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DRIVE-EQUIPPED TOY AEROPLANE

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Fig · 1

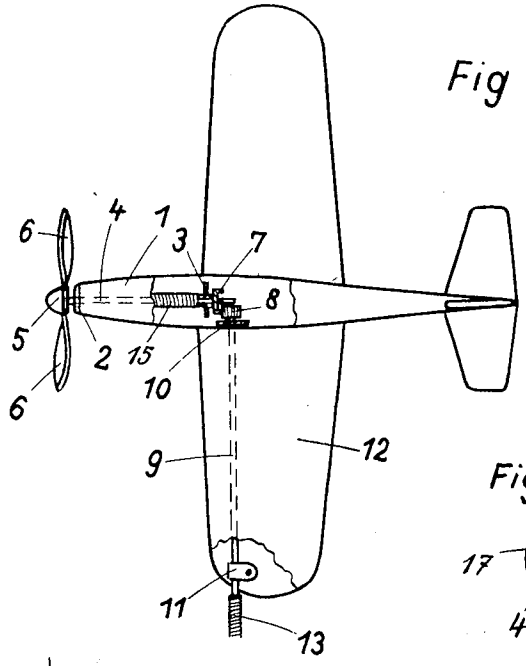


Fig · 4

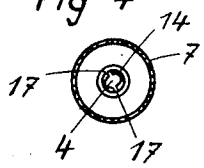


Fig · 2

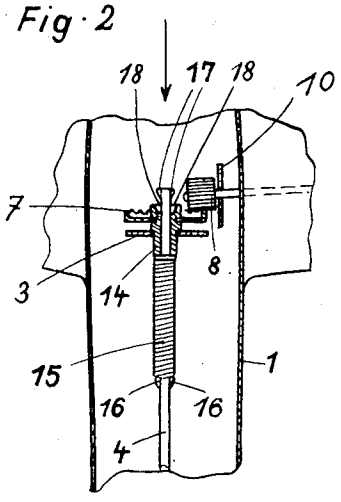
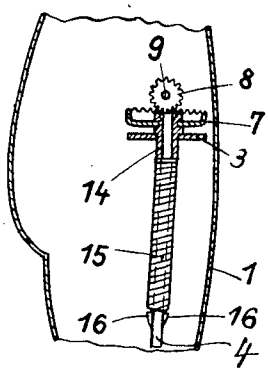


Fig · 3



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DRIVE-EQUIPPED TOY AEROPLANE

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4 Claims. (Cl. 46—77)

The present invention relates to drive-equipped toy aeroplanes and is of particular advantage in connection with toy aeroplanes which are remotely driven through the intervention of a flexible shaft which latter at one side of the aeroplane, especially at the tip of a wing, is connected to an angle drive, preferably step-down drive, said angle drive being arranged for driving the propeller.

With toy aeroplanes of the above type it is unavoidable that occasionally they will drop to the ground from a more or less great height. In such an instance, the propeller or propellers will first hit the ground. The shock occurring in such an instance primarily reacts between the propeller hub and the fuselage as a result of which the propeller shaft and the gear transmission, for instance angle drive, conveying driving power to said propeller shaft are subjected to considerable stress.

It is an object of the present invention to provide toy aeroplanes of the above type which are equipped with means adapted considerably to reduce the stress exerted on the gear transmission drivingly connected to the propeller shaft when the propeller hub should hit the ground after a drop of the aeroplane from any height.

It is another object of this invention so to arrange the propeller shaft of a toy aeroplane of the above mentioned type that the propeller shaft can yield in longitudinal direction thereof in response to a shock occurring from the propeller hub in an axial direction of said propeller shaft.

It is still another object of this invention to provide a toy aeroplane of the above mentioned type, in which automatically in response to a propeller or its hub accidentally hitting the ground, the drive to the propeller shaft will be disconnected from the latter so as to protect the respective gear system against damage.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings in which:

Fig. 1 illustrates a top view, partly in section of a toy aeroplane provided with a shock-absorbing arrangement according to the present invention.

Fig. 2 illustrates on a scale somewhat larger than that of Fig. 1 a top view partly in section, of a drive provided with a shock-absorbing arrangement according to the present invention.

Fig. 3 is a side view, partly in section of the arrangement shown in Fig. 2.

Fig. 4 is a view of the shock-absorbing arrangement of Fig. 2 seen in the direction of the arrow shown in Fig. 2.

General arrangement

In order to avoid damage to the propeller shaft and the gear transmission for driving said propeller shaft, according to the present invention shock-absorbing means are provided between the propeller hub and the driving means connected to the propeller shaft. According to a particularly simple embodiment of the invention, the propeller shaft is axially movable in the hub of the driving gear, more particularly a crown gear mounted on said

propeller shaft, while a pressure spring is interposed between said propeller shaft and said driving gear. In this way a shock occurring when the hub of the propeller of the aeroplane hits the ground will be absorbed by the said spring.

According to a further development of the invention the rear end of the propeller shaft may be provided with ears, preferably stamped out of the propeller shaft, while the hub of the driving gear mounted on said propeller shaft is provided with corresponding notches adapted to be engaged by said ears in order to couple said propeller shaft and said driving gear with each other for driving the propeller. This arrangement has the advantage that not only the transmission for the propeller will be protected against shock, but also at the instant of the aeroplane hitting the ground, the driving connection between the propeller shaft and the lateral drive shaft therefor will be temporarily disconnected. Damage to the driving device will in this way be prevented to a maximum extent.

