally carried tow target of the class described which is ideally suited to carrier operations.

A further object is a provision of a high speed, externally carried tow target of the class described, which may be quickly and easily mounted on and detached from the towing aircraft, and which is usable with virtually any type of service aircraft, capable of carrying external stores, without extensive modification to the aircraft electrical system.

Yet a further object is a provision of a high speed externally carried tow target of the class described which may be released from the towing aircraft prior to landing of the latter and which may carry a parachute and/or be provided with positive buoyancy so as to be retrievable for re-use. In the alternative, the target may mount landing skis and the like to enable landing of the target with the towing aircraft.

A still further object is the provision of a high speed externally carried tow target of the class described having provision for automatic detachment of the tow cable from the target in cases of release of the latter from the towing aircraft into a body of water so as to avoid submergence and loss of the target under the weight of the tow cable.

A further object is the provision of a high speed externally carried tow target and container therefor which may be jettisoned from the towing aircraft in cases of emergency.

And still a further object of the invention is the pro-

vision of a high speed externally carried tow target of the class described embodying a plurality of targets which are towed in tandem fashion behind the towing aircraft.

Other objects reside in the provision of novel means for carrying, streaming, releasing, and paying out from the towing aircraft of a high speed tow target of the class described and in the provision of an externally carried, high speed tow target which may incorporate a radiant energy source or radar reflection surfaces for use of the target with automatic fire control systems, as well as means for recording hits on the target.

Briefly the foregoing objects are achieved, in the illustrative embodiments of the invention, by the provision of a streamlined storage container, or pod, adapted for removable connection to conventional bomb or launching racks such as are found on various types of service aircraft. This arrangement permits emergency jettisoning of the target and container by releasing of the same from the racks. The after end of the container is open and horizontally slotted for receiving a dart-type target having fins which may be folded for receipt in the container slots so as to provide for ground clearance and enable the target to be stowed under the wing of the towing aircraft without restricting the action of the wing flaps and ailerons.

A cable attached to the target by a rigid or water soluble connection leads through brake mechanism to a coil of the cable within the forward portion of the container. Latch mechanism serves to releasably retain the target in the container until the towing aircraft becomes airborne and release of the target is desired. Upon release of the latch mechanism, the target is extracted from the container by the air drag on protruding portions of the target, the fins of the latter thereupon being triggered for release and return to their normal position under the action of springs. The rate of paying out of the cable from the coil is controlled and the brake mechanism is operative to brake the cable at a preset distance of the target from the tow plane.

Selectively operable means are provided for severing the cable to release the target when desired, and the latter may carry a parachute for slow descent and be made buoyant for floating on water after such release. In the case of release over water the aforementioned water soluble connection is employed to effect release of the tow cable from the target so as to preclude loss of the target by submergence under the weight of the cable. If desired, a radiant energy source may be provided at the tail of the target, and/or the tail may carry a hit recorder and be provided with suitable radar reflection surfaces, for use of the target with automatic weapons systems. It will be evident that the present target may be carried on and towed from unpiloted aircraft, or drones, as well as piloted aircraft. Also the primary target may carry releasable secondary targets to achieve a multiple target effect.

A better understanding of the invention may be had from the following detailed description thereof taken in conjunction with the annexed drawings wherein:

Fig. 1 is a perspective view of the present stowage container showing the target in stowed position therein;

Fig. 2 is a perspective view of the container with the target removed therefrom;

Fig. 3 is a perspective view of the present tow target;

Figs. 4 and 5 are sections in transverse planes of the target illustrating the manner of folding the target fins;

Fig. 5A is an enlarged detail view illustrating the means for retaining the fins folded;

Fig. 6 is a vertical section through the present stowage container illustrating the instant target in stowed position therein;

Fig. 7 is a horizontal section through the present stowage container showing the target in stowed position therein;

Fig. 8 is an enlarged section taken along line 8—8 of Fig. 7;

Fig. 9 is an enlarged section taken along line 9—9 of Fig. 6;

Fig. 10 is an enlarged section taken along line 10—10 of Fig. 6;

Fig. 11 is a view looking in the direction of the arrow 11 in Fig. 10;

Fig. 12 is an enlarged section taken along line 12—12 of Fig. 11;

Fig. 13 is an enlarged section taken along line 13—13 of Fig. 6;

Fig. 14 is a view illustrating one manner of lending positive buoyancy to the present target;

Fig. 15 illustrates one manner of mounting flares on the target; and

Fig. 16 illustrates a multiple target arrangement.

