Nov. 20, 1934. W. R. LEE 1,981,050

FLYING TOY

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Fig. 1.

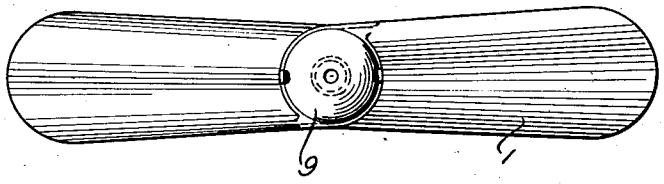
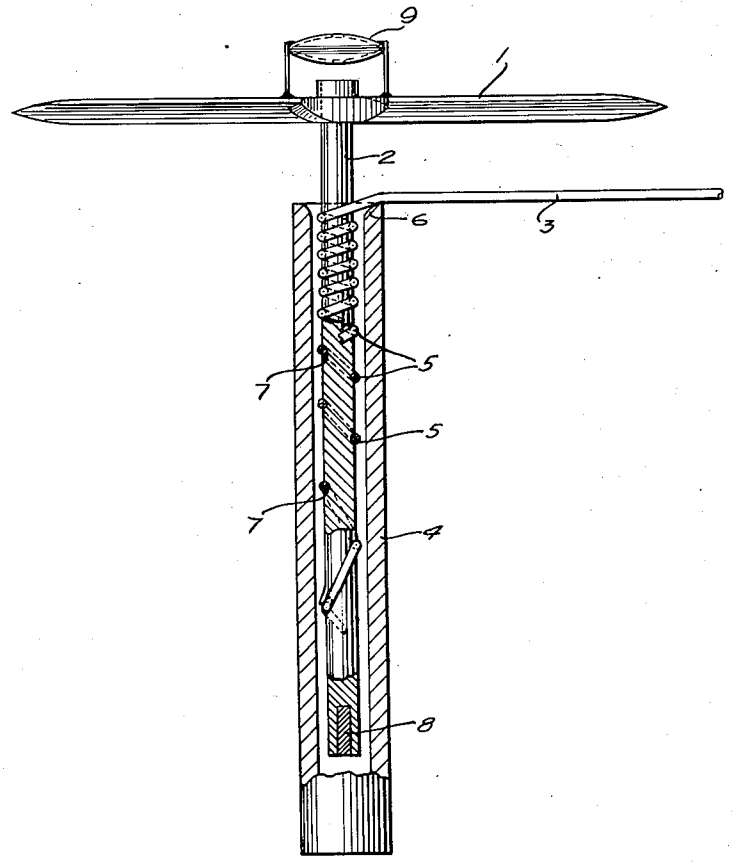


Fig. 2.



INVENTOR
WALTER R. LEE
BY Geo. M. Dowe
ATTORNEY

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FLYING TOY

Walter R. Lee, Ocala, Fla.

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4 Claims. (Cl. 46—51)

This invention relates to a flying toy or toy helicopter and its general object is to construct such a toy in a manner which more closely follows aero-dynamic principles than toys heretofore used with which I am familiar. Toy helicopters have been long in use and their essential elements consist of a propeller blade and a shaft attached thereto and some form of holder for supporting the shaft while the same is put into rapid rotation by a cord wound about the shaft. Insofar as I am aware, these devices heretofore produced have not taken into account the advantage to be gained by so winding the propelling cord as to cause the shaft to be accelerated during its lift under the pull of the cord, such acceleration rapidly increasing and becoming a maximum at the moment the shaft leaves the holder.

The present invention takes advantage of this and an important feature thereof relates to the provision of means whereby the pull of the propelling cord tends to lift the shaft in a vertical direction with increased speed This is accomplished by winding the cord in a helix about the shaft which helix has a steep pitch at the lower end of the shaft, the pitch falling off considerably towards the upper end of the shaft and assuming substantially the form of a regular helix a few turns from the upper end.

A further feature of the invention relates to the provision of means whereby the propeller and its shaft are more effectually maintained in a vertical position during flight. Preferably this is accomplished by providing a weight at the lower end of the shaft of sufficient size and density to accomplish the desired purpose.

