Nov. 5, 1929. E. A. SPERRY 1,734,353

AUTOMATIC LAUNCHING DEVICE FOR AIRPLANES

Filed Nov. 25, 1927

Fig. 1.

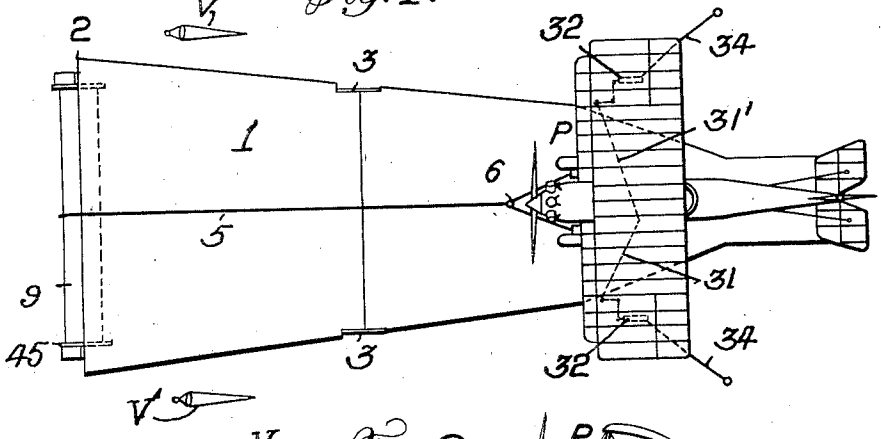


Fig. 2.

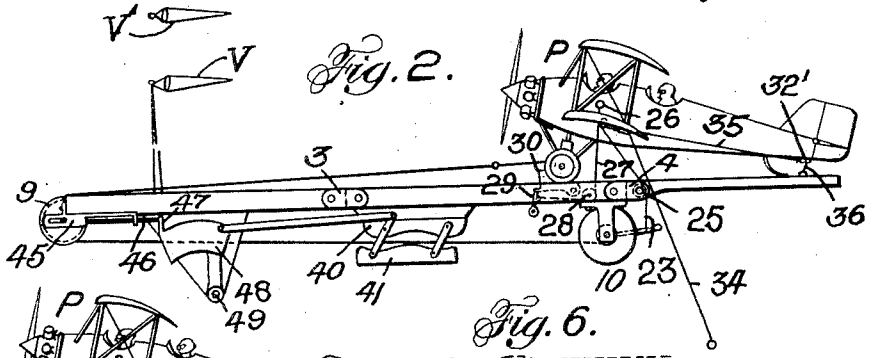


Fig. 3.

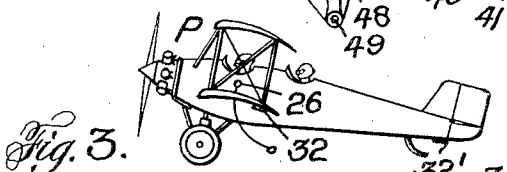
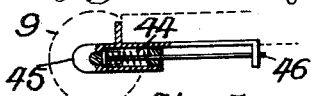


Fig. 6.



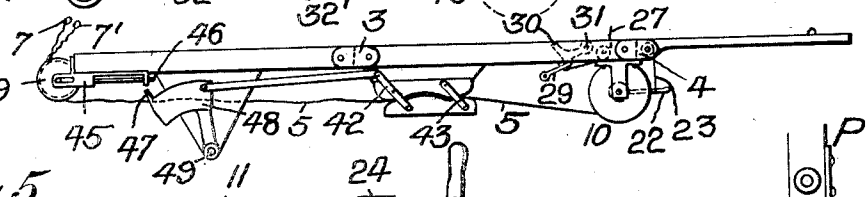


Fig. 5.