In Figs. 1 and 2 of the drawing, the numeral 20 denotes the storage container of the invention which is provided with suitable lugs 22 for releasable attachment of the container to a conventional bomb or launching rack 24 such as is found under the wings of certain types of military aircraft. The container is preferably constructed as three separable sections 26, 28, and 30 which are releasably joined in any conventional manner. The nose and tail sections 26 and 30, respectively, are tapered, as shown, to give the container a streamlined configuration and the tail section 30 is slotted at 31 in a normally horizontal plane.

The target 32 of the invention is of the dart type, as shown in Fig. 3, and comprises, generally, an elongate, hollow tubular body 34 suitable for containing apparatus such as electrical power sources, radio receivers, and the like. Body 34 has its forward end pointed, as illustrated, and mounts a tail cone 36 at its after end. Carried on and normally positioned in radial planes of the body 34 are a pair of horizontal stabilizing fins 38 and a pair of vertical stabilizing fins 40. This fin arrangement is illustrative only since other fin arrangements may be employed. Vertical fins 40 are rigid on the body 34 while horizontal fins 38 are rotatable on the body from a folded position of parallelism with the vertical fins, Fig. 4, to their normal horizontal position, Fig. 5.

To this end, the body 34 comprises a first inner sleeve 42, Figs. 4 and 5, on which are rigidly fixed a series of axially spaced outer sleeve sections 44, Fig. 3. Vertical fins 40 are firmly attached to these sleeve sections by brackets 46 (Figs. 4 and 5), so as to be rigid on the body 34. Rotatably positioned on the inner sleeve 42 between adjacent fixed sleeve sections 44 are a series of rotatable sleeve sections 48 to which the horizontal fins 38 are rigidly attached, at opposite sides thereof, by brackets 50. The horizontal fins 38 have radial projections 52 which extend through openings in the movable sleeves 48 into 90° circumferential slots 54 in the inner sleeve 42 for limiting of rotation of the horizontal fins on the latter sleeve to the extreme positions previously mentioned.

The body 34 includes a second, rigid inner sleeve 56 having its outer surface spaced from the inner wall of sleeve 42. Encircling the inner sleeve 56 are a series of coil springs 58, only one shown, each alined with one of the movable sleeves 48. The springs 58 have bent end portions 60 one of which engages an end wall of the adjacent slot 54 and the other of which engages the projection 52 on an adjacent one of the horizontal fins 38. These springs will be tensioned when the fins 38 are rotated to their folded position, Fig. 4, so as to bias the fins to their normal position, Fig. 5. A spring biased latch pin 62 (Fig. 5A), carried on one of the fixed sleeves 44 and releasably engaging in a slot 63 in the adjacent rotatable sleeve 48, releasably locks the horizontal fins in their folded position of Fig. 4.

A bridle 64 has one end pivotally attached to an out-

wardly projecting lug 65 on the latch pin 62 so that the latter will be retracted to release the horizontal fins for movement to their normal position of Fig. 5 in response to a strain in the tow cable 68 which is secured to the bridle by a connection 66. As previously mentioned, in cases of target release over water, connector 66 may comprise a conventional water soluble connector.

To enable the target 32 to be carried aloft by the tow plane, which may be a drone or a piloted aircraft, it is stowed within the container 20. To accomplish this stowing of the target, the horizontal fins 38 thereof are rotated to and latched in their folded position, Fig. 4, against the action of the biasing springs 58. The target is then bodily turned on its longitudinal axis to place the fins 38 and 40, and the bridle 64 in a horizontal plane and is then axially inserted, nose first, through an opening 70, Fig. 6, in the after end of the container with the fins 38 and 40 extending through the normally horizontal container slots 31, Figs. 7 and 8. The fins are folded and horizontally positioned in this manner in order to achieve close positioning of the container and wing from which it is suspended without interference between the target fins and flaps and ailerons on the wing or restriction of the action of the flaps and ailerons. Proper ground clearance is also thereby provided. The tail cone 36 of the target projects rearwardly of the container, as shown, in this stowed position.