A further feature of the invention relates to the provision of a whistle applied to the propeller near its center which adds to the attractiveness of the toy in the hands of children, although this feature may be omitted, if desired.

The invention will be better understood by reference to the accompanying drawing in which—

Figure 1 is a top view of my improved device; and

Figure 2 is a view partly in section and partly in elevation.

Referring to the drawing, the propeller 1 is rigidly mounted on the shaft 2 and after the propelling cord 3 has been wound about the shaft, the shaft is inserted in the holder 4. The holder is hollow and of sufficient depth to properly support the shaft and to guide it when the cord is pulled. It will be noted by reference to Figure 2 that the cord is wound about the shaft in a helix of variable pitch. A notch 5 is so shaped as to allow the cord to leave the shaft with ease at the final moment of ejection from the holder and the first few turns of the cord form a helix of very steep pitch. As the cord approaches the top of the shaft, however, the form of the helix diminishes and becomes of substantially equal pitch near the top. The cord is guided over the top edge 6 of the holder, which edge is flared to reduce friction when the cord is pulled to set the propeller into flight. As the cord 3 is pulled the shaft and its propeller are lifted with increased velocity, so that the acceleration in a vertical direction which is given to the propeller and shaft at the moment the shaft leaves the holder is at a maximum. At this moment also the propeller is rotating at its maximum speed. With this method of winding the cord about the shaft it is possible to proportion the propeller pitch and the pitch of the helix so that the vertical acceleration given to the shaft due to the lifting power of the cord at the moment the shaft leaves the holder approximates the lifting force given to the propeller due to its speed of rotation at this instant.

There is therefore no drag of the propeller caused by slip nor any tendency of the cord to retard the tendency of the propeller to leave the holder.

In order to make it convenient to wind the cord about the shaft into a helix of the desired form I provide a groove 7 in the shaft which has the desired characteristics, said groove being of steep pitch at its lower end and rapidly decreasing its pitch as it approaches the end adjacent the propeller blade where it assumes the form of a substantially regular helix. The groove also insures that the cord be wound about the shaft in the proper direction.

The propeller blade is preferably formed of metal while the shaft is made of a relatively light wood, although, of course other materials may be used. It is desirable, however, that the propeller have somewhat more mass than the shaft. The heavier propeller not only insures stability in flight but becomes the reservoir, as it were, for the storing up of greater momentum.

At the lower end of the shaft I insert or attach a weight 8 preferably of lead and of sufficient size to maintain the shaft upright in flight and more particularly to insure that the propeller will maintain its vertical position during descent.

The toy may be made more attractive and in-

teresting in the hands of children by providing a whistle indicated at 9 suitably mounted at the center of the propeller. This whistle may be of well-known construction consisting of two convex pieces of metal having apertures of suitable size to cause the whistling effect at the velocity considered most appropriate.

I claim:

1. A flying toy including a propeller-blade and a shaft secured thereto and means associated with the shaft to aid in winding of the propelling cord in a helix of decreasing pitch.

2. A flying toy including a propeller-blade and a shaft secured thereto, said shaft having a helical groove associated therewith to act as a guide in winding the propelling cord, said groove being of steep pitch at its lower end and rapidly decreasing its slope as it approaches the end adjacent the propeller-blade.

3. In a flying toy, the combination with a propeller, its attached shaft and a holder therefor, the propeller and shaft adapted to be projected into flight by rapid rotation given to the shaft through means of a cord wound about the shaft; characterized by the fact that the cord is wound about the shaft in the form of a helix having a rapidly increasing pitch towards the end of the shaft remote from the propeller.

4. In a flying toy, the combination with a propeller, its attached shaft and a holder, the propeller and shaft adapted to be projected into flight by rapid rotation of the shaft through means of a cord wound about the shaft, the holder acting as a guide for the cord and acting to lift the shaft bodily as the cord is pulled; characterized by the fact that the cord is so wound about the shaft that the lifting action thereof rapidly increases as the shaft approaches the upper end of the holder.

WALTER R. LEE.