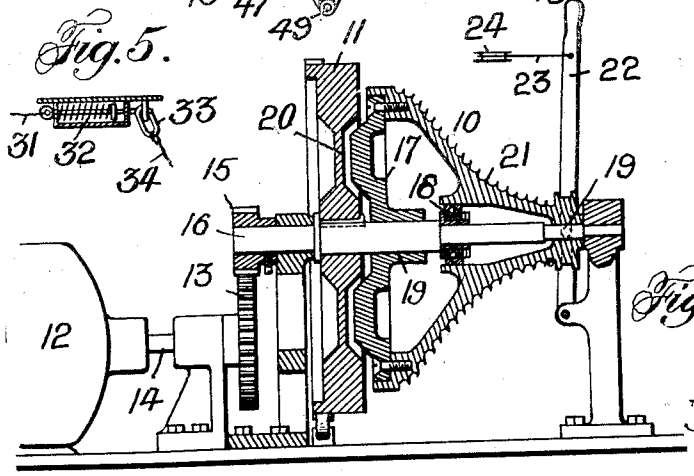


Fig. 7.

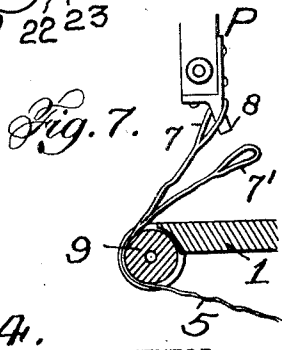


Fig. 4.

INVENTOR

Elmer A. Sperry

BY

Herbert H. Thompson

His ATTORNEY.

Patented Nov. 5, 1929

1,734,353

UNITED STATES PATENT OFFICE

ELMER A. SPERRY, OF BROOKLYN, NEW YORK, ASSIGNOR TO SPERRY DEVELOPMENT COMPANY, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE

AUTOMATIC LAUNCHING DEVICE FOR AIRPLANES

Application filed November 25, 1927. Serial No. 235,519.

This invention relates to a means for launching airplanes in a limited space, and has especial adaptation to the launching of airplanes from the deck of a ship where it is difficult to secure a long runway, especially on ships of moderate size. It has been proposed to hasten the delivery of mail by launching airplanes from the deck of the mail steamer when still some distance from port, the plane taking the mail directly to the airport and thus saving many hours in delivery, especially where mail is to be delivered by way of air mail to inland cities. By my invention I provide a reliable simple means for effectively launching an airplane which is substantially independent of weather conditions and of the ship's heading with respect to the wind. According to my invention I provide a power driven accelerator for imparting to the plane a high speed in a relatively short distance, and in order to insure proper operation I provide means for releasing the plane and simultaneously bringing the power means into action, all controllable from the driver's seat.

Referring to the drawings in which what I now consider the preferred form of the invention is shown,

Fig. 1 is a plan view of my launching runway with a plane mounted thereon ready to be launched.

Fig. 2 is a side elevation of the same.

Fig. 3 is a similar side elevation showing the plane in the act of being launched.

Fig. 4 is a side view, partly in section, of my preferred power accelerator.

Fig. 5 is a detail showing how the securing ropes are released from the plane when launching.

Fig. 6 is a sectional detail of the support for the forward roller on the platform.

Fig. 7 is a detail showing how the launching cables engage and disengage from the plane.

The launching runway or platform proper need not be anything more than a clear space on a ship's deck of some 35 or 40 feet, but I prefer to employ a special platform 1, such as shown in Figs. 1, 2 and 3, which may broaden out toward the outer end 2 of the same and which may be hinged at several points, such as 3 and 4, so that the platform may be folded up and stored between decks when not in use.

The plane P is launched by means of a cable 5 which is shown as forked at 6, the end of each fork being provided with a loop 7, 7′, each of which takes over a downwardly projecting stud 8 from adjacent each wheel of the plane or at some widely spaced points on the framework. The stud is preferably only slightly inclined to the rear, if at all, so that as the plane reaches the end of the runway and rises the loops will readily drop off the studs.

