Jan. 7, 1947. L. J. MAXSON ET AL 2,413,723

CATAPULT

Filed July 21, 1932 4 Sheets-Sheet 1

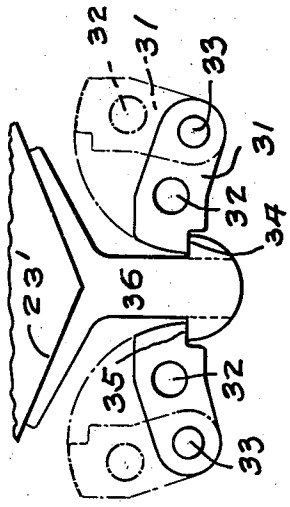


Fig. 4.

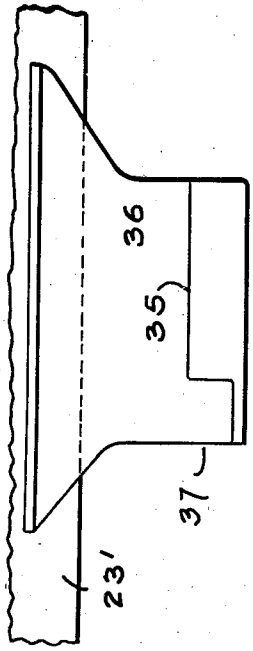


Fig. 5.

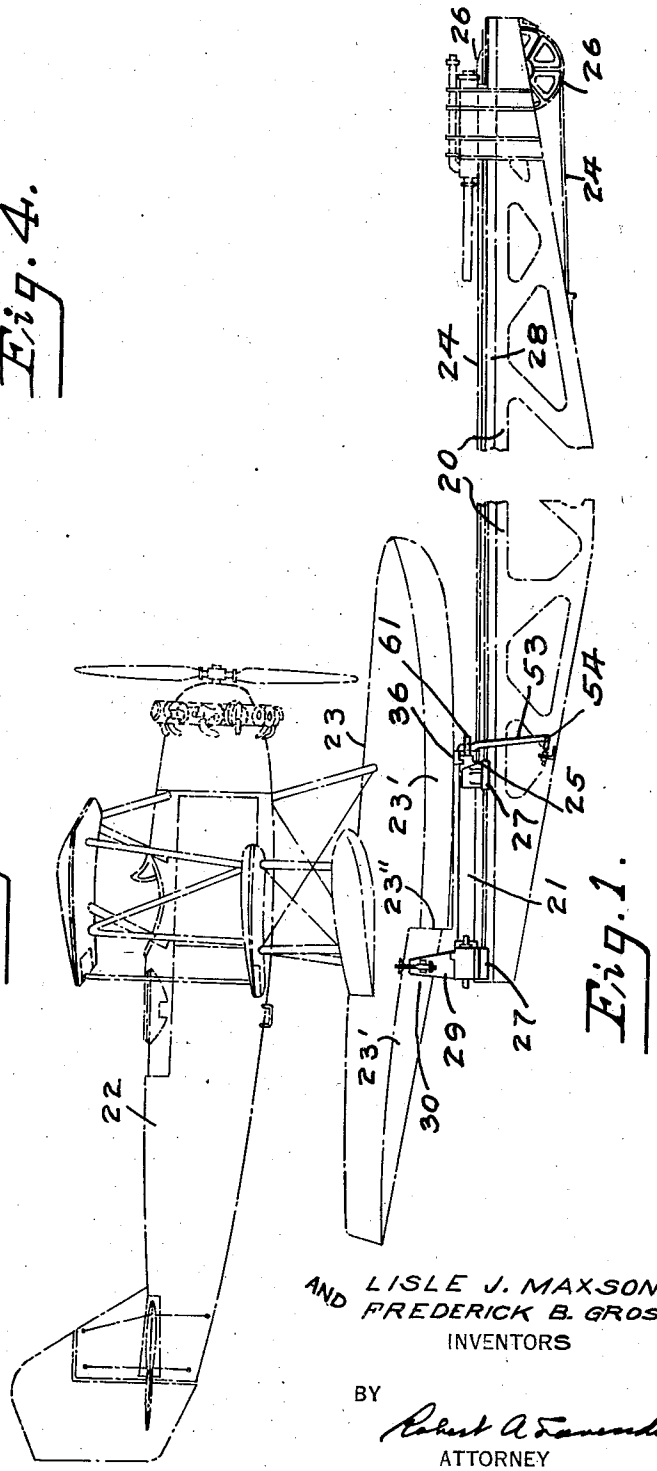


Fig. 1.

