June 15, 1937. H. L. ADAMS 2,083,805

LAUNCHING DEVICE

Filed Nov. 22, 1932 2 Sheets-Sheet 1

Fig. 1.

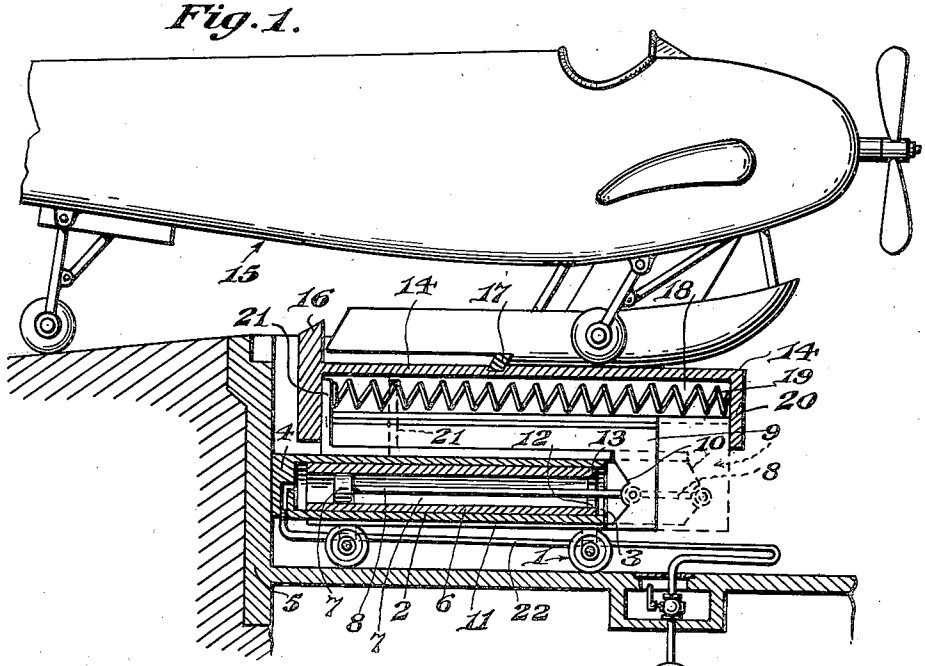


Fig. 2.

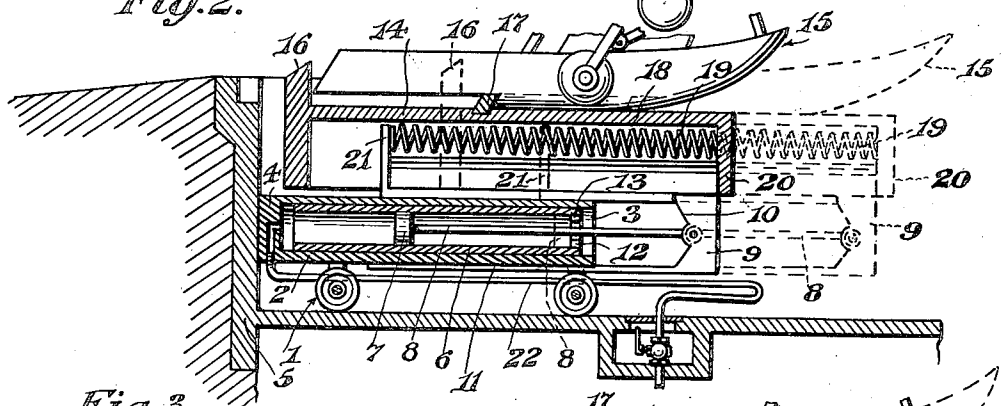
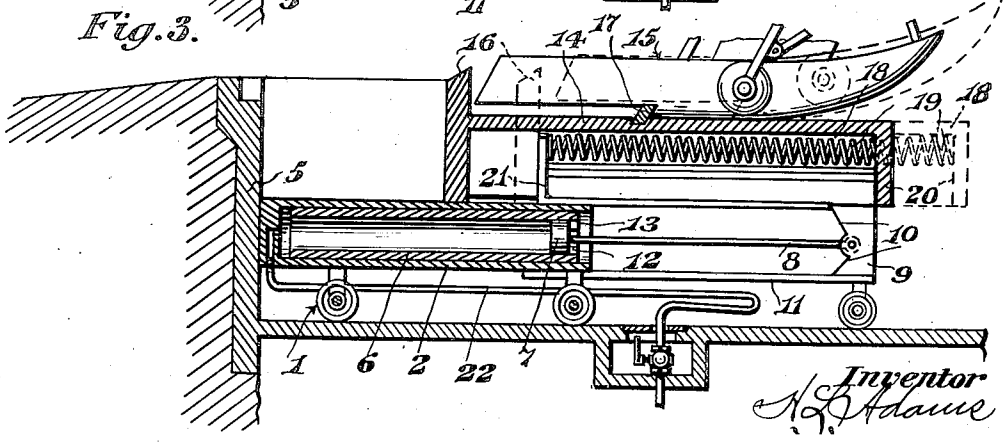


