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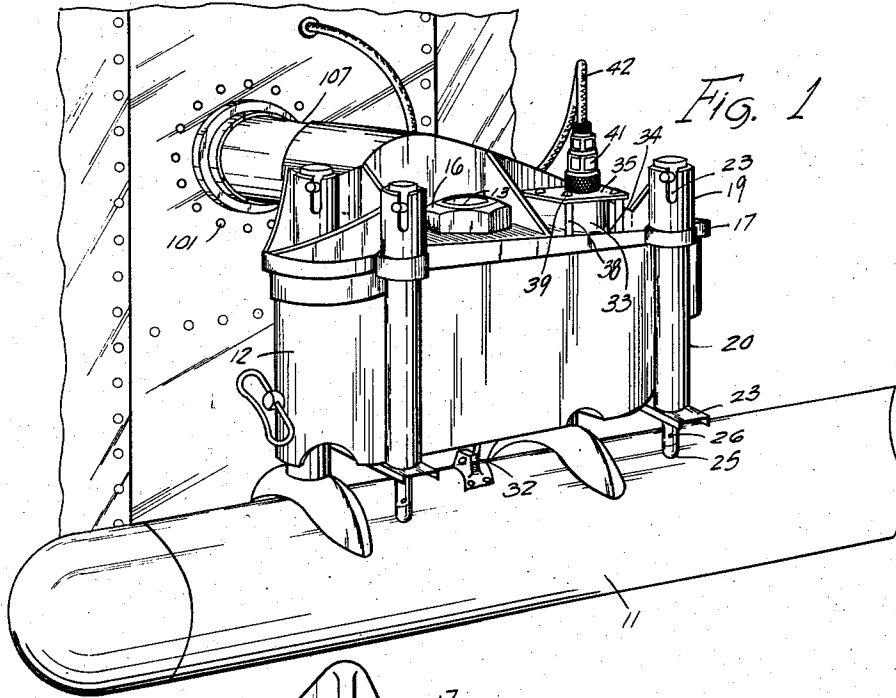
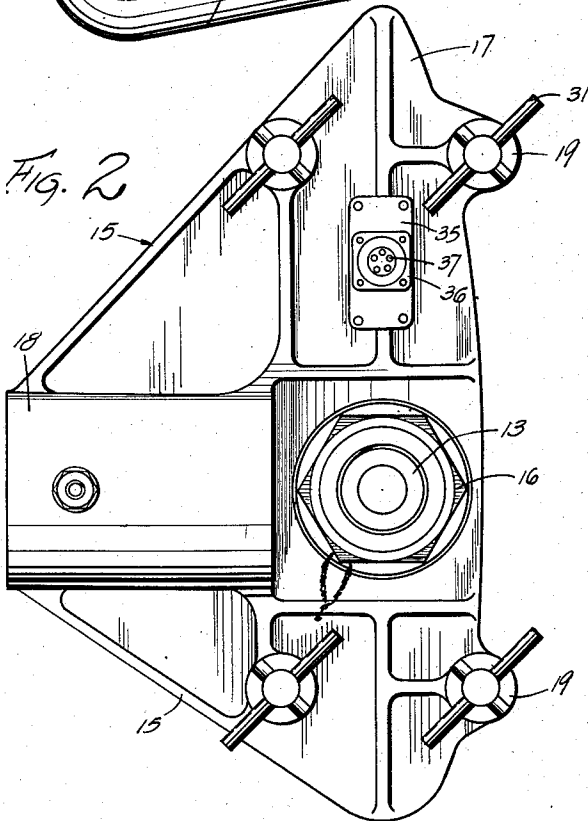
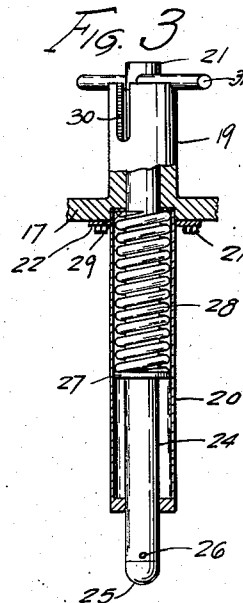
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2,858,737