The internal structure of the container and certain mechanism contained therein will now be described with reference to Figs. 6–13. As shown in Figs. 6 and 9, the after section 30 of the container is provided internally with supporting structure including a lower horizontal frame member 72 attached in any suitable manner along its outer edges to the inner wall of the after section 30 and having a central recessed portion 74 for receiving the body 34 of the target. This horizontal frame member is reinforced by a vertical supporting panel 76 secured thereto and to the after section 30.

Indicated at 78 is an upper horizontal frame member which is vertically spaced from the lower frame member 72 so as to accommodate the target fins therebetween and attached along its outer edges, in any suitable manner, to the inner wall of the after section 30. The after portion of this upper frame member converges toward the lower frame member 72, as shown most clearly in Fig. 6, and is recessed at 80 in alinement with the recess 74 in the lower frame, as shown, to define the after container opening 70.

The forward end of the upper frame 78 is upwardly stepped at 82, as shown in Fig. 6, and rigidly secured to the under surface of this stepped portion, in the vertical axial plane of the conatiner, are a pair of axially spaced brackets carrying cable guide rollers 84. Fixed to the upper surface of frame portion 82 and projecting downwardly through an opening in the latter, between guide rollers 84, is a solenoid operated, ballistic guillotine 86 including a blade 88. An electrical cable 89 leads from the guillotine to an electrical receptacle 89*a* on the container for connection of the guillotine in an energizing circuit on the tow plane through a detachable electrical connector 89*b*. Suspended below the blade 88 is block 90 against which the blade 88 is adapted to strike for reasons to be seen. A vertical cable guide roller 92 is rotatably supported on the under side of frame portion 82 forwardly of the forward guide rollers 84. A vertical, transverse reinforcing plate 94 is rigidly secured to the frame portion 82 and the inner wall of the after section, as shown.

Designated at 96 is a relatively sturdy frame which is rigidly fixed in the after section 30 forwardly of the upper horizontal frame 78. This frame 96 includes an upstanding portion 98, secured at its upper end to the inner wall of the after section 30, which upstanding portion, as shown most clearly in Fig. 10, is formed with

an offset, axially extending cable guideway 100. Guideway 100 has its axis tangent to the periphery of a cable drum 102 journalled for rotation about a vertical axis in a horizontal supporting portion 104 of the frame 96. This supporting portion of the frame 96, which is vertically spaced from the lower horizontal frame member 72 to accommodate the target fins, has opposite side edges attached to the after section wall in any convenient manner and is recessed in alinement with the recess 74 in the lower frame member to receive the body 34 of the target. A set of cable guide rollers 106 are carried on the frame 96 rearwardly of and in alinement with the guideway 100.

Drum 102 mounts an upper, cylindrical brake drum 108 which is peripherally engaged by a drag brake 110. This brake is shown as comprising a toggle 112 having one end pivotally connected to the support plate 94 and carrying at its other end a brake shoe 114 which is pressed against the brake drum by means of a coil compression spring 116 which biases the toggle toward its dead center position.

Drum 102 is journaled at its upper end in a gear case 118, rigidly carried on the after section 30 and enclosing reduction gearing, not shown, driven by the drum and including a final driven shaft 122. Shaft 122 extends to the exterior of the gear case 118 and mounts a slotted disk 124. Disk 124 is adapted to engage a key 126 on a brake 128 to retain the latter in released position.

Brake 128 is generally similar to drag brake 110 and comprises a toggle 130 having one end pivotally secured to upstanding portion 98 of frame 96, as shown, and carrying a brake shoe 132 at its other end. Brake shoe 132 is normally disengaged from brake drum 108, as illustrated in Fig. 6, and is adapted to be moved into frictional engagement with the brake drum, with sufficient force to prevent rotation of the latter, under the action of a coil compression spring 134 operatively engaged with the center pivot of the toggle 130. As previously mentioned, the brake 128 is retained in its disengaged position by the disk 124 and released by rotation of the disk to aline its slot 124′ with key 126. Suitable indicia 135 may be provided for initially angularly positioning the disk 124 in such a manner as to effect release of the brake 128 after a preset number of revolutions of the drum 102, for reasons to be hereinafter described.

