United States Patent [19]

Mabuchi

[11] **3,745,699**

[45] **July 17, 1973**

[54] **DEVICE FOR AUTOMATICALLY LOWERING AND LANDING AN ELECTRIC MODEL PLANE**

[75] Inventor: **Kenichi Mabuchi,** Katsushika-ku, Tokyo, Japan

[73] Assignee: **Mabuchi Motor Co., Ltd.,** Tokyo, Japan

[22] Filed: **July 27, 1972**

[21] Appl. No.: **275,772**

[30] **Foreign Application Priority Data**

Oct. 25, 1971 Japan 46/97941

[52] **U.S. Cl.** ..... **46/243 AV,** 46/76 R

[51] **Int. Cl.** **A63h 27/00**

[58] **Field of Search** ..... 46/76 R, 243 AV

[56] **References Cited**

UNITED STATES PATENTS

2,386,288	10/1945	Blaylock	46/76 R UX
2,599,484	6/1952	Rhodes	46/76 R
3,699,708	10/1972	Mabuchi	46/243 AV

Primary Examiner—Louis G. Mancene
Assistant Examiner—Robert F. Cutting
Attorney—James E. Armstrong et al.

[57] **ABSTRACT**

A device for automatically lowering and landing an electric model plane of the free flight type comprising an electromagnet securely mounted on a plane body and energized by a battery for supplying a motor for a propeller with an electric power; and a system connecting said electromagnet to horizontal planes hingedly mounted on the plane body and which includes a magnetic member rotatably held by said electromagnet and a tensile means fixed to the plane body. Said magnetic member is adapted to be attracted by said electromagnet against an action of the tensile means while the magnet is sufficiently energized by the battery thereby to maintain said horizontal tail planes in a horizontal flight position and said tensile means acts on the tail planes to shift the same into a slantingly raised position when the attracting force of said electromagnet is overcome by the action of said tensile means by exhaustion of the power thereby lowering and landing the plane automatically.

