July 20, 1948. L. JOHNSTON 2,445,400

DESCENT RETARDER

Filed Nov. 27, 1944 2 Sheets-Sheet 1

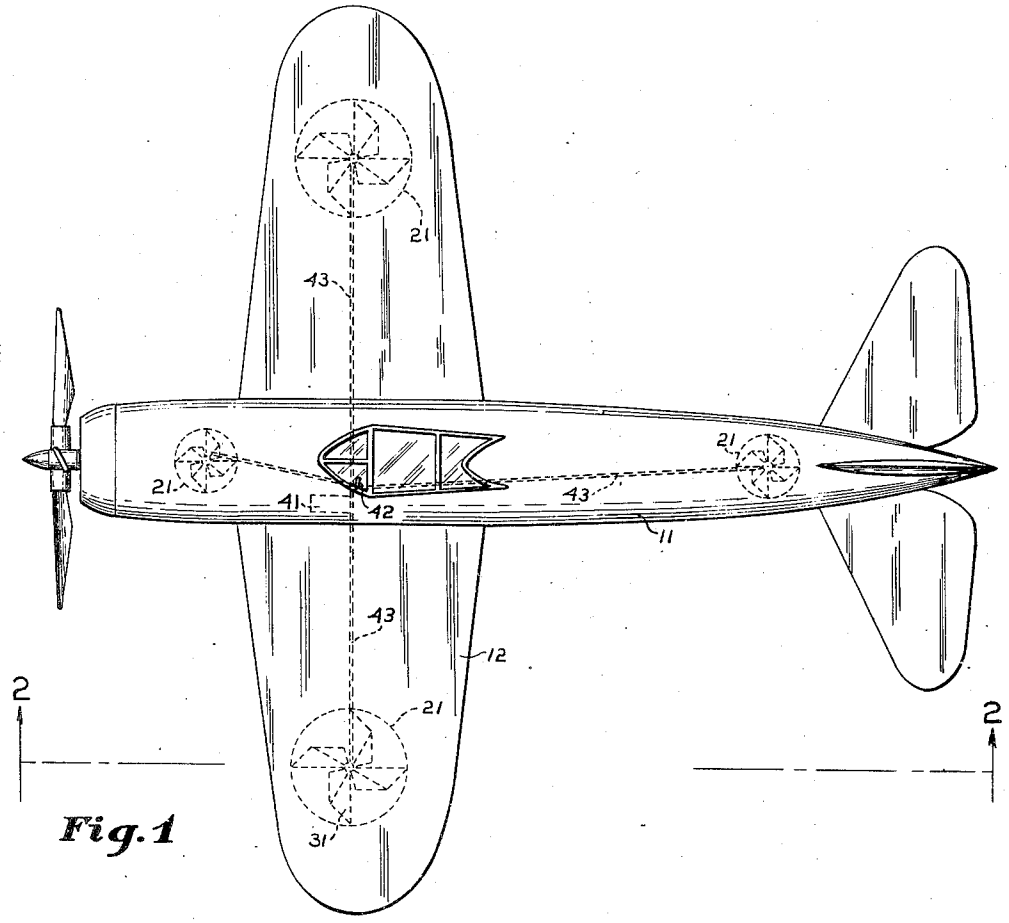



Fig. 1

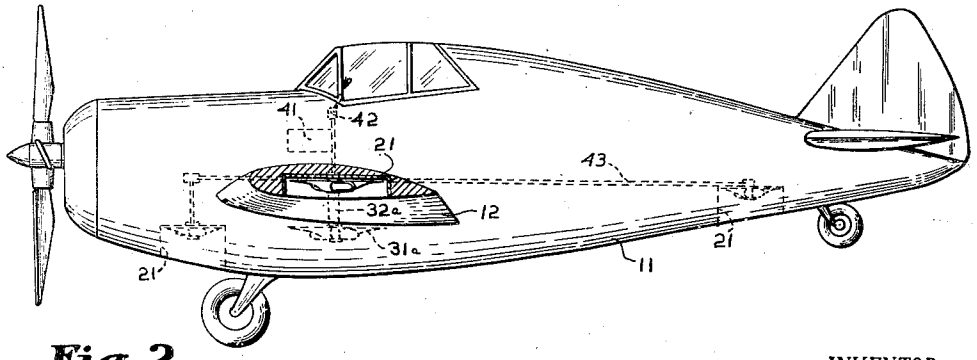



Fig. 2

INVENTOR.
LOREENE JOHNSTON
BY
Morton S. Brockman

July 20, 1948. L. JOHNSTON 2,445,400

DESCENT RETARDER

Filed Nov. 27, 1944 2 Sheets-Sheet 2

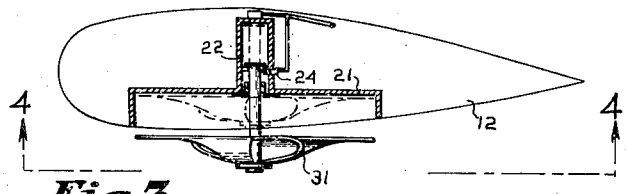



Fig. 3

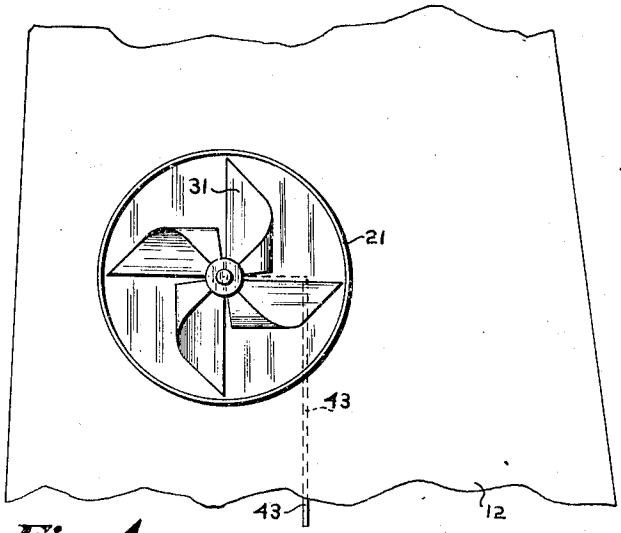



Fig. 4

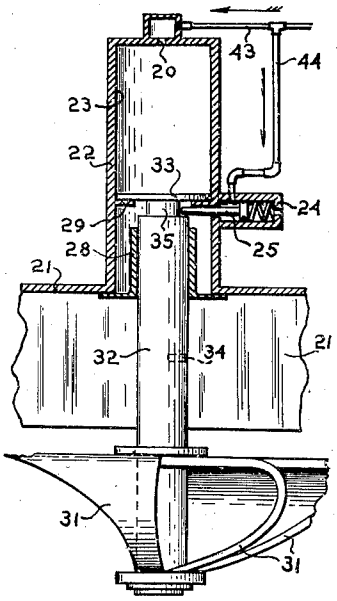



Fig. 5

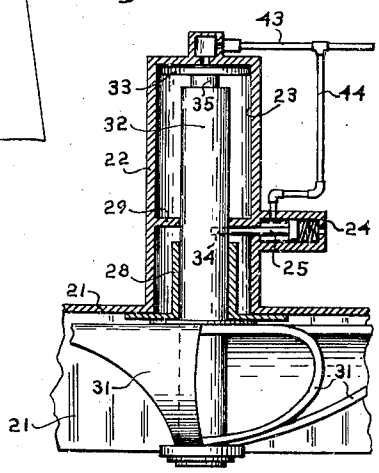