At the forward end of the platform the cable passes around a long roller 9 or other anti-friction device and from thence passes underneath the platform to the accelerating device 10. This is preferably in the form of a flywheel 11 which may be brought up to high speed by any source of power, such as an electric motor 12 connected to the flywheel by any suitable means, such as gear 13 on the shaft 14 of the motor, and the pinion 15 on the shaft 16 of the flywheel. Preferably motor 12 is of shunt wound characteristics to assist the flywheel maintaining its speed. As will be readily appreciated the energy which may be stored in a flywheel is very large and may be imparted very quickly to the airplane by coupling the flywheel in a suitable manner to the cable. For this purpose I have shown a clutch 17 which may be thrown against a cooperating clutch face 20 on the flywheel. On or driven from said clutch is a tapered rope pulley or cable drum 21 which is freely journaled on shaft 16 as by main anti-friction bearing 18 and auxiliary bearing 19. The surface of the drum is preferably so designed as to impart a uniform maximum acceleration to the car. If it were possible to maintain the flywheel up to speed during the car's acceleration, the drum would obviously be a cone up to the point where the airplane is released for uniform acceleration. This, however, is not the case, since the purpose of the mechanism is to make use of the stored energy of the flywheel. The shape of the drum is, therefore, made a function of the rate of

deceleration of the flywheel, and the required rate of acceleration of the plane, and is so designed that the cable will reach its largest portion and the plane reach its launching speed at the same time. For instance, the cone may be so shaped as to reduce the speed of the flywheel to three quarters is original speed at the time the plane is launched, thus causing the wheel to give up one half its total stored energy. The clutch may be controlled from handle 22 but is preferably operated directly from the aviator's seat as by means of wire or cord 23 connected to the handle and passing around pulleys 24 and 25, and up to an operating loop 26 adjacent the cockpit.

In prior launching devices which have been tried, dependence has been placed on mechanics or the ship's crew to release the plane and set into operation the launching mechanism. This I find is an incorrect method. The only person who really knows when the plane should be launched is the aviator himself, since he knows whether the engine is running to suit him, how the platform is pointed into the wind from the wind sox or vanes V and V′ and all such factors, which, in his judgment, determine the psychological moment to start. Therefore, I prefer to provide means at the aviator's cockpit which will simultaneously release the plane from all holding means and at the same time throw in the clutch. For this purpose I have shown the loop 26 or hand-hold adjacent the aviator's seat to which runs releasing wires for the various factors mentioned. One wire 27 is shown as passing over a pulley 28 to a trip 29 which releases the disappearing chocks 30 pivoted at 31 under the wheels. Other wires 31 and 31′ run to each of the spring-pressed pull pins 32 near the wing tips, said pins (Fig. 5) normally holding loops 33 to which ropes or wires 34 are attached which fasten the wings to the deck of the ship. Still a third wire 23 runs to the clutch 17 above described, while a fourth wire 35 is shown as releasing a third pull pin 32′ by which the tail lock wire 36 is released. When, therefore, the operator pulls the loop 26, the chocks 30 are dropped down, the fastening wires released and the clutch thrown in, and the plane is instantly accelerated.

At the time the plane is launched the cable, of course, will be going at its maximum speed. It is, therefore, necessary to apply a powerful brake thereto or to the cable drum. For this purpose I have shown a pair of gripping jaws or blocks 40, 41 which are linked together by links 42 and 43 and are preferably automatically clamped on the cable to retard the same as the airplane leaves the runway. For this purpose I have shown the forward roller 9 as spring-pressed outwardly as by means of a spring or springs 44 (Fig. 6). The roller bearings are shown as supported in the brackets 45 secured to the forward end of the platform and have extending inwardly therefrom a pin 46 which normally bears against a lug 47 on a weighted lever or inverted pendulum 48 pivoted at 49, and having a greater portion of the weight to one side of the pivot so that when the pin 46 is withdrawn the weight falls in a counterclockwise direction and clamps the brake shoes on the cable. It will be evident that the tension on the cable during launching of the plane will hold the roller inwardly against the action of spring 44, thus maintaining the pin 46 against said lug 47. When, however, the airplane leaves the runway and the loops 7 and 7′ disengage the studs 8 the tension on the cable is relieved, the roller is pushed forward by the spring, and the weight descends to apply the brake.

