Feb. 23, 1932. V. A. STEVENS 1,846,157

CATAPULT FOR GLIDERS

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FIG. 1.

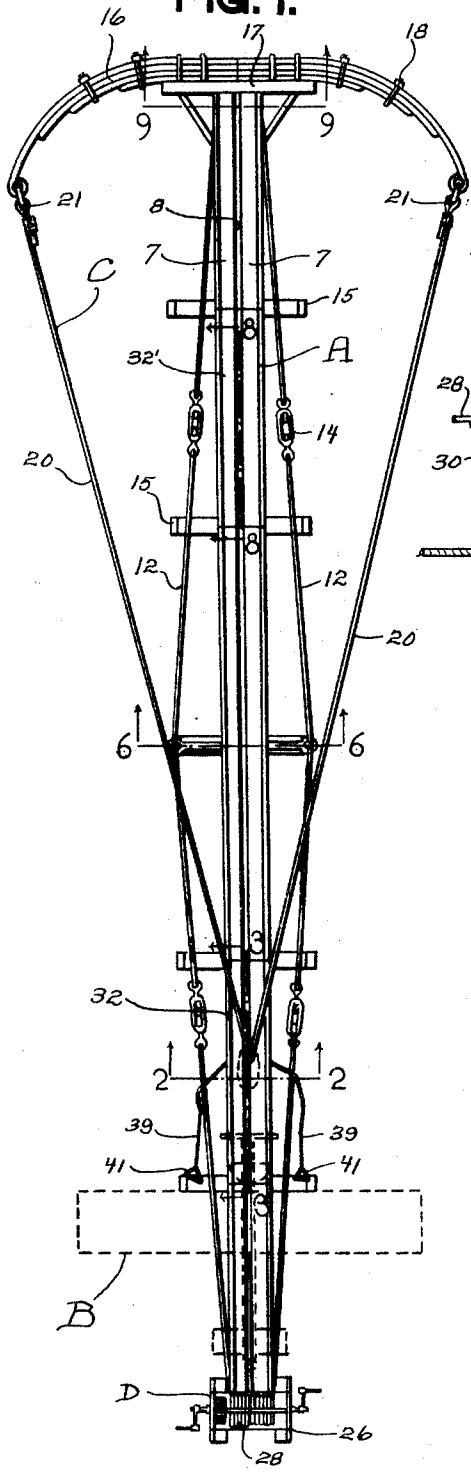


FIG. 2.

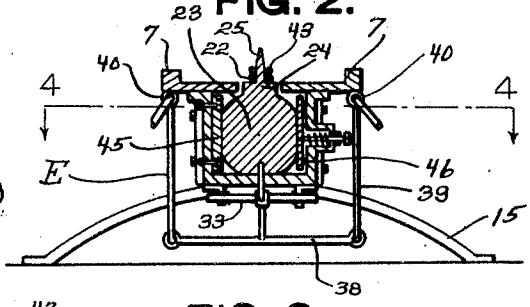


FIG. 3.

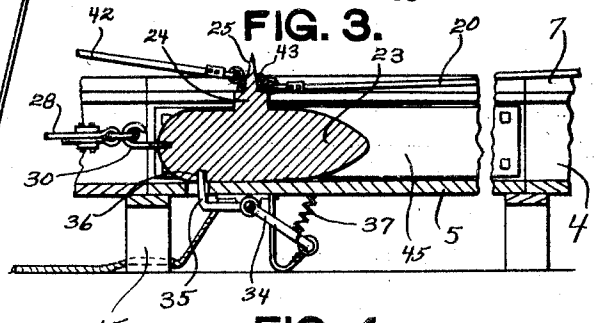
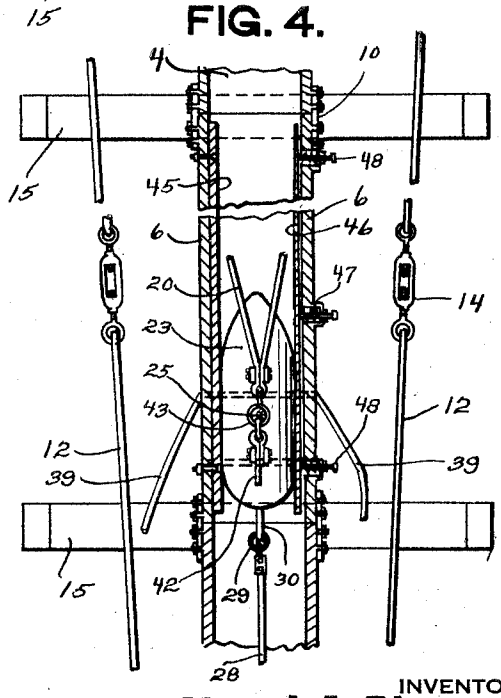