MISSILE OR MINE LAUNCHER

Filed April 13, 1953

3 Sheets-Sheet 1



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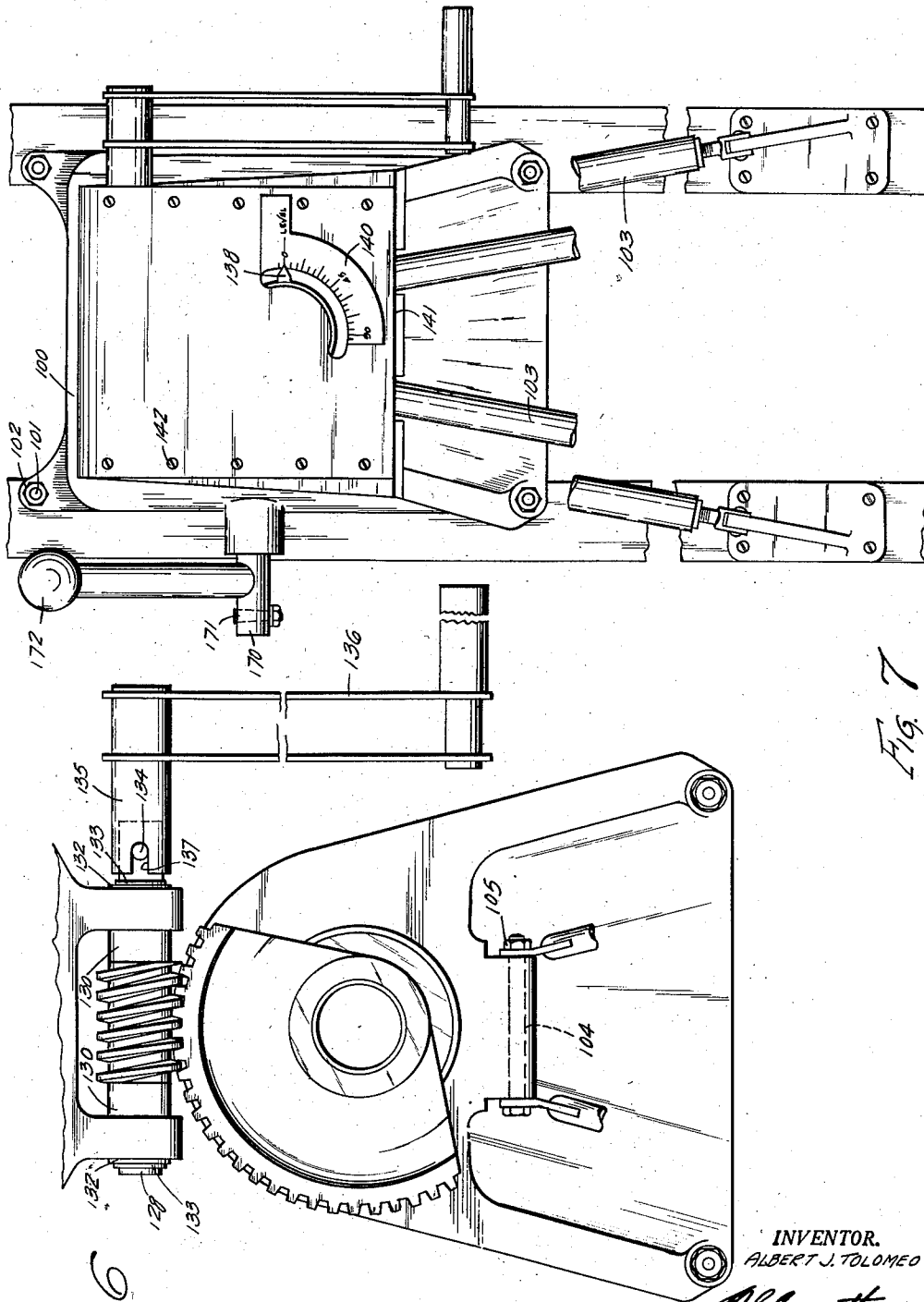


Fig. 6

Fig. 7

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MISSILE OR MINE LAUNCHER

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2 Claims. (Cl. 89—1.5)

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.

This invention relates to a mine launcher for use in supporting and launching a missile, such as a torpedo, mine or bomb from an airborne craft.

It is an object of the invention to provide a missile launcher which will support the missile in various attitudes of position over a range of approximately 90° with respect to the centerline of the fuselage of the aircraft. This is particularly important when the aircraft is carrying torpedos as the water entry angle is a critical factor in the path and depth of the torpedo.

It is a further object of this invention to teach means by which the position of the missile may be selected and maintained from within the aircraft.

Still another object of this invention is to provide new and novel means for supporting a missile from an airborne craft in a launching position independently of the attitude of the aircraft.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is an oblique view of the bomb rack assembly which forms part of the invention, showing a missile in place;

Figure 2 is a top plan view of the bomb rack assembly with the receptacle plug removed;

Figure 3 is a cross-sectional view of one of the plungers;

Figure 4 is a cross-sectional view of the support assembly which supports the bomb rack assembly shown in Figure 1;

Figure 5 is a cross-sectional view of the support assembly showing the brake;

Figure 6 shows the end of the support assembly with the cover plate removed to show the worm and worm gear sector; and

Figure 7 is an end view of the support assembly illustrating the position dial.

