March 11, 1941. C. GOLDBERG 2,234,758

ENGINE MOUNTING FOR TOY AIRPLANES

Filed June 14, 1940

Fig. 1.

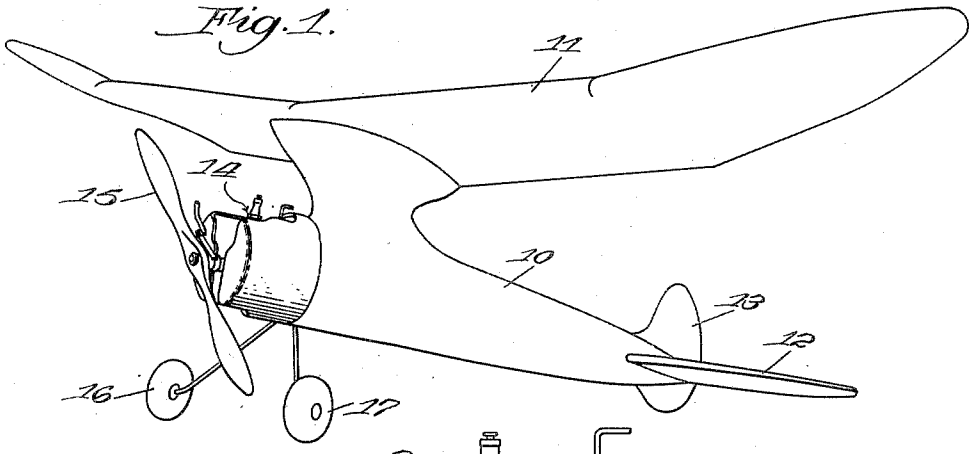


Fig. 2.

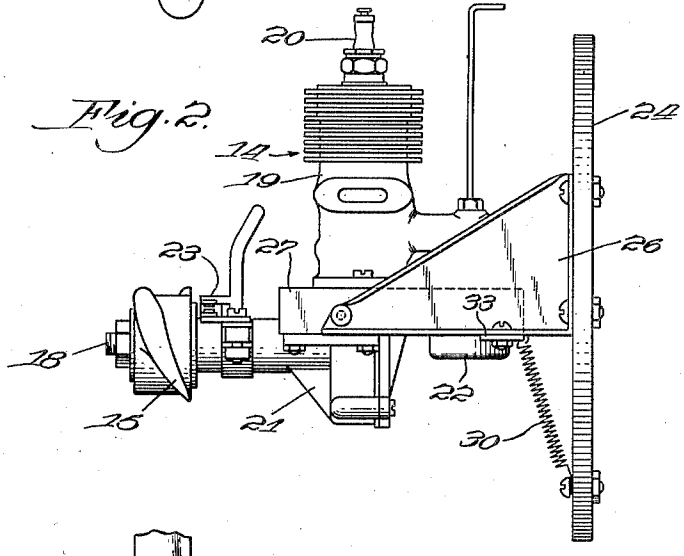
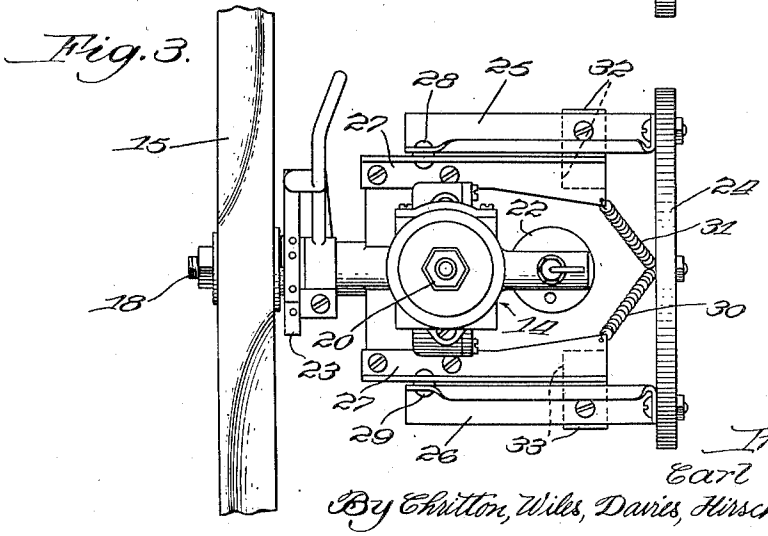


Fig. 3.