The intermediate section 28 of the container includes a series of internal, reinforcing rings 136 and longitudinal ribs 137 which slidably support a hollow, generally cylindrical cable drum 138. Drum 138 is adapted for positioning in the container by disconnection of the center and after sections 28 and 30 which are releasably joined at 139. Drum 138 has its after end open and includes a forward end wall 140 formed with a central opening 142 and a forwardly extending cylindrical flange 144 about the latter opening. Drum flange 144 is slidably received in a central opening in a rigid forward end wall 146 peripherally attached to the container central section 28. The wall 146 may be reinforced about its central opening, as shown. In the stowed position of the target in the container, the body 34 of the target extends centrally through the cable drum 138 and has its nose portion extending forwardly of the wall 146 through the drum flange 144, as may be seen in Fig. 6.

Contained within the cable drum 138 is a coil 148 of the tow cable 68 which has one end, in an outer turn of the coil, fixed to the container. The cable 68 leads from an inner turn of the coil 148, through the guideway 100 in the frame 96, through the guide rollers 106 and is wound several times around the drum 102. The cable leads from the drum 102, around the guide roller 92 and through the guide rollers 84 and then forwardly in looped fashion, the cable passing between the blade 88 and block 90 of the ballistic guillotine 86. The free

end of the cable is attached, as previously discussed, to the target bridle 64. An annular shoulder 149, carried on the forward end of the after section 30 and fitting in the after end of the cable drum 138, as shown, when the after section is assembled on the center section 28 of the container, retains the drum and coil 148 therein in position.

As was previously mentioned, extraction of the illustrative target from the container after the tow plane is airborne is effected by the drag forces on the tail cone 36 and other exposed parts of the target. Obviously, however, suitable means, such as a booster charge, could be housed in the container for forcibly ejecting the target. The target is releasably retained in the container by mechanism 150 in the nose section 26 of the container. Mechanism 150 is supported on a frame 152 which extends transversely of the container axis and has opposite ends secured to the inner walls of the nose section 26.

Frame 152 has a guideway 154 on the axis of the container which slidably receives the nose of the target. The frame 152 comprises a pair of spaced, vertical walls 155 (only one shown) between which is pivoted the upper end of a toggle link 156. The lower end of the toggle link works in a slot 158 in the frame 152 and opening into the guideway 154. This lower end of the link is movable between an extended position of projection into the guideway when the link is in its dead center position shown in Fig. 6, and a retracted position out of the guideway by movement of the center pivot of the link to the left, as viewed in the drawings. The body 34 of the target is notched at 160 for receiving the lower end of the toggle when the latter is extended so as to be locked against axial movement from the container.

Toggle 156 is biased to the left, to retract its lower end portion, by a coil compression spring 162 acting between the center toggle pivot and frame 152. Indicated at 164 is a rotatable drum journaled between the frame walls 155 which carries at one point on its periphery a detent 166 engageable with the toggle to releasably retain the latter in its extended dead center position against the action of spring 162. This drum is biased in an anti-clockwise direction, as seen in Fig. 6, to disengage the detent 166 from the toggle and release the latter, by a coil compression spring 168 acting between an arm 170 on the drum 164 and a wall of the frame 152. Drum 164 is releasably retained against rotation to release the toggle 156 by means of an arming wire 172 secured to and partially encircling the drum and extending through an opening 174 in the container nose section for connection to a arming solenoid 176 carried on the tow plane. This solenoid may comprise any of the well known forms of arming solenoids and serves to normally retain the arming wire 172 taut to maintain the drum 164 in its toggle engaging position. The solenoid may be energized from the tow plane to release the arming wire and toggle 156 and, accordingly, the target for axial movement of the latter out of the container.

In order to permit landing of the tow plane, the tow cable is severed by operation of the ballistic guillotine 86 to release the target in which case the latter may carry a parachute to slow its descent. In the alternative, the target may mount skids for landing of the target with the tow plane. In such cases a "break" link connection between the target and tow line is preferably employed to effect automatic release of the target in response to the increased tension in the tow cable upon contact of the target with the ground. If the target is intended for use in carrier operations or otherwise over bodies of water, sufficient buoyant material 178 (Fig. 14), such as foamed polystyrene, for instance, may be placed therein to lend positive buoyancy to the target. In order to comply with the maritime restrictions, however, it may be necessary in some cases to provide means for causing submergence of the target after a certain period of time. This may be accomplished, for example, by using a buoyant material which will become saturated and lose its buoyancy after a given time.