Fig. 3.



Inventor

H. L. Adams

June 15, 1937. H. L. ADAMS 2,083,805

LAUNCHING DEVICE

Filed Nov. 22, 1932 2 Sheets-Sheet 2

Fig. 4.

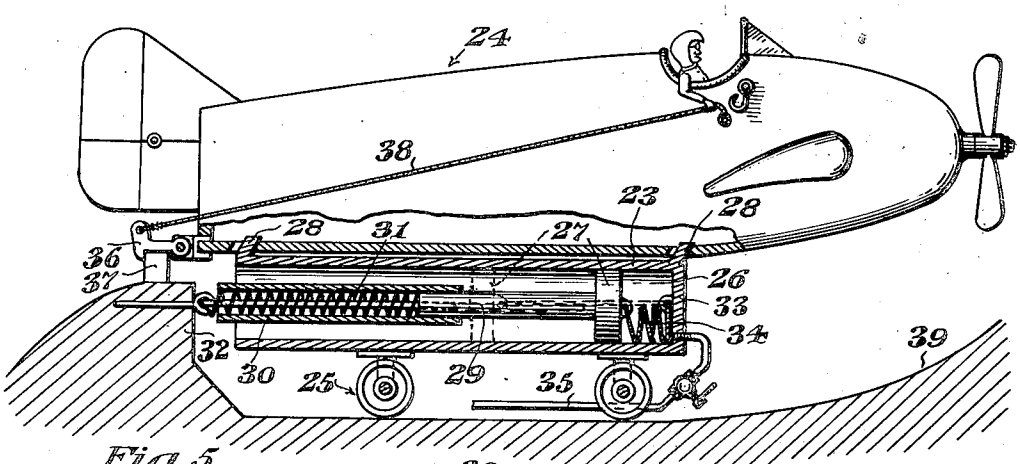


Fig. 5.