Fig. 6

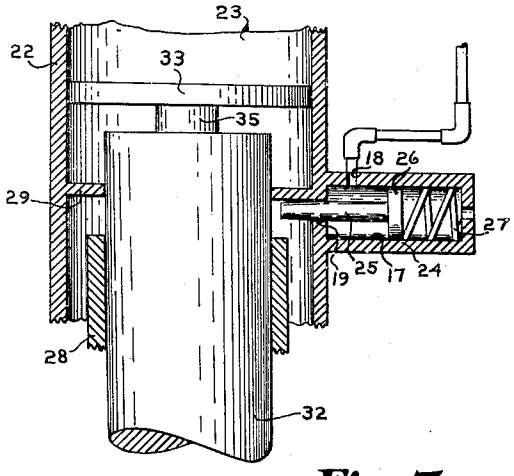



Fig. 7

INVENTOR.
LOREENE JOHNSTON
BY
Morton S. Brockman

Patented July 20, 1948 2,445,400

# UNITED STATES PATENT OFFICE

2,445,400

## DESCENT RETARDER

Loreene Johnston, Cleveland, Ohio

Application November 27, 1944, Serial No. 565,236

5 Claims. (Cl. 244—139)

1

This invention relates to safety apparatus for airplanes and particularly to devices used for retarding the descending speed of an airplane which may be out of control or partially damaged.