FIG. 4.



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FIG. 7.

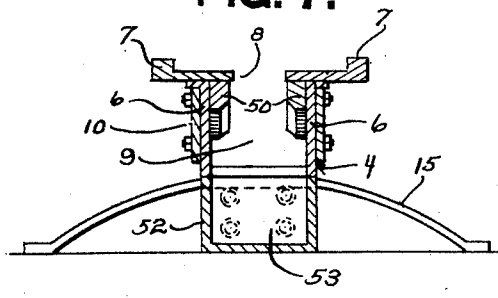


FIG. 6.

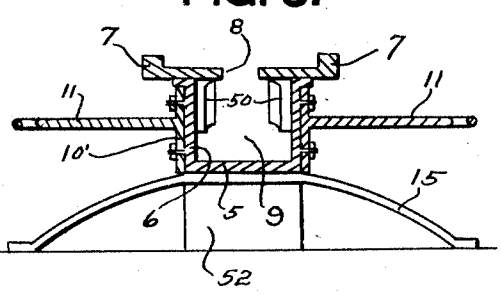


FIG. 9.

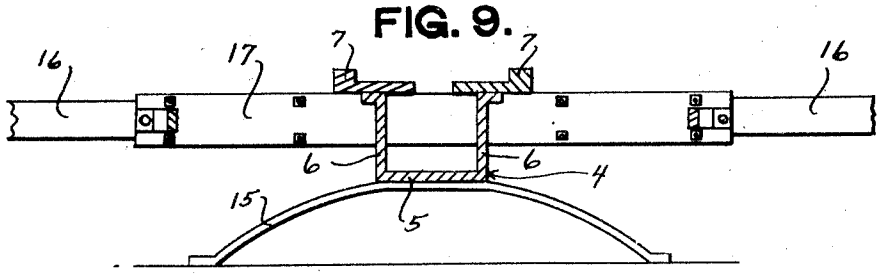


FIG. 5.

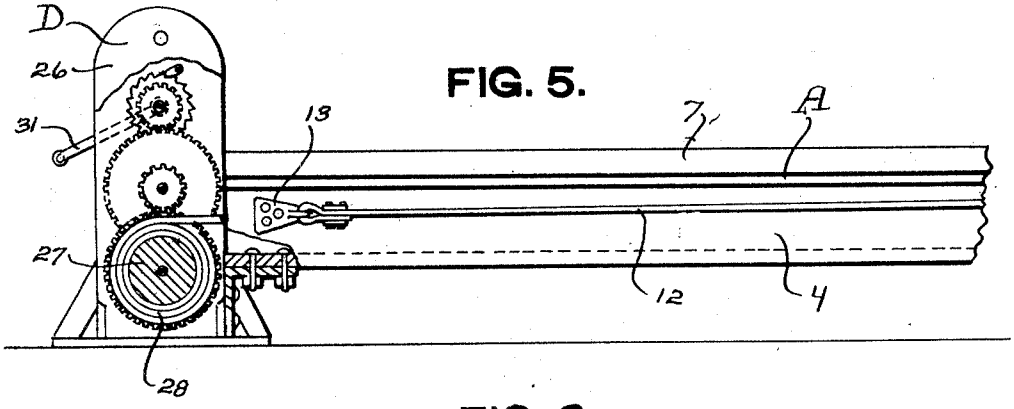
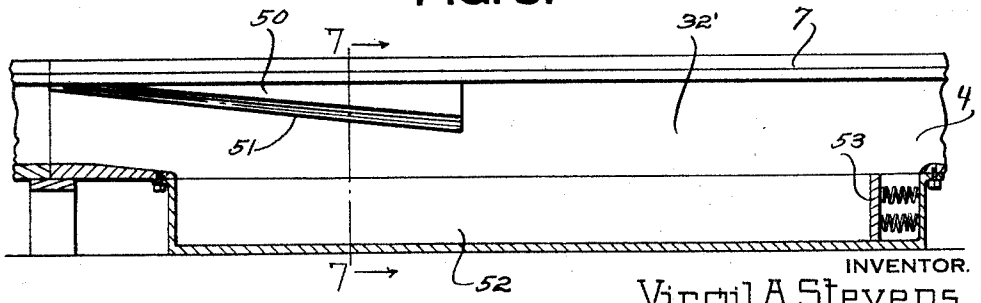