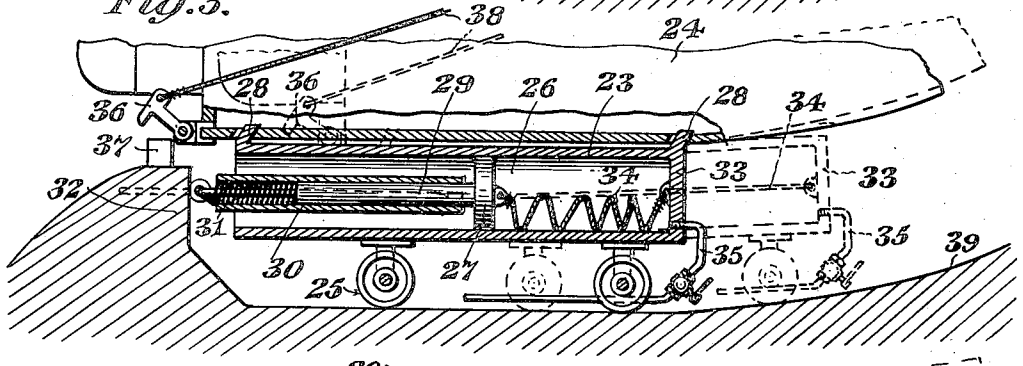
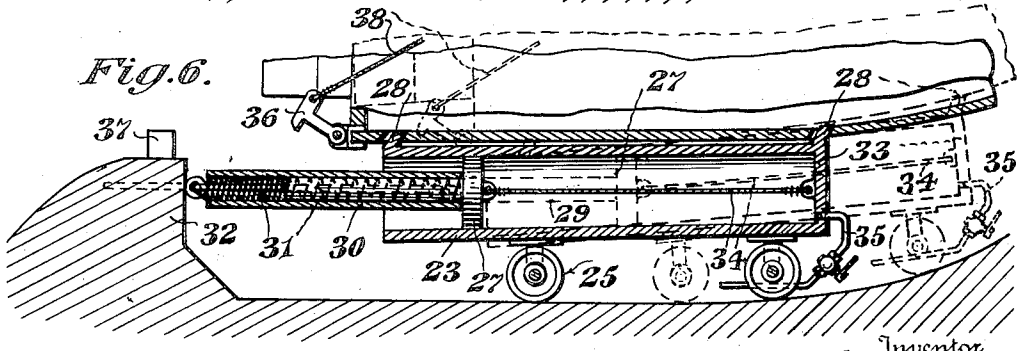


Fig. 6.



Inventor

H. L. Adams

Patented June 15, 1937 2,083,805

UNITED STATES PATENT OFFICE

2,083,805

LAUNCHING DEVICE

Herbert Luther Adams, Washington, D. C.

Application November 22, 1932, Serial No. 644,569

4 Claims. (Cl. 244—63)

This invention relates to apparatus for launching flying machines, and the application is a continuation in part of my prior application, Serial Number 461,412, filed April 14, 1921, and since maturing into Patent No. 1,888,418.

The primary object of the invention is to provide a device by means of which a flying machine may be launched from a comparatively small space.

A further object of the invention is to provide such a device which is readily portable, in order that it may be moved to head into the wind from place to place as conditions require.

A further object of the invention is to provide a launching device which is designed in a manner to retard initial movement of a flying machine being launched thereby to reduce shock to a minimum, and also designed to accumulate power which is released only during the final stage of launching to add impetus to the flying machine as it leaves the device.

Two embodiments of the invention are illustrated in the accompanying drawings, in which:

Figure 1 is a vertical section through a device in accordance with this invention showing in elevation a flying machine mounted thereon, and illustrating the first step in the operation of the device.

Figure 2 is a similar view with the flying machine partly broken away, and illustrating the second step in the operation of the device.

Figure 3 is a view similar to Figure 2 but illustrating the third and final step in the operation of the device.

Figure 4 is a view similar to Figure 1 showing a modified form of the invention.

Figure 5 is a view similar to Figure 4 with the flying machine partly broken away, and illustrating the second step in the operation of the modified form of the device.

Figure 6 is a view similar to Figure 5 but illustrating the third and final step in the operation of the modified form.

Referring to the drawings in detail, the numeral 1 indicates a movable carriage having a cylinder 2 mounted thereon. The cylinder 2 has an open end 3 and a closed end 4, with the latter engaging a suitable abutment such as 5. Telescoped within the cylinder 2 is a cylinder 6 which is open at both ends, and which provides a piston chamber for a piston 7 slidable therein and connected with a piston rod 8 projecting from the forward ends of the cylinders 2 and 6. Slidably mounted on the cylinder 2 is a platform or slide 9 which is connected with the forward end of the piston rod 8 by means of suitable hold-fast device such as a pin.