In some instances it may be desirable to mount various radiant energy sources on the target for use of the latter with electronic fire control systems. Thus, as shown in Fig. 7, an infra-red radiation source 180 may be enclosed in the tail cone 36 of the target and connected through electrical leads 182 to a radio receiver 184 in the nose of the target for remote control of the radiation source from the ground or tow plane. In the alternative, flares 186 (Fig. 15) or other similar devices may be mounted in the tail cone of the target and electrically fired in succession, for example, from firing mechanism 188 electrically connected to a radio receiver in the target for remote firing of the flares, as desired. The tail cone may have ports 190 through which the flame of the flares exhaust so as to be usable as either visible light or infra-red radiation sources. The target may also carry a suitable device for recording hits thereon.

As shown in Fig. 16, the tail cone 36 may be detachable from the target proper and contain a coil 194 of tow cable to permit towing of the target and tail cone in tandem to achieve a multiple target effect.

In use, the present target is stowed, with its horizontal fins folded, in the container 20 and the latter is attached to the tow plane in the manner previously described. After the tow plane has reached the firing area, the arming solenoid 176 is energized to release the target whereupon air drag on the tail cone and other exposed portions of the target will cause rearward extraction of the target from the container. Upon the slack in the cable being taken up, which is preferably made to occur after the target has cleared the tail surfaces of the tow plane, the tow cable becomes taut to retract the latch pin 62 and release the horizontal target fins 38 for movement to their normal position under the action of their biasing springs 58.

The tow cable 68 is unreeled from the interior of the cable coil 148 and the drum 102 rotates as the cable pays out. The rate of rotation of the cable drum and therefore the rate at which the cable is payed out is restricted by the drag brake 110. The latter may be adjustable to obtain a desired rate of paying out of the cable. The notch 124′ in latch disk 124 is initially so set in alinement with a desired mark on the scale 135 so that after a preset number of drum rotations, corresponding to a predetermined length of cable payed out, it will become alined with key 126 of the brake mechanism 128 to release the same and the brake for movement of the latter against the brake drum 108. Rotation of the cable drum 102, and therefore, paying out of the cable 68, is thereby terminated.

Prior to landing of the tow plane, the solenoid actuated guillotone is energized to sever the tow cable and release the target which falls to the earth or water as the case may be. The target may, of course, be retrieved for reuse, if possible, in which case the target will carry a parachute to slow its descent, and the buoyant material 178 and water soluble connector 66 will be embodied in the target if the latter is released over water so as to assure floating of the target until the latter is retrieved.

While the drawings illustrate a dart-type target, other forms of rigid, high speed tow targets, such as those preliminarily mentioned, may be employed with the present container, and with some types of these targets it may be desirable or essential that the latter be forcibly ejected from the container as by a booster charge.

The various instrumentalities carried in the container 20 may take forms other than those illustrated. Thus, for example, a solenoid actuated latch might be used in place of the mechanical latch mechanism 150, and a governor controlled drag brake may be employed in lieu of the spring actuated drag brake 110. Also, the brake 128 and the latch mechanism associated therewith are illustrative only and may assume various other forms.

Accordingly the invention is intended to be limited only by the spirit and scope of the following claims.

I claim:

1. In combination, a hollow elongate stowage container having forward and after ends, means on the exterior of the container for attaching the latter to an airplane, a high speed tow target comprising a rigid elongate body axially receivable in said container, the container having an opening in its after end for movement of the target from the container, guide means in the container for slideably supporting the target body for rearward axial movement thereof through said opening in flight, a cable drum, a coil of tow cable supported on said drum, one end of the cable being affixed to the container and the other end of the cable being affixed to the target, a brake drum separate from said cable drum and journaled for rotation in the container, the length of tow cable leading from the coil to the target being wound around said brake drum, said target being adapted for movement from the container for towing behind the airplane with resultant paying out of the tow cable from said coil, said brake drum being rotated by said tow cable during paying out of the latter, and braking means operatively associated with said brake drum for controlling the rate at which the cable is payed out.