The primary object of this invention is to provide a simple device which might be built into a conventional airplane without materially disturbing its existing balance, shape, performance or method of operation.

Another object is to provide a device of the type mentioned which may be made to operate automatically in emergencies.

A further object is to construct such device as a separate unit, that may be standardized for easy interchange or replacement.

A still further object is to utilize a pneumatic form of quick and easy operation for a device of this type.

These and other objects and advantages of the invention will become apparent from a reading of the following specification and claims, together with the accompanying drawings in which like parts are referred to and indicated by like reference characters and wherein:

Figure 1 is a plan view of a conventional single-motored plane equipped with the instant safety speed retarding device;

Figure 2 is a side elevation, partly in section, of the plane shown in the Figure 1, and taken along the line and in the direction of the arrows 2—2 thereof;

Figure 3 is an enlarged cross-sectional view of an airplane wing containing the device;

Figure 4 is a bottom view of the portion of the wing shown in the Figure 3 and taken along the line and in the direction of the arrows 4—4 thereof;

Figure 5 is an enlarged vertical cross-sectional view of the device in its open or emergency position;

Figure 6 is an enlarged vertical cross-sectional view of the device in its closed or normal position; and

Figure 7 is an enlarged cross-sectional view of a portion of the housing, spindle and air lock used with the device.

This invention consists primarily of three elements: the housing, the repeller and the pneumatic control apparatus. Each of these elements will be described in detail hereinafter and in the order just set forth.

The housing unit consists of a shallow chamber 21 and a deep chamber 22 concentric therewith and opening thereinto. These chambers are built

2

into parts of the airplane in balanced positions similar to the ones shown in the Figure 1 of the drawing. Two devices may be mounted in the wings 12, one on each side, and two may be mounted in the fuselage 11 fore and aft. The bottoms of both the chambers are open and face downward and may be made of fairly thin or light sheet metal.

The shallow chamber 21 may be three to six feet in diameter and fifteen to thirty inches deep, depending upon the size and weight of the plane.

The deep chamber 22 opens into the shallow chamber 21 and may be six to twelve inches in diameter and two to six feet deep, depending upon the size of the plane. Both of these chambers are mounted in suitable recesses, as shown. The deep chamber 22 is divided horizontally into two sections. The top section forms an air cylinder 23 and the lower section contains the bearing 28 for the hereinafter described rotor spindle 32.

The top end of the air cylinder 23 has a port or orifice 20 for the entrance of air which affects the hereinafter described piston 33. The bottom part of the chamber is separated from the top part by the ring 29 which closely encircles the spindle 32.

Just below the ring 29 and on the outside of the deep chamber 22 there is attached an air lock 24. This is simply a pneumatically operated pin or bolt 25 having a head or piston 26 that works against a compression spring 27 in the small air cylinder 17. The bolt 25 projects through the opening 19 and normally engages the hole 34 in the spindle 32, as is shown in the Figure 6.

The repeller element consists of a pin-wheel type rotor 31 mounted face downward as shown and which is entirely contained by the shallow chamber 21. The blades of the rotor open downward and when in the normal or contained position, are not affected by air flowing past the bottom surface of the wing.

The rotor 31 is rigidly mounted on the shaft or spindle 32 which is fairly substantial, slidable and capable of practically free rotation in the bearing 28. The top end of the spindle 32 has a disk or piston head 33 mounted thereon which closely fits the air cylinder 23. Below the piston head 33 and between it and the end of the spindle there is a constricted portion or neck 35 which engages the air-lock bolt 25 when the device is open and in the position shown in the Figure 5.

The air-control means consists of a supply or a source of compressed air. This may be either a tank of compressed air or a small, light weight mechanical air compressor, of which there are

several now commercially available. This air source or supply is schematically indicated by the reference character 41. Suitable conduits 43 conduct the compressed air from the source 41 to each of the air cylinders 23 by way of the opening 20 therein. Each air lock 24 is connected to the conduit 43 by a branch conduit 44 which opens into the port 18, as is clearly shown in the Figures 5 and 6.

The control valve 42 is in the pilot's compartment. This valve may be either a manually operated valve or an automatic device which functions during an emergency and which is commonly known as a "dead man's control."