4 Claims, 6 Drawing Figures

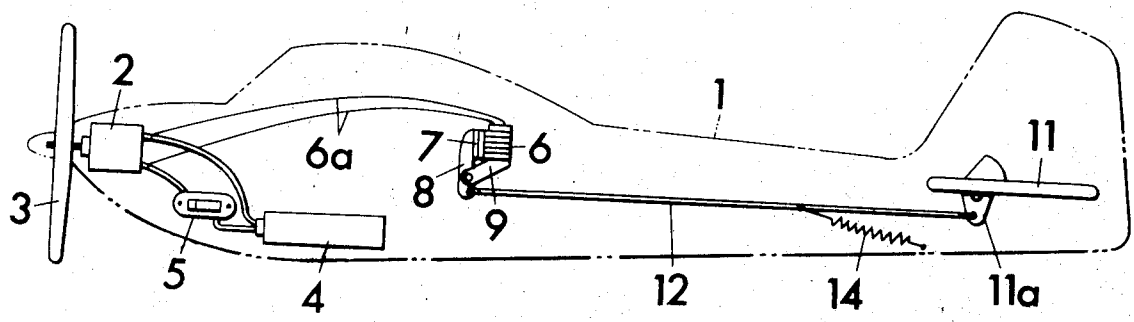


FIG.1

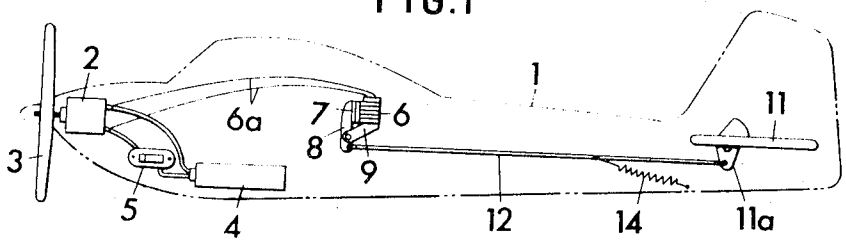


FIG.2

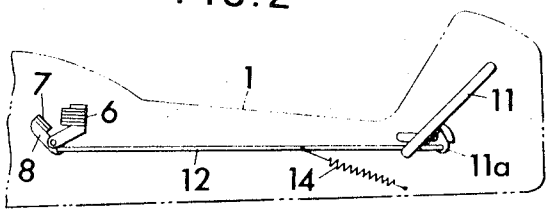


FIG.3

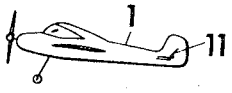


FIG.4

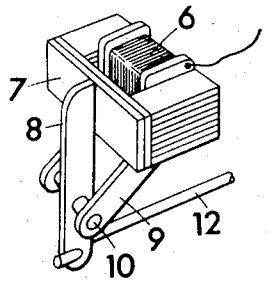


FIG.5

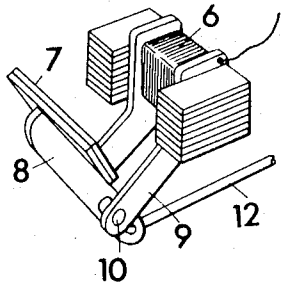
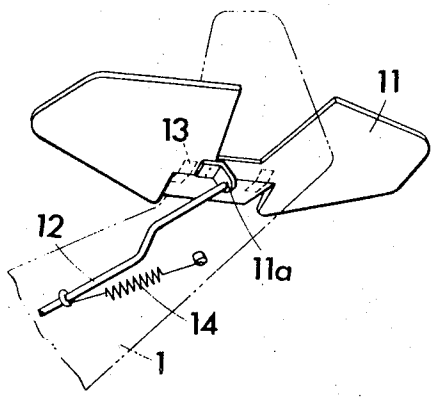


FIG.6



DEVICE FOR AUTOMATICALLY LOWERING AND LANDING AN ELECTRIC MODEL PLANE

This invention relates generally to an electric model plane of so-called free flight type, and more particularly to a device for automatically lowering and landing electric model plane of said type.

The free flight type electric model plane tends to stay in the air for a long time and therefore easily gets lost when it is entrained in an ascending air flow. In order to prevent such accidents, there have been introduced various kinds of devices including those devices of so-called pop up type, spoiler type and parachute type. With these devices, the plane body is caused to loose the dynamic lift, the air resistance of the plane body is suddenly increased to correspondingly increase its lowering speed and/or the plane body is lowered by means of a parachute after a lapse of predetermined time with use of a time adjusting device such as a self-timer and a matchcord or fuse. These time adjusting devices, however, more or less have defects, that is to say, the self-timer involves high production costs and frequency troubles while the matchcord or fuse is susceptible to the danger of burning accidents.

The primary object of the present invention is to provide a device for automatically lowering and landing an electric model plane which will eliminate the above noted difficulties.

Another object of the present invention is to provide a device for automatically lowering and landing an electric model plane of the type mentioned above which is low in manufacturing cost, easy to handle and reliable in operation.

A further object of the present invention is to provide a device for automatically lowering and landing an electric model plane of the type mentioned above which is simple in construction and free from troubles.

One of the features of the present invention resides a device for automatically loweing and landing an electric model plane including horizontal tail planes hingedly mounted on a plane body at a tail portion thereof, an electric motor for rotating a propeller and a battery acting as a power source for said electric motor; which comprises an electromagnet securely mounted on the plane body and energized by said battery; and a system for connecting said electromagnet to the horizontal tail planes which includes a magnetic member attracted by the electromagnet to maintain said horizontal tail planes in a horizontal flight position while the electromagnet is sufficiently energized by the battery, and a tensile means acting on the tail planes for shifting the same into a slantingly raised position when the battery is almost exhausted thereby to lower the plane before complete exhaustion of the power.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a side elevation of the device embodying the present invention, showing the overall construction thereof;

FIG. 2 is a side elevation showing the relationship between the electromagnet and the horizontal tail in the lowering position;

FIG. 3 is a side elevation showing the manner in which the plane is lowered;

FIGS. 4 and 5 are perspective views each showing the relationship between the electromagnet and the iron plate member; and

FIG. 6 is a perspective view showing the relationship between the horizontal tail and the push rod member.