In order to prevent a bending of the propeller shaft, it is furthermore suggested in conformity with the present invention to make the propeller shaft of high grade steel.

Structural arrangement

Referring now to the drawing in detail, the arrangement shown therein by way of example concerns a toy aeroplane adapted to be driven by a flexible shaft **13** which enters the aeroplane at the tip of a wing **12**. An angle drive **9**, **8**, **7**, **4** is interposed between the flexible shaft **13** and the propeller **6**. The angle drive is preferably a step-down transmission. More specifically, the reference numeral **1** designates the fuselage having rotatably journalled therein at **2** and **3** the propeller shaft **4**. The front end of the propeller shaft **4** carries the propeller hub **5** with the propeller **6**. The rear end of the propeller shaft **4** is provided with a crown gear **7** the teeth of which are engaged by the teeth of a pinion **8**. The pinion **8** is connected to the inner end of a drive shaft **9** which is rotatably journalled at **10** and **11** in the left wing **12** of the toy aeroplane. The drive shaft **9** is adapted to be driven by a flexible shaft **13** which in this instance is designed as a wire coil adapted to be connected to the outer end of shaft **9**.

The crown gear **7** is provided with a hub **14** and together with the latter is rotatably journalled in the bearing **3**. The rear portion of the propeller shaft **4** is provided with a pressure spring **15** one end of which rests against the hub **14**, whereas the other end of spring **15** rests against ears **16** which are stamped out of the shaft **4**. The rear end of the propeller shaft **4** is provided with two further ears **17** likewise stamped out of the propeller shaft **4** and adapted to engage corresponding notches **18** provided in the hub **14**.

Fig. 2 shows the propeller shaft **4** in a position in which it has been moved axially backwardly so that the two ears **17** have disengaged the notches **18** in the hub **14** of the crown gear **7**. As a result thereof, the pressure spring **15** has been compressed to a certain extent and has thus absorbed the shock which brought about backward movement of the propeller shaft **4**.

Fig. 3 shows the angle drive in operative position in which the ears **17** of shaft **4** engage the corresponding notches **18**, thereby coupling the crown gear **7** to the propeller shaft **4**.

Fig. 4 shows a view of the crown gear **7** and the propeller shaft **4** seen in the direction of the arrow of Fig. 2 and illustrating the position of the ears **17** within the hub **4**.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In combination with a toy aeroplane equipped with a propeller having a hub, wings, a propeller shaft drivingly connected to said propeller and being operable remotely by a remote drive motor through the intervention of a flexible shaft: an angle drive system including a transmission shaft supported by one of said wings and having its outer end drivingly connected to said flexible shaft, a gear supported by and drivingly connected to the inner end of said transmission shaft, a propeller shaft having one of its ends drivingly connected to said propeller and being axially movably mounted in said aeroplane, a second gear meshing with said first gear and supported by the other end of said propeller shaft, first clutch means connected to said second gear, second clutch means connected to said propeller shaft, and spring means continuously urging said first and said second clutch means into operative engagement with each other, said first and said second clutch means being arranged in response to a certain axial movement of said propeller shaft in the direction toward said first gear to disengage said first and second clutch means from each other to thereby interrupt driving connection between said propeller shaft and said gears.

2. A toy aeroplane according to claim 1, in which said second gear is a crown gear having a hub forming said first clutch means.

3. In combination with a toy aeroplane equipped with a propeller having a hub, wings, a propeller shaft drivingly connected to said propeller and being operable remotely by a remote driving motor through the intervention of a flexible shaft: an angle drive system including a transmission shaft supported by one of said wings and having its outer end drivingly connected to said flexible shaft, a gear supported by and drivingly connected to the inner end of said transmission shaft, a propeller shaft having one of its ends drivingly connected to said propeller and having its other end provided with ears, said propeller shaft being axially movably mounted in said aeroplane, a second gear meshing with said first gear and provided with a hub having an axial bore therethrough, said propeller shaft extending through said gear hub so that said gear hub is interposed between said ears and said propeller, said gear hub being provided with notches adapted to be engaged by said ears for establishing driving connection between said second gear and said propeller shaft, and spring means surrounding said propeller shaft and continuously urging said ears into engagement with said notches, said spring means being yieldable to allow axial movement of said propeller shaft for disengagement of said ears from said notches in response to a shock exerted upon said propeller shaft in axial direction thereof toward said gears.

4. In combination with a toy aeroplane equipped with a propeller and operable remotely by a remote driving motor through the intervention of a flexible shaft: an angle drive system including a first transmission shaft supported by said aeroplane and having its outer end drivingly connected to said flexible shaft, a first gear carried by and connected to said first transmission shaft, a second transmission shaft having one end thereof drivingly connected to said propeller, a second gear continuously meshing with said first gear, said second gear being provided with a hub and having a bore therethrough, bearing means supported by said aeroplane and supporting said hub, said second transmission shaft axially slidably extending into said bore and being supported thereby, said second transmission shaft having that end thereof which is adjacent said second gear provided with first abutment means arranged normally drivingly to connect said hub with said second shaft, second abutment means arranged on said second shaft intermediate said hub and the other end of said second shaft, and spring means extending around said second transmission shaft and interposed between said hub and said second abutment means, said spring means being arranged to be compressed in response to a certain minimum force acting upon said second shaft in the direction from said propeller toward said second gear and causing said first abutment means to move out of driving engagement with said hub, said compressed spring means automatically reestablishing said driving engagement of said first abutment means with said hub in response to the force acting upon said second shaft in said direction dropping below said certain force.

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