Preferably the cylinder 2 will be connected directly with the carriage 1, with the platform 9 slidable with respect to both, although, if desired, the platform may be connected directly to the carriage, in which event the platform and carriage both would be movable with respect to the cylinder 2. A portion 11 of the platform 9 extends beneath the cylinder 2, and as herein shown, this portion is free of connection with the carriage, and the platform 9 is slidably supported on the upper face of the cylinder 2. This arrangement could be reversed if desired, with the portion 11 of the platform 9 connected with the carriage 1, and slidably supporting the cylinder 2. Although the element 2 is designated and referred to as a cylinder, the cross sectional shape thereof is unimportant so long as its inner face corresponds in contour to the outer face of the cylinder 6. In practice, any suitable means may be provided for limiting relative movement between the cylinders 2 and 6, and between the cylinder 6 and piston 7, at any point desired. As herein shown, the cylinder 6 is provided with a stop 12 which permits a full stroke of the piston 7, and the cylinder 2 is provided with a stop 13 which permits but a slight movement of the cylinder 6. These stops need not be restricted to any particular position, and may be provided at any point desired to achieve the required length of stroke of the device as a whole.

Slidably mounted on the platform 9 is a support 14 for a flying machine indicated generally at 15. Appropriate lugs, such as 16 and 17 are provided on the support 14, for engagement with some part of the flying machine 15 for exerting force on the latter in a forward direction. The support 14 is formed with a lengthwise extending recess 18, within which is disposed a compression and expansion spring 19. The forward end of the spring 19 abuts against the forward wall 20 of the support, and the rearward end of the spring abuts against a plate 21 carried by the platform 9 and projecting into the recess 18. The plate 21 normally is held in engagement with the rear wall of the recess 18 by the expansion of the spring 19.

In operation, the apparatus is arranged as shown in full lines in Figure 1, with the flying machine to be launched mounted on the support 14, and with any suitable portion of the flying machine engaged by one or more lugs such as 16 and 17. Fluid under pressure is then admitted through a suitable fluid line 22 to the interior of the cylinder 2, at the rear end of the latter.

The force of this fluid against the piston 7 forces the latter forward, carrying the platform 9 therewith, and compressing the spring 19 until the front end of the platform engages the front wall 20 of the support 14, as shown in dotted lines in Figure 1, and in full lines in Figure 2. Any further pressure on the piston 7 will cause the support 14 and flying machine 15 to move with the platform, with no further compression of the spring 19. Thus it will be seen that the first shock of the application of power is absorbed entirely by the spring, and that power is stored therein which is equal to the amount of power necessary to compress the spring.

Preferably the spring 19 will be of appropriate strength to require an amount of power necessary to compress the same which is substantially equal to the amount necessary to overcome the inertia of the support with the flying machine mounted thereon. However, the strength of the spring may be increased if desired, in which event the platform 9 will not engage the front wall 20 of the support 14, and the power from the piston 7 will be transmitted to the support through the spring 19.

In either event, the continued application of force against the piston 7 moves the platform 9, support 14, spring 19 and flying machine as a unit until the piston reaches the end of its stroke as shown in dotted lines in Figure 2, and in full lines in Figure 3. From this point, the support 14 and flying machine will be carried forward by momentum, which is augmented by the recoil or expansion of the spring 19 operating to drive the support 14 forward until the rear end of the support is brought into engagement with the plate 21, which prevents further movement of the support 14. At this time, the flying machine will be carried off the support by momentum, and thus it will be seen that the thrust energy stored in the spring 19 will be applied to the flying machine just prior to the time that it is launched into the air. It will be understood, of course, that the flying machine motor should be warmed up before the launching device is put into operation, and prior to the actual launching of the flying machine, the throttle should be opened in order that the self propelling power of the flying machine may become effective coincidentally with the height of momentum resulting from the operation of the launching device.

In the embodiment shown in Figures 4 to 6, a support 23 for a flying machine 24 is mounted directly on a carriage 25, and is provided with a bore or piston chamber 26 within which a piston 27 is slidably mounted. The support 23 is provided with suitable lugs such as 28 for engagement with some suitable portion of the flying machine for causing the latter to move forwardly with the support, and for permitting the flying machine to leave the support at the forward end of the latter

The piston 27 is mounted on a piston rod 29 which extends rearwardly from the piston into a hollow guide 30 having a compression and expansion spring 31 coiled therein and with its rear end secured to a suitable abutment such as 32. Preferably the piston rod 29 will be keyed to the guide 30 to prevent separation of the parts. The piston 27 is connected to the forward end 33 of the support 23 by means of a cable 34. The piston 27 is operable by means of compressed fluid entering the forward end of the bore 26 through a suitable fluid line 35, and premature forward movement of the support is prevented by means of a latch member 36 carried by the flying machine 24. The latch member 36 engages a suitable lug 37 on the abutment 32, and is provided with a release line 38 extending to a point within the ready reach of the operator of the flying machine.