Referring in detail to the accompanying drawings showing a preferred embodiment of the present invention, there is shown at 1 a plane body of the model plane which has an electric motor 2, a propeller 3, battery 4, a switch 5, an electromagnet 6 and a lead line 6*a* from the electromagnet 6. All these component parts are mounted suitably on the plane body 1 as shown in FIG. 1.

Designated at 7 is a plate member, preferably of iron material, securely supported on a rotary plate member 8. The rotary plate member 8 is mounted on a shaft 10 extending between and supported by a pair of support arms 9. The reference numeral 11 shows horizontal tail planes which is pivotally mounted at the tail of the plane body 1 by means of hinges 13. One end of a push rod member 12 is connected to the lower portion of the afore-mentioned rotary plate member 8 while the other end is connected to a horn 11*a* secured to the horizontal tail planes 11. There is provided a tension spring 14 having one end thereof secured to the push rod member 12 and the other end to the plane body 1, It is to be noted that any tensile means such as a rubber string may be alternatively employed.

With the above construction, the electromagnet 6 is energized by the battery 4 to attract the iron plate member 8 by rotating the same around the shaft 10 from the position shown in FIG. 5 to the position shown in FIG. 4. As the iron plate member 8 is rotated, the push rod member 12 is brought into the position shown in FIG. 1 against the action of the tension spring 14 to maintain the horizontal tail planes in the normal flight position or horizontal position shown in FIG. 1. If, then, the battery 4 becomes almost exhausted, the attracting force of the electromagnet 6 is overcome by the action of the tension spring 14, allowing the push rod member 12 to be shifted from the forward position shown in FIG. 1 to the retracted position shown in FIG. 2. This causes the horizontal tail planes 11 to rotate around the hinge 13 into the slantingly raised position as shown in FIG. 2 by way of the horn 11*a*. With the horizontal tail plane held in the slantingly raised position or the lowering position, the plane body is safely lowered and landed since the rotational speed of the motor 2 is rapidly reduced due to reduced power supply from the battery 4 which is almost exhausted.

What is claimed is:

1. A device for automatically lowering and landing an electric model plane including horizontal tail planes hingedly mounted on a plane body at a tail portion thereof, an electric motor for rotating a propeller and a battery acting as a power source for said electric motor; which comprises an electromagnet securely mounted on the plane body and energized by said battery; and a system for connecting said electromagnet to the horizontal tail planes which includes a magnetic member attracted by the electromagnet to maintain said horizontal tail planes in a horizontal flight position while the electromagnet is sufficiently energized by the battery, and a tensile means action on the tail planes for shifting the same into a slantingly raised position when

the battery is almost exhausted thereby to lower the plane before complete exhaustion of the power.

2. A device for automatically lowering and landing an electric model plane as claimed in claim **1,** wherein said system comprises a rotary member pivotally mounted on a shaft and securely fitted to said magnetic member; a rod member connected at one end to the lower portion of said rotary member and at the other end to said horizontal tail planes, said magnetic member being attracted by said electromagnet to pull said rod member forward thereby maintaining the horizontal tail planes in the horizontal flight position while the electromagnet is sufficiently energized by said battery; and a tension spring having one end thereof connected to said rod member and the other end secured to said plane body and pulling backward the rod member to shift the horizontal tail plane into a slantingly raised position when the battery is almost exhausted.

3. A device as defined in claim **2,** wherein said rod member is connected to the horizontal tail plane by way of a horn member secured to the lower face of said horizontal tail plane.

4. A device as defined in claim **2,** wherein said shaft is supported on a pair of arm members extended on both sides of said electromagnet.

* * * * *