FIG. 8.



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UNITED STATES PATENT OFFICE

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CATAPULT FOR GLIDERS

Application filed June 28, 1930. Serial No. 464,619.

The present invention relates to launching devices for gliders, sail planes, model planes and similar motorless aircraft and the primary object of the invention is to provide a device of this character whereby a single attendant may effectively launch the aircraft.

A further object of the invention is to provide a launching device for gliders which will permit launching of the glider by the pilot while seated in the glider and without the usual ground crew for launching of the glider.

A further object resides in the novel arrangement whereby the glider is launched without a sudden shock during initial launching movement.

A further object resides in the novel arrangement of the launching means whereby the aircraft will be projected with considerable propelling force.

A still further object resides in the novel towing means for the glider and the manner in which the glider is automatically released from the towing means.

A still further and important object of the invention is to provide a catapult or launching device for gliders which is readily portable in that the same is of knockdown construction thus permitting ready movement from place to place and positioned for best results according to prevailing winds or air currents.

Other objects and advantages of the invention will be apparent during the course of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification and in which drawings:

Figure 1 is a top plan view of the device and showing the parts in a launching condition.

Figures 2 and 3 are enlarged fragmentary sections on the respective lines in Figure 1 showing the manner in which the towing block is mounted in the launching track.

Figure 4 is a horizontal section on the line 4—4 of Figure 2 and showing the arrangement for retarding initial movement of the towing block when released.

Figure 5 is a fragmentary view part in side elevation and part in section of the retracting or tensioning means for the propelling means.

Figure 6 is a transverse section on line 6—6 of Figure 1.

Figure 7 is a transverse section on the line 7—7 of Figure 8.

Figure 8 is a fragmentary longitudinal section thru the track showing the arrangement for freeing the shock cord and glider coupling rings from the towing block.

Figure 9 is an enlarged fragmentary section on the line 9—9 of Figure 1 showing the manner of mounting the spring bow at the forward end of the track.

In the drawings, and wherein similar reference characters designate corresponding parts thruout the several views, the letter A designates a launching track providing a runway for a glider or any type of motorless aircraft diagrammatically shown at B, C launching means for launching the glider B, D retracting or tensioning means for the launching means C, and E release means for the launching means C.

Referring first to the specific construction of the launching track A, the same is preferably of sectional construction to permit transportation of the device and in actual practice the track is of one hundred or more feet in length. The track A is of special formation embodying a channel-shaped lower portion 4 being open at its upper side and providing a bottom wall 5 and parallel upstanding side walls 6 which may have outturned flanges along their upper edges. Secured along the upper edge of each side wall 6 is an angle or L-shaped guide rail 7 the horizontal flange portions of which project over and partially close the upper side of the channel-shaped lower track portion and have their adjacent edges slightly spaced apart to provide a guide slot 8 extending thruout the length of the track A midway between the walls 6. These angle-shaped guide rails 7 provide a runway along which the glider is moved and in which the glider skid has sliding movement during the launching operation. The inwardly overhanging portions of

the guide rails 7 partially close the upper side of the track channel and provide a slide way 9 being closed at all sides with the exception of the longitudinal guide slot 8 opening into the top of the slide way 9.