The device which is the subject of the invention comprises a support assembly which includes means for attaching the missile launcher to the aircraft and for controlling the position of the missile about a horizontal axis normal to the aircraft fuselage and a bomb rack assembly outside the aircraft which is suspended from the support assembly and which includes a bomb rack for holding the missile and means for attaching an electrical connector supplying arming and releasing current and means for applying an initial launching force to the missile upon its release.

As shown in Figure 1 the mine 11 is supported by a standard bomb rack 12 known as the Mark 55, Model 0 Navy bomb rack. This rack is provided with a threaded boss 13 which passes through an opening 14

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in a bracket or adapter 15 of the missile launcher. A nut 16 is threaded onto the boss 13 and lock wired in place.

The bracket 15 comprises essentially a flat, ribbed plate 17 merging into a cylindrical collar 18. At the apices of an imaginary rectangle inscribed on the plate 17 are located four cylindrical sleeves 19 and extending opposite these sleeves and coaxially therewith are cylindrical housing members 20. Bolts 21 pass through a flange 22 on one end of each of the housing members to secure said members to the plate. Channels 23 connect the other ends of the housing members in pairs and help maintain them in position. A slidable tubular pin or plunger 24 is inserted in each of the housing members and has at one end a solid tip 25 which bears against a missile held in the bomb rack, and the tip being secured by a small pin 26. Each of the plungers is provided about midway of its length with a collar 27 and surrounding the plunger is a compression spring 28 whose one end bears upon said collar and whose other end abuts an annular shoulder 29 formed in the plate 17. The purpose of these plungers is to impart an initial launching force to the missile upon its release to insure release of the hanger lug 32 on the mine and to help obtain clearance of the mine from the aircraft. In tests conducted by the inventor using a dummy missile of 300 pounds and a combined spring force on the missile of 200 pounds, the missile was dropped from various attitudes between 5° above the horizontal to 90° below the horizontal, the approximate limits of position of the support assembly, with good clearance between the released mine and the aircraft being obtained in all cases. Each of the sleeves 19 is provided with a slot 30 which cooperates with a cross-pin 31 on each of the plungers to limit the motion of the plungers in one direction. These cross-pins also afford a means by which the plungers may be locked out of action for certain purposes, for instance to facilitate placing the missile in position on the bomb rack.

On the plate 17 is a projecting hollow cylinder 33 through which passes a wiring conduit 34 provided on the bomb rack. A mounting plate 35 is attached to the plate 17 over said cylinder 33 by bolts 39 and nuts 40 passing through spacers 38. A receptacle plate 36 is riveted to the mounting plate and supports a receptacle 37 which receives pins on plug 41 on the end of the cable 42 carrying arming and releasing current to the bomb rack. The cable 42 is terminated at a switch accessible to the pilot.

The support assembly is located interiorly of the aircraft and comprises a frame member 100 attached to structural members of the aircraft by clevis bolts 101 and nuts 102. Further support is provided by tubular braces or rods 103 bolted to structural members of the aircraft and extending to the free end of said frame and being attached there by a bolt 104 and nut 105. Said frame includes a bearing support 106 integral with said frame. A main shaft or tube 107 extends through the bearing support and exteriorly of the aircraft where it fits into the collar 18 and serves to support the bomb rack assembly. Taper pins 43 secure the tube 107 to collar 18. A riveted collar 108 on said tube abuts the end of a bearing 109 inserted in the bearing support to prevent thrust in one longitudinal direction and a brake drum 110 secured by pins 111 to said shaft abuts the end of a second bearing 112 also held in said bearing support thereby preventing movement of the shaft in the other direction. A grease fitting 113 is threaded into the hole 114 in said bearing support to facilitate lubrication of the bearings 109 and 112.

Tube 107 terminates within a bearing support 115

formed in the frame 100 at its end opposite the bearing support 106. The tube is rotatable within the bearing 116. Grease fitting 117 is provided for lubricating said last mentioned bearing and a washer 118 acts to retain the bearing in place. A stepped, hollow stub shaft 119 is secured to said main shaft by taper pins 125 and has a portion fitting within said main shaft while its reduced portion 120 projects beyond the end of said main shaft sufficiently to receive the hub 126 of a worm gear sector 121. The gear sector is keyed to the part 120 by a key 122 and is held against endwise movement by a washer 123 and locking ring 124.