2. The subject matter of claim 1 including additional braking means operative in response to a preset number of revolutions of said brake drum to brake the latter against rotation and discontinue paying out of said tow cable.

3. In combination, a hollow elongate stowage container having forward and after ends, means on the exterior of the container for attaching the latter to an airplane, a high speed tow target comprising a rigid elongate body axially receivable in said container, the container having an opening in its after end for movement of the target from the container, guide means in the container for slideably supporting the target body for rearward axial movement thereof through said opening in flight, a cable drum, a coil of tow cable supported on said drum, one end of the cable being affixed to the container and the other end of the cable being affixed to the target, a brake drum separate from said cable drum and journaled for rotation in the container, the length of tow cable leading from the coil to the target being wound around said brake drum, said target being adapted for movement from the container for towing behind the airplane with resultant paying out of the cable from the coil and rotation of the brake drum by the cable, and braking means associated with the brake drum to brake the latter against rotation in response to a preset number of revolutions thereof.

4. The subject matter of claim 3 wherein said braking means includes adjustable means for initially establishing a desired value of said number.

5. In combination, a hollow stowage container having forward and after ends, external means on the container for attaching the latter to the exterior of an airplane, the after end of the container being open, a high speed target comprising an elongate rigid body axially positioned in the container, means in said container slideably supporting said target for rearward movement from the container through said open after end, said body having a transverse notch therein, releasable latch means comprising a detent carried by the container and removably engaging in said notch for releaseably securing the target in the container, and means including actuating means extending exteriorly of the container for effecting removal of the detent from the notch to release the target.

6. In combination, a hollow stowage container having a forward end and an open after end, means on the container for attaching the latter to the exterior of an airplane, a high speed tow target including an elongate rigid central body axially positioned in said container, means in the container supporting said target for rearward movement from the container through said open after end, said body having a transverse notch, a toggle pivoted at one end on the container and having its other end arranged for movement into said notch to lock the target in the container by movement of the toggle to dead center position, spring means biasing the toggle out of dead center position to release the target, and lock means including actuating means extending to the exterior of the container for releasably retaining said toggle in dead center position against the action of said spring means, said lock means being releasable to release the toggle by operation of said actuating means.

7. In combination, a hollow stowage container having an open after end and being formed with slots in opposite sides thereof in a given longitudinal plane of the container, said slots opening through said after end, a high speed tow target comprising a rigid, elongate body axially positioned in said container, pairs of normally vertical and horizontal stabilizing fins fixed to the body in longitudinal planes of the body, one of said pairs of fins being rigid on the body and the other pair of fins being rotatable about the longitudinal axis of the body between a normal position wherein said pairs of fins are in normal planes and a folded position wherein said pairs of fins are in substantially parallel, slightly spaced planes, spring means biasing said other pair of fins to their normal position, said one pair of fins being folded and said pairs of fins projecting through said container slots, means slidably supporting said target in the container for rearward movement from the latter in flight, latch means operable exteriorly of the container releasably securing the target against rearward movement from the container, a coil of tow cable supported in the container, one end of the cable being attached to the container and the other end of the cable being attached to the target, and braking means for terminating paying out of said cable after a given length thereof has been payed out.

8. In combination, a high speed tow target comprising a rigid body having foldable fins, a container for said target, means for attaching the container to an airplane, said container having an opening through which the target may move from the container in flight, a tow cable secured at one end to the container, means securing the other end of the tow cable to the target including latch means for releasably latching said target fins in their folded condition, said latch means being released in response to a predetermined tension in the tow cable, and spring means for erecting the fins upon release of said latch means.

9. A high speed tow target, comprising an elongate, rigid body, means for attaching a tow cable to said body, stabilizing fins carried on the body in longitudinal planes thereof, means mounting at least some of the fins on the body for rotation about the longitudinal axis of the latter between a normal position and a folded position, spring means biasing said rotatable fins to their normal position, latch means for releasably latching the fins in folded position, and means operatively connecting said first mentioned means and latch means for release of the latter to release the fins upon a force being applied to said first mentioned means in a forward direction relative to the target.