INVENTORS
AND LISLE J. MAXSON
FREDERICK B. GROSS

BY
Robert A Lavender
ATTORNEY

Jan. 7, 1947. L. J. MAXSON ET AL 2,413,723

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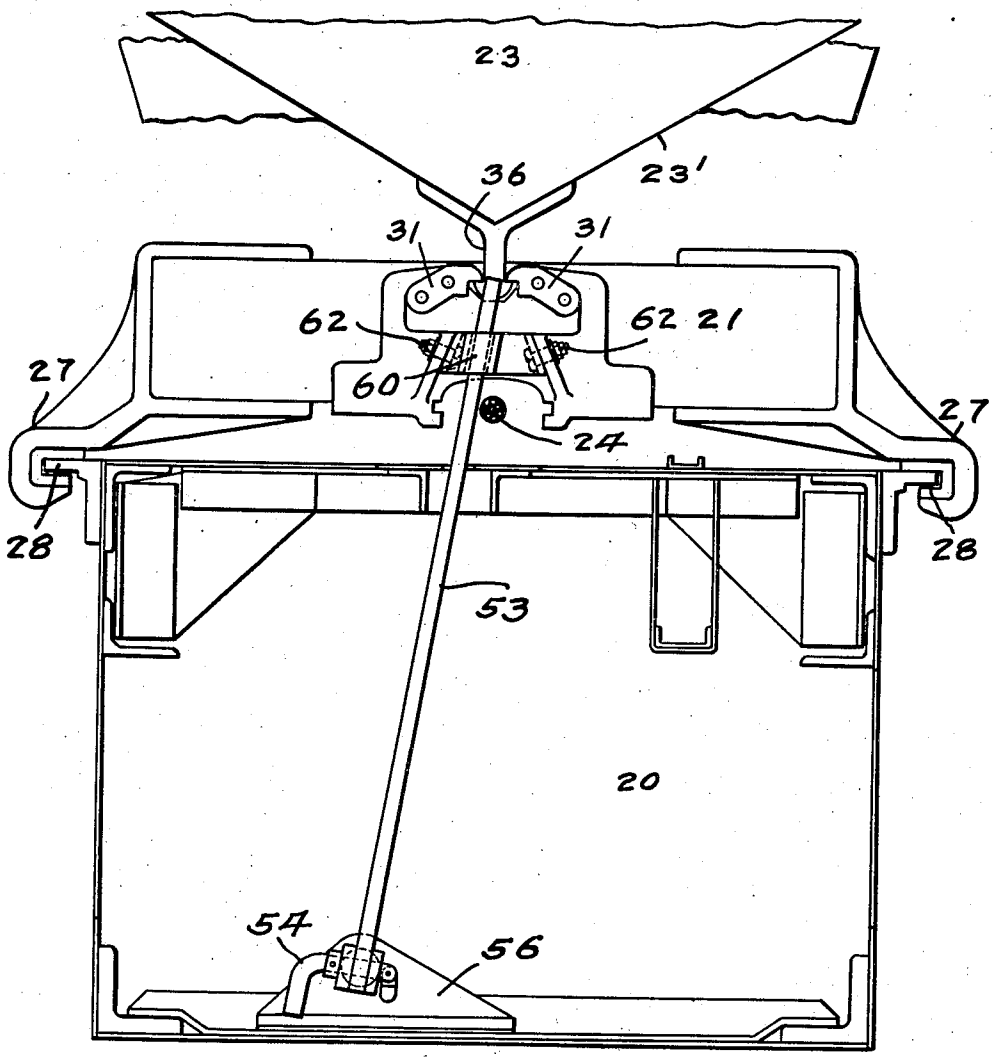


Fig. 2.