The devices are mounted in the plane members as shown in the Figures 1, 2, 3 and 4. Each rotor is in its normal or closed position and the pistons and spindles are up in the deep chamber as shown in the Figure 6. The air lock 24 engages the spindle 32 in the manner heretofore mentioned and the rotor and spindle, as well as all the other elements, are fixed or stationary. When in these positions, the plane is flown and piloted in the regular manner and its performance is unaffected in any way. The chambers 21 and 22 are built in the machine as part of the bracing structure and no additional weight is added thereto. The repeller member or rotor is flush with the lines of the plane and the opening does not affect normal flight thereof.

In an emergency, the pilot operates the valve or the automatic valve comes into play, whichever one is on the plane. Compressed air is immediately forced into the air lock 24 and acts on the bolt side of the small piston 25 and against the tension of the spring 27. Simultaneously, air forces the piston 33 downward and moves the rotor outside of the flush line of the plane body.

Either gravity or the force of the air in the cylinder forces the piston down to its fully extended position, as shown in the Figure 5. The air lock, because of the spring 27, engages the top end of the spindle adjacent to the neck 35 and thus prevents the force of the outside air from moving the repeller elements back into their respective chambers.

The pin-wheel type of rotor, having a large air capacity, rotates freely. This rotation, being necessarily limited to some degree by the friction of the bearing 28 and the disk 29, has a retarding or braking effect on the otherwise normal descent of the plane, the retarding action being very similar to the retarding effect caused by the rotation of helicopter or autogyro vanes.

It is obvious that two or more of these novel devices may be mounted anywhere on the plane, making due allowance for other necessary apparatus such as engines and gas tanks.

Having thus disclosed the invention in its preferred form, it should be understood that there may be many other forms or modifications of the invention which also should be considered as coming within the scope of the appended claims. For example, it may be desired to use a hydraulic control system instead of a pneumatic system; or many bladed rotors other than the pin-wheel type shown may also be used effectively in this invention. However, no limitations of the invention are intended except those imposed thereon by the following claims.

I claim:



1. In combination with an airplane having a body including a wall provided with an outwardly facing recess, a vertically extending cylinder mounted within said body and communicating with said recess, a piston slidably and rotatably mounted in said cylinder, a rotor carried by said piston and disposed for movement into and out of said recess, and means for locking the piston against rotation when the piston and thereby the rotor is moved to inoperative position within the recess, and for locking the piston and thereby the rotor in projected position while permitting free and independent rotation of the piston and rotor, while in said projected position.

2. The combination as set forth in claim 1, wherein there is means for simultaneously releasing the locking means when the rotor is disposed in its inoperative position within the recess of the body and for projecting the piston and thereby the rotor to operative position.

3. In combination with an airplane having a body including a wall provided with an outwardly facing recess, a rotor movable into and out of said recess, and a single locking means for holding the rotor against movement when the latter is in its inoperative position within said recess and for holding the rotor in its operative position when the same is moved outwardly of the recess while permitting free and independent rotation of the rotor in its last named position.

4. The combination as set forth in claim 3, wherein the locking means is normally biased to operative position and wherein there is pneumatic means for moving the same to inoperative position while simultaneously projecting the rotor outwardly of said recess.

5. In combination with an airplane having a body including a wall provided with an outwardly facing recess, a rotor mounted for movement into and out of said recess to inoperative and operative positions respectively, locking means for holding the rotor against rotation in its inoperative position within the recess and for holding the rotor in its operative position beyond the recess while permitting free and independent rotation thereof, and pneumatic means for simultaneously releasing the locking means when the rotor is in its inoperative position within the recess and for projecting the latter to its operative position outwardly of said recess.

LOREENE JOHNSTON.


## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,135,537 | Lake | Apr. 13, 1915 |
| 1,140,444 | Clark | May 25, 1915 |
| 1,270,200 | Peterson | June 18, 1918 |
| 1,662,406 | Thompson | Mar. 13, 1928 |
| 1,719,048 | Ehmig | July 2, 1929 |
| 1,765,818 | Alvistur | June 24, 1930 |
| 1,856,999 | Kiss | May 3, 1932 |
| 2,052,086 | Dornier | Aug. 25, 1936 |
| 2,094,105 | Myers | Sept. 28, 1937 |
| 2,227,204 | Sepko | Dec. 31, 1940 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 457,983 | Great Britain | Dec. 7, 1936 |