In the operation of the device, the latch member 36 is engaged with the lug 37, and the flying machine motor is warmed up, after which fluid under pressure is admitted to the forward end of the bore 26, by means of the fluid line 35. The pressure of the fluid on the piston causes the latter to move rearwardly from the position shown in full lines in Figure 4 to the position shown in dotted lines therein, and also shown in full lines in Figure 5. This movement of the piston compresses the spring 31, and stores power therein equal to that required to compress the spring.

After the spring 31 has been fully compressed, the operator of the flying machine releases the latch member 36 by means of the release line 38, whereby the continued pressure of the fluid entering the bore 26 will be applied to the forward wall 33 of the bore 26, causing the carriage 25, support 23 and flying machine 24 to move forward as a unit until such movement is arrested by the cable 34 as shown in dotted lines in Figure 5 and in full lines in Figure 6.

If desired, the use of the latch member 36 may be dispensed with, in which event the spring 31 will be compressed only until the amount of power necessary to further compress the same equals the amount necessary to overcome the inertia of the support 23 with the flying machine mounted thereon. After this, a continued application of the power causes the support to move forwardly while the piston remains stationary, instead of the piston moving rearwardly while the support remains stationary. The relative movement between the support and piston continues until arrested by the cable 34. Upon the completion of relative movement between the support 23 and piston 27, the spring 31 is permitted to recoil or expand, thereby causing the piston and support to move as a unit, and augmenting the momentum of the flying machine just prior to the time that it leaves the support. The movement of the piston and support as a unit is shown in dotted lines in Figure 6. Preferably the throttle of the flying machine motor will be open before the launching device is put in operation when the latch member 36 is employed, although this may be deferred until just prior to the time that the flying machine leaves its support, and such deferment is always necessary when the latch member 36 is not employed. Preferably the forward portion of the runway for the carriage 25 will incline upwardly as indicated at 39.

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

1. In a launching device for flying machines, a piston chamber forming member, a platform slidable with respect to said member, a support for a flying machine slidable on said platform, a piston slidable in said chamber for moving said platform relative to said support, a compressible energy accumulator connecting said platform and said support and adapted to be compressed to accumulate energy by movement of the platform relative to the support, said accumulated energy being released to move the support relative to

the platform to give added impetus thereto when platform and support cease to move as a unit.

2. In a launching device for flying machines, a movable platform, a support for a flying machine slidable on said platform, spring means connecting the platform and support, means for moving the platform relative to the support and against the resistance of said spring means and then moving the platform, spring means and support as a unit, said spring means acting as an energy accumulator which later releases energy to move the support relative to the platform and give added impetus to the support.

3. In a launching device for flying machines, a movable platform, a support for a flying machine slidable on said platform, spring means connecting the platform and support for yieldingly resisting movement of said platform relative to said support, means for moving said platform relative to said support whereby said spring means absorbs energy until the inertia of the support with a flying machine thereon is overcome and then moves the platform, spring means and unit, and means for limiting said movement as a unit to allow said spring support relative to the platform.

4. In a launching apparatus for a flying machine adapted to cooperate with a stationary ramp and an abutment, a portable launching apparatus comprising a piston chamber forming member adapted to cooperate with said abutment, a platform slidable with respect to said member, a support for a flying machine slidable on said platform, a piston slidable in said chamber for moving said platform relative to said support, a compressible energy accumulator connecting said platform and said support and adapted to be compressed to accumulate energy by movement of the platform relative to the support, said accumulated energy being released to move the support relative to the platform to give added impetus thereto when platform and support cease to move as a unit.

HERBERT L. ADAMS.