AND LISLE J. MAXSON
FREDERICK B. GROSS
INVENTORS

BY

Robert A. Lavender
ATTORNEY

Jan. 7, 1947. L. J. MAXSON ET AL 2,413,723

CATAPULT

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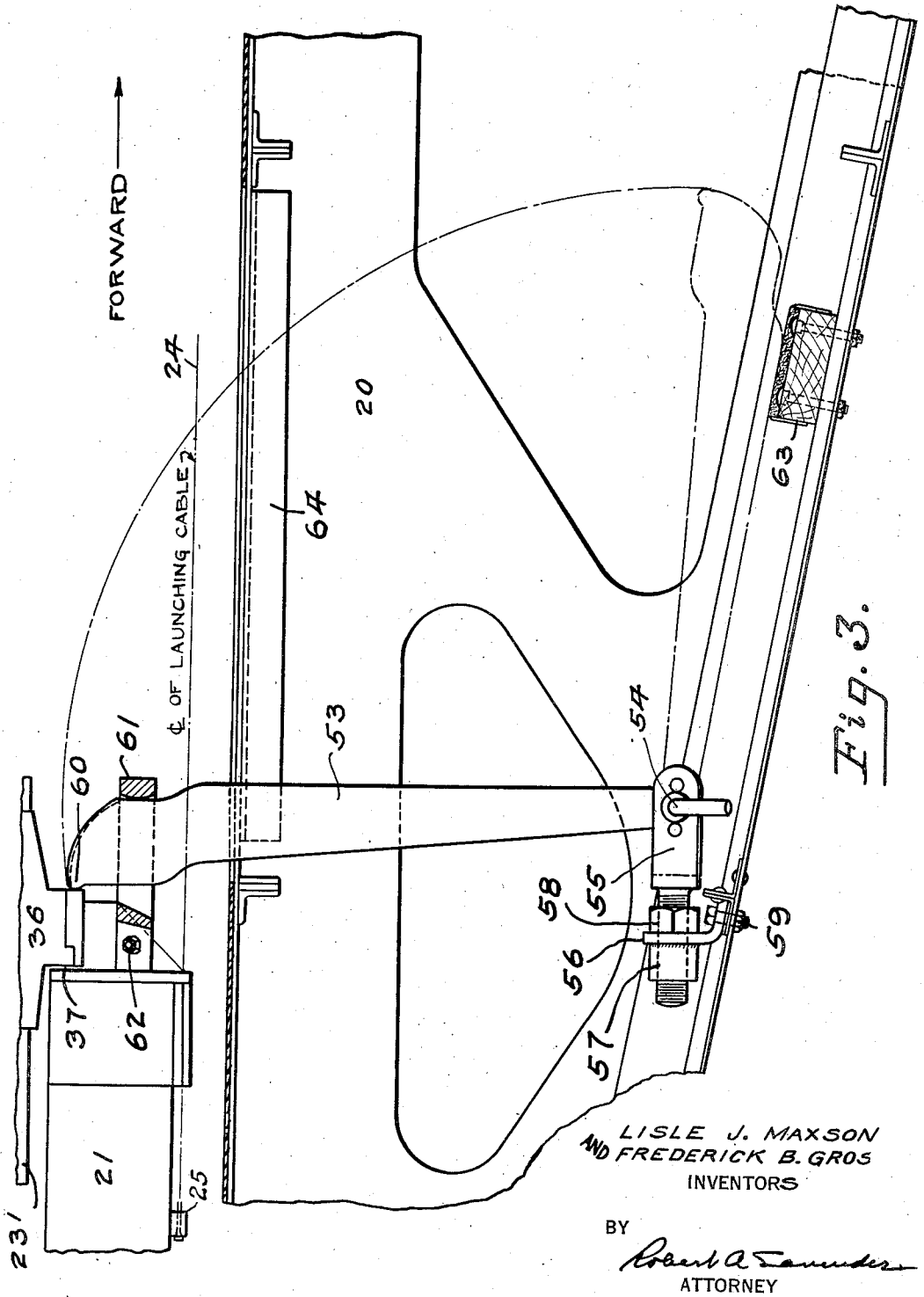


Fig. 3.