10. A stowage container for a high speed tow target of the class described, comprising, a hollow, generally cylindrical shell having a closed forward end and an open after end, means for attaching the shell to an airplane, a cable storage drum supported within said shell, coil of tow cable supported by said drum, said cable having one end secured to the container and a free end leading from the coil for attachment to a tow target, a rotary cable drum journaled in said container, said free end of the cable leading from the coil being wrapped around said rotary drum, and means associated with the rotary drum for controlling the rotation thereof.

11. The subject matter of claim 10 wherein said last mentioned means comprise braking means responsive to

a preset number of revolutions of the rotary drum to brake the latter against rotation.

12. In combination, a tow target including a rigid elongate body having forward and after ends, a generally cylindrical stowage container for said target, an annular cable drum mounted in said container, said drum having an axial opening of a size to receive the forward end of said target body, support means in the container defining a guideway for slideably supporting said target body in the container in substantially concentric relation to said drum with the forward end of the target extending through said opening in the cable drum, and said container having an open, normally after end to accommodate rearward axial movement of the target from the container.

13. The subject matter of claim 12 wherein said after end of the target protrudes exteriorly of the container through the open after end of the latter when the target is stowed in the container, said container being adapted to be mounted exteriorly of an airplane whereby said protruding end of the target has a rearward drag force exerted thereon in flight for causing said rearward axial movement of the target from the container, said support means slideably supporting the body of the target for axial movement of the latter from the container under the action of said drag force, and releasable means for retaining the target in the container against the action of said force.

14. In combination, a hollow elongate stowage container having forward and after ends, means on the exterior of the container for attaching the latter to an airplane, a high speed tow target comprising a rigid elongate body axially receivable in said container, the container having an opening in its after end for movement of the target from the container, guide means in the container for slideably supporting the target body for rearward axial movement thereof through said opening in flight, a hollow cylindrical cable storage drum in said container, an annular coil of tow cable within said drum, one end of the cable leading from an outer turn of said coil and being fixed to the container and the other end of the cable leading from an inner turn of said coil and being secured to the target.

15. In combination, a hollow elongate stowage container, a target including a rigid tubular body substantially equal in length to said container, said target being positionable in a stowed position in the container wherein the target body extends axially of the container, means for attaching the container to an airplane with the longitudinal axis of the container extending in a fore and aft direction, the normally after end of the container being open to accommodate rearward axial movement of the target from the container, guide means in the container for slidably supporting said body of the target for said rearward axial movement from the container in flight, said target having radially extending, stabilizing fins at one end, said one end of the target when the latter is in said stowed position being located at said after end of the container, and said container being formed with longitudinally extending slots opening through its after end for slidably receiving said target fins.

16. The subject matter of claim 15 wherein the number of said slots is less than the number of said target fins, and said target comprises means mounting at least some of said fins on the target body for movement between normal positions and folded positions wherein the fins are accommodated to receipt in said slots.

17. The subject matter of claim 16 wherein said container is formed with a pair of said slots located in a common longitudinal plane of the container, and said container being adapted to be mounted on the wing of an airplane with the plane of said slots substantially paralleling the wing, said target comprising two pairs of said fins, the fins of each pair being substantially coplanar, one of said pair of fins comprising said movable fins, the plane of said movable fins being substantially normal to the plane of the other pair of fins in the normal positions of the fins, and the movable fins being movable on the target body from said normal position to said folded position wherein said pairs of fins lie in substantially parallel planes, and said pair of container slots being proportioned to slidably receive said target fins when the latter are located in said substantially parallel planes.

18. In combination, a hollow elongate stowage container, a target including a rigid tubular body substantially equal in length to said container, said target being positionable in a stowed position in the container wherein the target body extends axially of the container, means for attaching the container to an airplane with the longitudinal axis of the container extending in a fore and aft direction, the normally after end of the container being open to accommodate rearward axial movement of the target from the container, guide means in the container for slidably supporting said body of the target for said rearward axial movement from the container in flight, a length of tow cable connecting said container and target for towing of the latter at a given distance behind the container, said target comprising radially extending, stabilizing fins, means mounting at least some of said fins in the target body for movement between normal positions and folded positions to accommodate positioning of the target in the container, means for biasing said movable fins to normal position, and releasable latch means for retaining the movable fins in folded position.

19. The subject matter of claim 18 wherein said releasable latch means includes means connected to said tow cable for effecting release of the latch means in response to a given tension in the tow cable.

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