The track sections or portions may be held in longitudinal alignment by means of suitable coupling plates 10, and the plates 10' serving to couple the two central track sections are preferably each provided with a laterally projecting brace arm 11. Connected in eyes at the other ends of the brace rods 11 are suitable truss rods 12 which extend from the brace arms to opposite ends of the track and are attached to suitable brackets 13 carried by the channel side walls 6. These truss rods 12 serve to stiffen the track and are preferably provided with suitable turn-buckles 14. Secured to the under side of the track and preferably at the meeting ends of the track sections are transversely disposed supports 15 which aside from slightly elevating the track serve to prevent sidewise tilting of the track.

Referring now to the launching or propelling means C, the same includes a cross spring bow 16 secured transversely of the forward end of the track A upon a suitable cross head piece 17 so that the cross bow extends parallel to the ground surface and projects equally to opposite sides of the track. This cross bow 16 may be of any preferred construction and in the example shown consists of a series of steel spring leaves connected by suitable clips 18. Owing to the length of the spring bow, which may be approximately fifty feet, the bow is preferably formed in two sections and clamped to the cross head 17. As will be observed in Figure 9, the cross head 17 is mounted below the guide rails 7 so as to be below the glider runway and not interfere with the glider skid should the glider fail to leave the runway prior to reaching the forward end of the track. An elastic draft cable or shock cord 20 is attached as by suitable coupling means 21 to the ends of the cross bow 16 and has suitably attached thereto at a point midway its points a suitable shock cord ring 22. The shock cord 20 may be of any suitable strength in accordance with the desired launching power required and likewise the strength of the cross spring bow may vary in accordance with the required launching power.

The launching means C further includes a towing block 23 of shuttle-like formation for free sliding movement in the slide way or track groove 9. This towing block as will be observed in Figure 3 is of elongated formation and has a tapering forward end to permit free sliding movement of the block. Projecting upwardly from the central portion of the towing block is a guide extension 24 for sliding movement in the guide slot 8, and projecting above the extension 24 is a preferably cylindrical towing block post 25 preferably having a tapered upper end. This post 25 as will be observed in Figures 2 and 3 projects above the horizontal portions of the guide rails 7 and forms a coupling post for receiving the shock cord ring 22.

The retracting or tensioning means D for the launching means C preferably comprises a geared winch 26 detachably mounted at the rear end of the track A and embodying a winding drum 27 on which is intended to be wound a retracting cable 28. This retracting cable 28 extends thru the slide way or track groove 9 and at its free end is provided with a suitable ring 29 adapted for detachable connection with a suitable hook or the like 20 projecting from the rear end of the towing block 23. The winch may be operated by the crank 31 for winding the cable 28 upon the drum 27 and drawing the towing block rearwardly in the track groove 9.

In placing the launching means in a launching condition, the retracting cable ring 29 may be hooked over the hook 30 with the towing block at a location adjacent the forward end of the track and then the shock cord ring 22 placed over the towing block post 25. The winch 26 may then be operated for winding the cable 28 upon the drum 27 and drawing the towing block rearwardly in the track groove 9 and applying a tension on the cross bow 16 and shock cord 20. The towing block 23 is retracted to a position where it is automatically retained by the release means E carried by the track section 32.

This release means E for releasably retaining the towing block in its retracted position may embody a rock shaft 33 mounted transversely beneath the track section 32 and carrying a trigger arm 34 provided with a pawl or sear 35 which projects upwardly thru an opening in the bottom channel wall 5 for engaging in a suitable notch 6 provided in the under side of the towing block 23. Acting between the lower end of the trigger arm 34 and the under side wall 5 is an expansion coil spring 37 acting to normally urge the sear 35 upwardly into the towing block notch 36. Connected to the lower forward end of the arm 34 is a cross arm 38 to the ends of which are attached suitable pull ropes or cables 39 which may extend upwardly from the end of the cross arm and be trained thru suitable guides 40. From the guides 40 the pull ropes extend rearwardly toward the winch 26 and have attached to their ends suitable handles 41 to be gripped by a person seated in the glider to be launched. If so desired merely one of the pull ropes may be provided and it will be seen that when a pull is exerted on the pull ropes that the trigger arm will be swung upwardly compressing the spring 37 and retracting the sear 35 from the notch 36 and releasing the towing block. It may here be well to mention that the retract-

ing cable ring 29 is preferably released from the hook 30 before releasing the towing block.