LISLE J. MAXSON
AND FREDERICK B. GROS
INVENTORS

BY Robert A. Saunders
ATTORNEY

Jan. 7, 1947. L. J. MAXSON ET AL 2,413,723

CATAPULT

Filed July 21, 1932 4 Sheets-Sheet 4

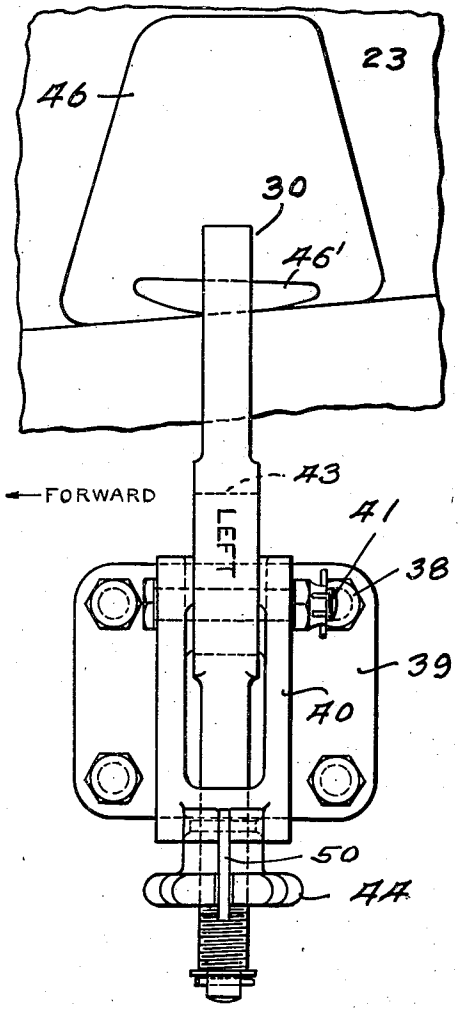


Fig. 6.

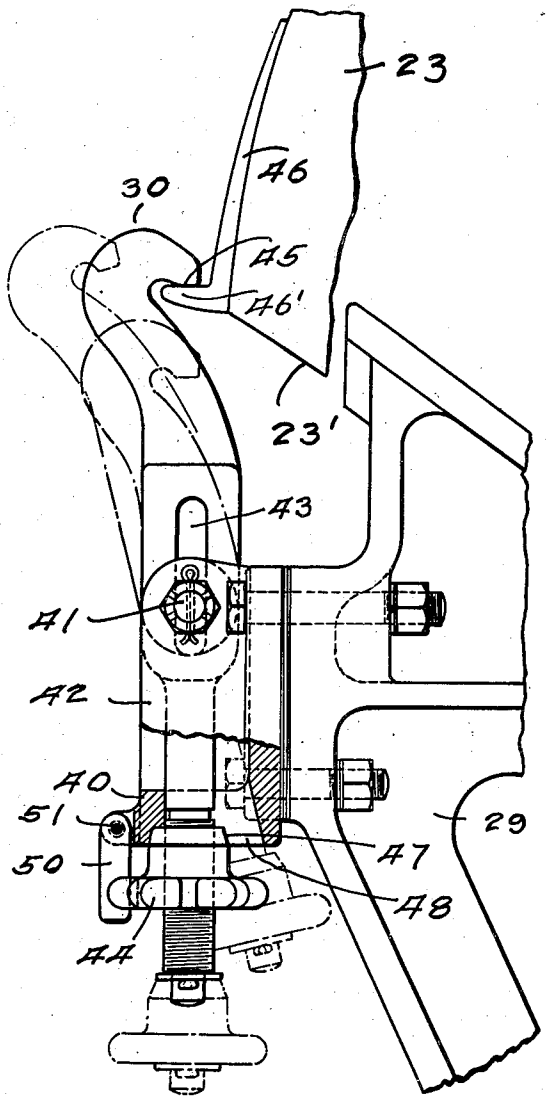


Fig. 7.

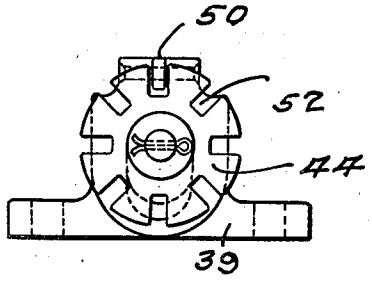


Fig. 8.