In accordance with the provisions of the patent statutes, I have herein described the principle and operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means. Also, while it is designed to use the various features and elements in the combination and relations described, some of these may be altered and others omitted without interfering with the more general results outlined, and the invention extends to such use.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A launching device for airplanes comprising locking means for anchoring the plane until ready to launch, a mechanical accelerating device for accelerating the plane, and means controlled from the airplane cockpit for releasing said locking means and bringing said accelerating device into operation.

2. A launching device for airplanes comprising a cable adapted to be detachably fastened to said plane, a cable drum, means for rapidly accelerating said drum, a cable brake, and means responsive to slacked tension in said cable for applying said brake.

3. A launching device for airplanes comprising a cable adapted to be detachably fastened to said plane, a cable drum, a flywheel, means for driving said drum from said flywheel, a cable brake, and means responsive to slacked tension in said cable for applying said brake.

4. A launching device for airplanes comprising a runway, a cable adapted to be attached to the plane, a forward roller around which said cable passes, motive means adjacent the rear end of said runway for winding up said cable, a braking means for the cable, and means responsive to release of pressure

of said cable on said roller for bringing said braking means into action.

5. A launching device for airplanes comprising a runway, a cable adapted to be attached to the plane, a forward roller around which said cable passes, a cable drum adjacent the rear end of said runway for winding up said cable, a stored energy device for rotating said drum, a braking means for the cable and drum, and means responsive to release of pressure of said cable on said roller for bringing said braking means into action.

6. In a launching device for airplanes, a flywheel, power means for rotating the same, a cable drum, means for clutching said drum so as to be rotated by said flywheel, a cable having a loop or eye at the free end thereof, and a downwardly projecting lug on the airplane over which said eye engages, said lug being so shaped that said loop automatically disengages therefrom as the airplane rises.

7. In a launching device for airplanes, a flywheel, power means for rotating the same, a cable drum, means for clutching said drum so as to be rotated by said flywheel, a cable having a loop or eye at the free end thereof, a downwardly projecting lug on the airplane over which said eye engages, said lug being so shaped that said loop automatically disengages therefrom as the airplane rises, and means brought into action when said cable is disengaged from the airplane for applying a brake to said cable.

8. In an automatic launching device for airplanes, a launching runway, locking means for the plane including disappearing wheel chocks movably mounted on said runway, and means operable from the cockpit for releasing said chocks.

9. In an automatic launching device for airplanes, locking means for the plane including disappearing wheel chocks and wing locks, and means operable from the cockpit for releasing said chocks and wing locks.

10. A launching device for airplanes comprising locking means for anchoring the plane until ready to launch, a flywheel, cable drum and clutch for accelerating the plane, and means controlled from the airplane cockpit for releasing said locking means and throwing in said clutch.

11. In an accelerating means for masses, the combination with a cable adapted to be detachably secured to the mass to be accelerated, means for winding up the cable at an accelerated rate, means for releasing the mass from the cable, and means responsive to the resultant slackening of tension of the cable for applying a brake thereto.

12. In an accelerating means for masses, the combination with a cable adapted to be detachably secured to the mass to be accelerated, a power driven flywheel, a cable drum adapted to be clutched thereto for winding up the cable at an accelerated rate, means for releasing the mass from the cable, and means responsive to the resultant slackening of tension of the cable for applying a brake thereto.

In testimony whereof I have affixed my signature.

ELMER A. SPERRY.