Various means may be provided for releasably coupling the glider to the towing block and in the example shown, a short coupling cable 42 is provided, one end of which may be connected in any suitable manner to the nose of the glider and the opposite end of which is provided with a coupling ring 43 adapted to be slipped over the towing block post 25 above the shock cord ring 22. Thus when the towing block 23 is released, the glider will be drawn forwardly over the track by the launching means C.

A novel drag means is provided for relieving the snap or jerk during initial movement of the towing block and allowing a smooth release and quick pick-up for the glider and this means is provided in the track section 32 and produces a wedging action upon the towing block when in its retracted position. This drag means preferably consists of a hard wood strip 45 fixed longitudinally upon the inner surface of one of the channel side walls 6 and extended substantially thruout the length of the track section. Carried by the opposite side wall 6 is a wedge-shaped wooden strip 46 which is normally urged toward the fixed drag strip 45 by means of a suitable number of expansion coil springs 47 which may have the tension thereof varied by adjustable stud bolts 48. The wedge-shaped drag strip 46 as will be observed in Figure 4 tapers toward the forward end of the track section and this tapering allows for gradual increase in speed pick-up as the towing block is moved between the drag strips. The wedging action of the drag strips upon the sides of the towing block at the forward end of the strips will be relatively slight and owing to the taper of the strip 46, a smooth and quick pick-up will be had as the towing block moves forwardly. Thus it will be seen that when the towing block is released that the dragging action created by the strips 45 and 46 will relieve the snap or jerk which would otherwise be inherent and allows for a smooth yet substantially quick pick-up during initial movement of the towing block.

An arrangement is provided for insuring positive release of the rings 22 and 43 from the towing block post 25 and this means is preferably incorporated in one of the forward track sections and as shown in the track section 32′. Mounted in the track groove 9 upon the track side walls 6 is a pair of deflecting strips 50 having beveled lower edges 51 which are engaged by the towing block in such manner that the block is forced downwardly in the track groove thru an opening in the bottom wall of the track section 32′ and into an elongated receiving trough 52. This receiving trough 52 may be secured in any preferred manner to the under side of the track section and as the towing block is forced downwardly thereinto by the beveled deflecting strips 50 the towing block post 25 will be drawn thru the guide slot 8 and the rings 22 and 43 forced off of the post. The forward end of the trough 52 may be provided with a suitable shock absorbing means 53.

In use, the shock cord ring 22 is placed over the post 25 and the retracting cable ring 29 engaged over the towing block hook 30. The winch 26 is then operated for winding the cable 28 upon the drum 27 and drawing the towing block rearwardly in the track groove until the sear 35 automatically engages in the recess 36 and retains the towing block in its retracted position. This rearward movement of the towing block flexes the cross bow 15 and also tensions the elastic cable or shock cord 20. The retracting cable ring 29 is then preferably uncoupled from the hook 30 and the device is now in a launching condition. The glider B is then placed upon the launching track rearwardly of the towing block and the ring 43 of the glider cable 42 placed over the post 25. The operator or pilot from a seated position in the glider B then grasps one or both of the handles 41 of the pull ropes 39 and exerts a pull thereon which raises the trigger arm 34 against the tension of the spring 37 and retracts the sear 35 for freeing the towing block 23. As the towing block is released the tensioned bow 16 and shock cord 20 exert a forward pull upon the towing block and the block is prevented from starting with a quick snap or jerk by the wedging action of the drag strips 45 and 46 which permit of a smooth release but quick pick-up of the block. As the block is drawn forwardly in the launching track the glider is moved with it and in most cases will be raised from the track and freed from the towing block post before the block reaches the deflecting track section 32′.