AND LISLE J. MAXSON
FREDERICK B. GROSS
INVENTORS

BY Robert A. Lavender
ATTORNEY

Patented Jan. 7, 1947 2,413,723

UNITED STATES PATENT OFFICE

2,413,723

CATAPULT

Lisle J. Maxson and Frederick B. Gross,
United States Navy

Application July 21, 1932, Serial No. 623,808

11 Claims. (Cl. 244—63)

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

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Our invention relates broadly to catapults for launching airplanes, and more particularly to improved hold-down and release mechanism of the launching car associated therewith.

The principal object of our invention is to provide improved and efficient operating mechanism for securing the airplane to the launching car and insure positive release of the same automatically during the launching run.

A further object of our invention is to provide a positive means whereby absolute certainty is assured in the freeing of an airplane from a launching car at a proper time after acceleration has begun.

A further object of our invention is to provide a positive hold-down mechanism for securing the landing gear of an airplane to a launching car of a catapult in such a manner as to insure positive security until after acceleration has begun and, after the run and the launching car is returned to its starting position, the hold-down mechanism can be readily set up for receiving another aircraft.

Another object of our invention is to provide the mechanism of the character described that is rugged, light in weight, and positive in action.

Reference is to be had to the accompanying drawings, forming a part of this specification in which like reference characters indicate corresponding parts throughout the several views and in which:

Figure 1 is a detail side elevation of an airplane mounted in starting or battery position upon a launching car of a catapult, incorporating our improved hold-down and releasing mechanism.

Figure 2 is an enlarged fragmentary front view showing portions of the forward hold-down fitting, and details of the safety connecting bar.

Figure 3 is a detail side view of parts shown in Figure 2.

Figure 4 is an enlarged fragmentary front view of the forward hold-down members.

Figure 5 is an enlarged fragmentary side view of the elongated lug extending below the center of the pontoon.

Figure 6 is an enlarged detail side view of one of the rear hold-down hooks.

Figure 7 is a side view of the rear hold-down hook and its application to the side of the launching car.

Figure 8 is a bottom view of the hand wheel and its locking member.

Referring more particularly to the drawings 20 indicates a portion of a conventional catapult

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beam with a mechanism for the acceleration of launching car 21 upon which is attached a typical airplane 22 being shown more or less diagrammatically. For the purpose of illustration our improved mechanism has been shown as applied to an airplane of the seaplane type equipped with a single pontoon 23 having a V bottom 23' and single step construction 23''.

The launching car 21 is propelled along the guide rails of the catapult 20 by means of power applied to the launching cable 24. The cable 24 being connected to the car 21, as at 25 and is run forward over the sheave 26 and then to a catapult engine (not shown).

The car 21 is constructed of metal fabricated structure composed of numerous castings, plates and angles secured together to form a rigid unit.

The customary shoes 27 are located at the four corners of the car 21 for sliding engagement along the side rails 28 of the catapult beam 20.

In the operation of the device it is also the practice to provide a release mechanism or breaking bar between the car and the launching beam that will separate only after sufficient predetermined amount of power has been developed to accomplish a perfect launching, but since this feature does not constitute novelty in the present invention further description is omitted.

A saddle 29 secured to the structural members of the car 21 provides a rest for the rear end of the pontoon 23 and a support for the rear hold-down hooks 30 for connecting the pontoon 23 to the launching car 21, while the forward end of the car is provided with latch members 31 which are equipped with removable securing pins in the apertures 32 and pivot about the bolts inserted at 33. The inner ends of the latch members 31 are machined off so as to form bearing faces 34, for engagement with the shoulder 35 of the central forward fitting 36 of the pontoon 23. The rear end of the fitting 36 extends below the lines of the car structure as at 37 and acts as the propulsion contact between the car and the pontoon, while the forward end of the fitting 36 forms an abutment for the coupling mechanism (to be described later).