The taper pins 43, 111 and 125 are inserted in holes drilled and reamed to a close fit and are drawn tight by threading on nuts.

Worm gear 121 meshes with worm 127 which is locked to a shaft 128 by a key 129. The shaft 128 is journaled in the frame member and retained by a washer 132 and locking ring 133 on each end. Spacer 130, also carried on the shaft 128, limit end play of the worm. A crosspin 134 is also driven through the shaft 128 and engages a pair of notches 137 in the hub 135 of a crank 136. The worm may thus be rotated by means of the crank to cause partial rotation of the gear sector which rotation is transmitted to the main shaft and finally to the bomb rack assembly to orient the missile held by the bomb rack to its desired relative position. An indicator or pointer 138 is attached to the gear sector by screws 139 and in conjunction with a calibrated dial 140 on a cover plate or guard 141 shows the attitude of the missile. The cover plate is fastened onto the frame member by a plurality of threaded fasteners 142.

The brake assembly includes, in addition to the brake drum 110, a brake band 150 substantially encircling the brake drum and having its one end secured about an adjusting bushing 151 while its other end is free. A bolt 152 is utilized to mount the bushing on the frame member. The free end of the brake band has attached to it a cam follower 153 having a cam face 154 and a guide slot 155, said guide slot cooperating with a guide pin 156 to keep the brake band in alignment with the brake drum. The guide pin is provided with a threaded stem 157 which receives the nut 158 to fasten said pin to the frame member. A pair of stop pins 159 having threaded stems 160 are secured to the frame member with nuts 161 and in cooperation with an abutment pin 162 secured in the brake drum operate to limit rotation of the gear sector within the boundaries of its arc. A nut 164 threaded onto the shank 163 of the abutment pin serves to attach said pin to the web of the brake drum.

A bore 165 is provided in the frame member 100 houses a bearing 166 in which is journaled a tubular stub shaft 173. A cam 167 bears on the cam face 154 of the follower 153 and is secured to the stub shaft by a pin 168. The hub 170 of a tubular handle or lever 172 is fitted onto the shaft 173 and bears against a washer 169 also assembled on the shaft 173. A taper pin 171 passes through the hub 170 and the shaft 173 to secure them against relative rotation.

To operate the positioning mechanism the brake is released by moving the handle 172 to rotate the cam 167 to its position wherein the most shallow portion of the cam

bears against the cam face 154. The brake is released in this position of the cam and the brake drum and consequently the tube 107 may be turned freely. The crank 136 is rotated in the desired direction to turn the worm gear by means of the worm to a preselected position as indicated on the dial 140, thus placing a missile held in the bomb rack assembly in a desired attitude. When this is accomplished the brake lever is rotated to a position wherein the cam 167 forces the brake band into clamping engagement with the brake drum, locking the mine in its set attitude.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. In a missile launcher for aircraft, a support assembly located interiorly of the aircraft, a main shaft, bearings provided in said assembly for rotatably supporting the main shaft, a worm gear sector fixed to one end of said main shaft, a manually rotatable worm meshing with the worm gear sector and operable to cause rotation of said sector, a brake drum keyed to said main shaft, a brake band cooperating with said brake drum and a manually rotatable cam operatively associated with said brake drum and effective to clamp the brake band on the brake drum to prevent rotation of said brake drum and consequently of said main shaft and means for supporting a missile externally of the aircraft, said means including a substantially flat, ribbed plate merging into a cylindrical collar, the other end of said shaft being inserted into said collar and rigidly secured thereto.

2. Missile launching equipment for aircraft comprising a support located interiorly of the aircraft, a tubular shaft rotatably mounted in the support and projecting exteriorly of the aircraft, a missile holding assembly secured to the exterior end of the shaft with the longitudinal axis of the assembly parallel to the longitudinal axis of the aircraft, means within the aircraft for rotating the shaft to any desired position so that the longitudinal axis of the assembly forms an acute angle with the longitudinal axis of the aircraft, locking means for holding the shaft in any desired position, missile holding and releasing mechanism located centrally on the assembly and a plurality of spring biased plungers located equidistantly from the holding and releasing mechanism for supplying a launching force to the missile.

References Cited in the file of this patent

UNITED STATES PATENTS

1,400,261	Bowker	Dec. 13, 1921
1,720,846	Mather	July 16, 1929
2,481,542	Schuyler	Sept. 13, 1949
2,549,785	Douglas	Apr. 24, 1951
2,771,811	Lauritsen	Nov. 27, 1956

FOREIGN PATENTS

428,934	Great Britain	May 15, 1935
380,253	Italy	May 1, 1940
411,576	Italy	Jan. 18, 1945
987,903	France	Apr. 25, 1951