As the towing block reaches the track section 32′ the force of the cross bow 16 and shock cord 20 will be spent and the towing block will be deflected into the receiving trough 52 by the deflecting strips 50. This downward movement of the towing block serves to positively release the rings 22 and 43 from the towing block post and prevents any possible hanging of the glider coupling cable to the block.

From the foregoing description it will be apparent that a novel device for the launching of gliders, sail planes, model planes or other motorless aircraft has been provided whereby the aircraft will be projected with considerable propelling force and without a snap or jerk occurring during initial movement of the aircraft from the launching device. It will also be apparent that a novel arrangement has been disclosed whereby a single person may operate the device and

launch a glider while seated therein. It will further be apparent that a novel arrangement has been shown permitting ready and easy transporting of the device due to its knock-down construction.

Changes in detail may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In a launching device for aircraft, the combination of a track, launching means including a towing member slidably guided in the track and means for propelling the towing member forwardly in the track, retracting means for the towing member for tensioning the propelling means, releasable keeper means for retaining the towing member in a retracted position, and drag means for retarding initial movement of the towing member when released.

2. In a launching device for aircraft, the combination of a track, a towing member slidably guided in the track, an elastic cable connected at the forward end of the track and having connection with the towing member, retracting means for the towing member for tensioning the elastic cable, releasable keeper means for retaining the towing member in a retracted position, and drag means frictionally engageable with the towing member for retarding initial movement thereof when released.

3. In a glider launching device, the combination of a track, a towing block slidably guided in the track, a shock cord connected at the forward end of the track and having releasable connection with the towing block, means for drawing the towing block rearwardly in the track for placing the shock cord under tension, releasable keeper means for retaining the towing block in a retracted position, friction drag means for retarding initial movement of the towing block, and means for releasing the shock cord from the towing block adjacent the forward end of the track.

4. In a glider launching device, the combination of a track, a towing block slidably guided in the track, a shock cord connected at the forward end of the track and having releasable connection with the towing block, means for drawing the towing block rearwardly in the track for placing the shock cord under tension, releasable keeper means for retaining the towing block in a retracted position, friction drag means for retarding initial movement of the towing block, a coupling cable for the glider and having detachable coupling with the towing block, and means for releasing the coupling cable from the towing block adjacent the forward end of the track.

5. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track, an elastic cable connected between the forward end of the track and the block, a retracting cable connected to the block and extending rearwardly therefrom to the track, a rotatable drum mounted at the rear end of the track upon which the retracting cable is wound for retracting the towing block and tensioning the elastic cable, releasable keeper means for retaining the towing block in a retracted position, means for retarding initial movement of the towing block, and glider coupling means releasably connected to the towing block.

6. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track, a cross bow mounted at the forward end of the track, a shock cord connected to the ends of the cross bow and having connection at its central portion to the towing block, retracting means mounted at the rear end of the track for drawing the towing block rearwardly in the track and placing a tension upon the cross bow and shock cord, releasable keeper means for retaining the towing block in a retracted position, and means for detachably coupling the glider to the towing block.

7. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track, a cross bow mounted at the forward ends of the track, a shock cord connected at the end of the cross bow and having connection at the central portion to the towing block, retracting means mounted at the rear end of the track for drawing the towing block rearwardly in the track and placing a tension upon the cross bow and shock cord, releasable keeper means for retaining the towing block in a retracted position, means for retarding initial movement of the towing block when released, a glider coupling cable releasably coupled to the towing block, and means for releasing the glider coupling cable from the towing block adjacent the forward end of the track.

8. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track, a spring cross bow mounted at the forward end of the track, a shock cord connected to the ends of the cross bow and having releasable connection with the towing block, means for retracting the towing block including a cable having detachable connection with the towing block, releasable keeper means for retaining the block in a retracted position, glider coupling means including a coupling ring for releasable connection with the towing block, drag means for retarding initial movement of the towing block when released, and deflecting means for the towing block at the forward end of the track for releasing the glider coupling ring from the towing block.

9. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track and provided with

an upstanding coupling post, a cross bow mounted at the forward end of the track, a shock cord connected to the ends of the cross bow and provided midway its ends with a coupling ring for positioning over the towing block post, means for retracting the towing block in the track, releasable keeper means for retaining the towing block in a retracted position, a glider coupling cable having a coupling ring for positioning over the towing block post, and deflecting means arranged in the path of movement of the towing block adjacent the forward end of the track for freeing the shock cord and glider coupling cables from the coupling post of the towing block.

10. In a launching device for gliders, the combination of a track having a slide way and a slot opening along the upper side of the slide way, a towing block guided in the slide way and having an upstanding coupling post projecting thru said slot, propelling means for the towing block including a shock cord having its ends connected to the forward end of the track and a coupling ring intermediate its end for positioning over said coupling post, means for moving the towing block rearwardly in the track for tensioning the shock cord, manually releasable keeper means for retaining the towing block in a retracted position, a glider coupling cable provided with a coupling ring for positioning over the upstanding coupling post of the towing block, a receiving trough opening into the lower side of said slide way adjacent the forward end of the track, and deflecting strips arranged in the slide way at opposite sides of the slot for directing the towing block downwardly into the receiving trough and causing movement of the shock cord and glider coupling cable rings off of the towing block post.

11. In a launching device for gliders, the combination of a track including a channel-shaped lower portion embodying side walls, launching means including a towing block slidably guided in the track between said side walls and shock cord means for propelling the towing block forwardly in the track, retracting means for the towing block, releasable keeper means for retaining the towing block in a retracted position, and drag means for retarding initial movement of the towing block embodying drag strips carried by said track side walls in frictional engagement with opposite sides of the towing block when in its retracted position.

12. In a launching device for gliders, the combination of a track including a channel-shaped lower portion embodying side walls, launching means including a towing block slidably guided in the track between said side walls and shock cord means for propelling the towing block forwardly in the track, retracting means for the towing block, releasable keeper means for retaining the towing block in a retracted position, and drag means for retarding initial movement of the towing block including fixed and yieldable drag strips carried by said track side walls for frictional engagement with the sides of the towing block when in is retracted position, one of said strips being of tapered formation and tapering toward the forward end of the track.

13. In a launching device for gliders, the combination of a track including a channel-shaped lower portion embodying side walls, launching means including a towing block slidably guided in the track between said side walls and shock cord means for propelling the towing block forwardly in the track, retracting means for the towing block, releasable keeper means for retaining the towing block in a retracted position, drag means for retarding initial movement of the towing block including fixed and yieldable drag strips carried by said track side walls for frictional engagement with the sides of the towing block when in its retracted position, one of said strips being of tapered formation and tapering toward the forward end of the track and means for varying the dragging action of the tapering strip upon the towing block.

14. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track, a shock cord connected between the forward end of the track and block, means for releasably retaining the towing block in a retracted position, and means for retarding initial movement of the towing block including friction strips engageable with the towing block when in a retracted position, one of said strips being spring urged toward the towing block and being tapered in the direction of movement of the block when released.

15. In a launching device for gliders, the combination of a track, a towing block slidably guided in the track, a shock cord for propelling the towing block forwardly in the track, and releasable keeper means for retaining the towing block in a retracted position embodying a sear releasably engaging the towing block, a spring urged trigger arm normally retaining the sear in holding engagement with the block, and pull cables connected with the trigger arm and extending rearwardly therefrom to be grasped by an operator seated in a glider positioned upon the track rearwardly of the retracted position of the towing block.

16. In a launching device for gliders, the combination of a track embodying separate sections, means connecting the sections in longitudinal alignment, means bracing the connected sections, a sectional spring cross bow connected at the forward end of the track, a shock cord connected with the ends of

the cross bow, a towing member slidably guided in the track, means connecting the shock cord to the towing member, a winch mounted at the rear end of the track and including a drum, a retracting cable connected with the towing member and adapted to be wound on said drum, and releasable keeper means for retaining the towing member in a retracted launching position.

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