After the car 21 has been brought back to battery position at the rear end of the catapult beam 20 the airplane 22 is lowered by a hoisting crane and sling (not shown) to the battery position, the float 23 is secured to the car 21 by means of the combined hold-down and automatically releasable hooks 30 which are secured to the sides of the saddle structure 29 by means of

bolts or the like 38 passing through the apertures in the flange plate 39 of the brackets 40. The hooks 30 are mounted by a passing bolt 41 through apertures in the side plates 42 of the brackets 40, and through an elongated slot 43 formed in the shank of the hook. A hand operated wheel 44 is threaded to the lower end of the hook 30 so that when the same is raised to full line position of Figure 7 the lip 45 will pass over the flange 46' of the plates 46 secured to the side of the pontoon 23. The wheel 44 is then turned up on the threads until the bevelled faces 47 are brought up against the edges of the elongated aperture 48 formed in the bracket 40. In order to insure the parts against accidental release a dog 50 is hinged at 51 to the bracket 40 and engages notches 52 formed in the flange of the wheel 44. The plates 46 have the upper face of their flanges 46' slightly inclined in a forward direction as shown more clearly in Figure 6 so that as the airplane is launched forward the hook 30 will slip off at the back end more readily.

In addition to the hold-down mechanism 30 located at the rear of the step 23'' of the pontoon 23, and the forward hold-down members 31 in engagement with the fitting 36 secured to the bottom 23' of the pontoon 23, we provide a further safety coupling bar 53 to prevent accidental separation or displacement of the pontoon 23 from the launching car 21 while in starting or battery position upon the launching beam 20. The coupling bar 53 is pivotally connected by a removable pin 54 located at the lower end to an adjustable fitting 55 mounted on a bracket 56 which is set at the desired position by means of the threaded collar 57 and lock nut 58. The bracket 56 is secured by bolts 59 to the beam 20. The bar 53 has a lip 60 which is placed in contact at the foremost point of the fitting 36 of the pontoon bottom 23' and is held in this position by a link fitting 61 which is connected to the launching car 21 by the bolts 62. This bar 53 will move in an arc as shown in Figure 3 to the broken line position immediately after the launching run has begun and rest upon the resilient pad 63 until reset for another launching.

To reset the bar 53, the pin 54 is removed and the nose is slipped through the slot in beam 20 between the reinforcing angles 64 and through the link fitting 61 and placed in contact with the fitting 36 of the pontoon.

The operation of our improved device is as follows:

Before the aircraft is placed on the launching car, the hooks 30 are lowered out of position, the latch members 31 are opened as shown by the dotted lines in Fig. 4 and the bar 53 is removed from its fitting by taking out pin 54. The airplane is then lowered until the float rests on the launching car, where it is made secure against upward and sidewise displacement by placing hooks 30 in contact with flanges 46' and securing the latches 31 by pin 32 so that bearing faces 34 rest against the shoulders 35 of the fitting or lug 36. The nose of bar 53 is then inserted through slotted link fitting 61 with the lip portion 60 bearing against the forward end of lug 36 and the lower end of the bar is placed into fitting 55 and pivotally secured by pin 54. When the launching car is released or starts to move forward, the lip 60 of bar 53 is pushed out of contact with the lug 36 and the forward movement of the car causes the bar to rotate about its pivot point, the pin 54, until it is entirely displaced from the slotted fitting 61 and permitted to drop to

the pad 63. Thus, by a short or very limited movement of the launching car, the means for preventing creeping of the airplane in battery position is displaced and the airplane is free to move out forward from the launching car as soon as the acceleration of the airplane exceeds that of the car.

It will be understood that the above description and accompanying drawings comprehend only the general and preferred embodiment of our invention, and that various changes in construction, proportion and arrangement of parts may be within the scope of the appended claims, and without sacrificing any of the advantages of our invention.

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

What we claim is:

1. In a hold-down connection for securing airplanes to catapulting apparatus, in combination, a landing gear, a launching car, flanged fittings secured to said car, brackets supported by said car, hooks pivotally connected to said brackets adapted to engage flanged fittings, and threaded hand wheels for tensioning said hooks, and means for locking said wheels in adjusted position supported by said brackets.

2. In an airplane launching apparatus, in combination, a launching beam, a launching car adapted to travel on said launching beam, an airplane having a float supported by said car, a lug projecting downwardly from the bottom of said float, a cross beam attached to said car for contact with said lug to impart a propelling motion to said airplane by forward movement of said car, flanges extending from said lug, latches secured to said car transversely of said lug and having bearing faces for engagement with said flanges, securing pins removably inserted through apertures in said latches for pivotally moving said latches when seating the airplane on said car, a plurality of flanged plates projecting horizontally from the sides of the float of said airplane, a plurality of adjustable hooks adapted to be moved transversely to engage said flanged plates upon lowering of said airplane on said car, thereby restricting the airplane when leaving the car to horizontal movement.

3. In a coupling mechanism for holding the rear of an airplane down upon a launching car, in combination, flanged brackets projecting outwardly from the side of the airplane, and adjustable hooks pivotally mounted upon the launching car and adapted to engage said flanges to prevent the airplane from lifting vertically.

4. In a coupling mechanism for restricting the rear end of an airplane to horizontal movement while mounted upon a launching car, in combination, a plurality of flanged plates projecting horizontally from the sides of the airplane, a plurality of adjustable hooks adapted to be moved transversely to engage said flanged plates upon seating the airplane on the car to restrict the airplane to horizontal movement when being freed from the car.

5. In a coupling mechanism for holding the forward end of an airplane down upon a launching car, in combination, a lug secured to the airplane and having horizontally located flanges extending from the sides thereof, a plurality of latch members pivotally mounted to the launching car and adapted to engage the horizontal flanges of said lug for holding down the airplane, and re-

movable securing pins adapted to hold said latch members in place after the airplane is lowered onto the launching car.

6. A launching apparatus for an aircraft, in combination, landing gear having a lug secured to and projecting below the bottom thereof, a launching beam, a launching car mounted on the beam, latching means on the car for engaging the lug of said landing gear so as to hold the forward portion of said car against upward displacement, flange fittings on the side of the gear pivot means adjustably secure to the car for engaging the fittings to hold the rear portion of the gear in position, and means pivotally secured to the launching beam to bear against said lug to prevent forward movement of the gear when the airplane is in battery position, and to automatically move out of position when the launching car is moved.

7. A launching apparatus for an aircraft, in combination, landing gear having a lug secured to and projecting below the bottom thereof, a launching beam, a launching car adapted to reciprocal motion on said beam, latching means on said car for engaging said lug, and means for holding the gear against forward motion when the launching car is in battery position, said holding means comprising a lever pivotally secured to the beam and a guide member secured to the car for holding the lever against the lug, the lever being automatically displaced from the lug as soon as the car moves forward.

8. A launching apparatus for an aircraft, in combination, a landing float having a lug projecting from the bottom thereof, a launching beam, a launching car having a cross bar member with latching means for engaging said lug when the gear is lowered into battery position, a lever pivotally secured to the launching beam, and a guide link attached to said cross bar member for holding the lever against the lug while the launching car with the aircraft is in battery position, the lever being automatically displaced from the lug and guide link as soon as the car moves forward.

9. A launching apparatus for aircraft comprising a launching beam, a launching car adapted to reciprocal motion on said beam, means on said car for holding the forward portion of an aircraft against upward and sidewise displacements, means for retaining the rear portion of the aircraft against upward and sidewise displacements, and a hold-back mechanism supported on said beam for preventing the creeping of an aircraft while in battery position on the launching car.

10. A launching apparatus for aircraft comprising a launching beam, a launching car on said beam, U-shaped members carried by said launching car, said U-shaped members providing guiding and sliding means for said launching car on said beam, and hold-back mechanism supported on said beam for preventing the creeping of an aircraft while in battery position on the launching car and automatically releasable from said aircraft by the initial forward motion of said car from starting position.

11. A launching apparatus for aircraft comprising a launching beam, a launching car adapted to reciprocal motion on said beam, U-shaped members carried by said launching car, said U-shaped members providing guiding and sliding means for said launching car on said beam, means for holding the forward portion of an aircraft against upward and sidewise displacements, means for retaining the rear portion of the aircraft against upward and sidewise displacements, and a hold-back mechanism supported on said beam for preventing the creeping of an aircraft while in battery position on the launching car and automatically releasable from said aircraft by the initial forward motion of said car from starting position.

LISLE J. MAXSON.
FREDERICK B. GROSS.