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ENGINE MOUNTING FOR TOY AIRPLANES

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9 Claims. (Cl. 46—78)

This invention relates to an engine mounting for toy airplanes, and more particularly to means for supporting the propeller shaft bearing in such a way as to permit it to rotate about a horizontal axis transverse to the direction of movement of the plane whenever the lower portion of the propeller strikes an object during forward movement of the plane, as on landing.

One feature of this invention is that it provides means for preventing breakage of the propellers of toy model planes upon landing thereof; another feature of this invention is that it is particularly useful in connection with model airplanes wherein the tips of the propeller blades swing in an arc below any other portion of the airplane as it lands, as where the model airplane is provided with a retractable under-carriage; yet another feature of this invention is that the propeller, propeller shaft, motor and all parts associated with the motor, as the gasoline supply, are mounted for movement as a unit about a horizontal axis transverse to the direction of movement of the airplane, with which the propeller shaft is substantially aligned; a further feature of this invention is the provision of means for normally maintaining the propeller shaft in desired alignment with the direction of flight of the model airplane, yet making this means yieldable to permit the desired movement about the aforementioned horizontal axis; other features and advantages of this invention will be apparent from the following specification and the drawing, in which:

Figure 1 is a perspective view of a model airplane embodying my invention; Figure 2 is a side elevation of the propeller, propeller shaft, motor and associated parts and motor mounting; and Figure 3 is a top plan view of the apparatus shown in Figure 2.

Toy model airplanes are no longer devices with open fuselages and rubber-band motor, but well finished and well designed planes with miniature internal combustion engines which drive them at good speed and to great heights. A recently designed model airplane, for example, has a wing span of six feet and an over-all length of over four feet. It may be powered by a small internal combustion engine of about one-fifth horsepower; and it has the amazing climb of fifteen hundred feet per minute; moreover, to increase its aerodynamic efficiency the under-carriage is made automatically retractable, snapping up into a fuselage well when the plane gets into the air.

The increase in horsepower of the motors available for actual operating model airplanes results in a necessary increase in propeller size, so that when a retractable landing gear is used, or even with an ordinary landing gear when the plane is coming in with its nose slightly down in a landing, the tips of the propeller blades move in an arc which has a lower point than any other portion of the plane, and thus strike the ground or other surface on which the plane is landing first. Moreover, even where this is not the case obstructions of one kind or another sometimes strike the lower blade of the propeller as the plane is again landing. Model airplane builders have heretofore been faced with two alternatives, both undesirable. If they wanted to protect the propeller shaft, bearings, and motor parts in general a very light propeller was used, and this would break very frequently, requiring replacement. A high-speed heavily powered model airplane with a very light propeller would oftentimes break the propeller every two or three landings. On the other hand, if the propeller was made particularly strong and able to withstand the shock of striking an obstacle upon landing, the impact frequently strained the propeller shaft or threw its bearings or some part of the motor, particularly the crank shaft, out of line. It will be understood that the model airplanes referred to herein are toys, these toy airplanes being frequently called "models" because of their faithful reproduction of the outer appearance of real airplanes of various makes.

I have overcome these and other difficulties by so mounting the propeller shaft that it is normally maintained in a desired substantially horizontal position, in general alignment with the direction of movement of the airplane in flight; but mounting it for movement about a horizontal axis transverse to the line of flight, the means normally maintaining it in the desired position being yieldable upon impact to permit the lower propeller blade to move back when it strikes an obstacle.

In the particular embodiment of my invention illustrated herewith a model airplane of a particularly efficient type, as mentioned heretofore, is shown in Figure 1. It comprises a main body portion or fuselage 10, wings 11, stabilizing and control surfaces, as 12 and 13, a motor 14, a propeller 15 driven thereby, and an under-carriage here shown as comprising two wheels 16 and 17 with their supporting means. While two spaced wheels are here shown, it will be understood that a single wheel can be used in conjunction with two spaced sliding points or skids at the rear of

the plane to provide stability on take-off. Moreover, the under-carriage or landing gear is frequently automatically retractable, being latched in the position shown so long as there is any weight on the wheel or wheels, but snapping up into a fuselage well when the plane lifts off the ground and there is no longer any weight holding the latch in place. Such an arrangement is not here illustrated in detail, since it forms no part of the present invention.

As may be best seen from Figures 2 and 3, the driving means for propelling the model airplane comprises the propeller 15 mounted on a propeller shaft 18 and rotatably mounted in and driven by a small one-cylinder internal combustion engine here indicated in general as 14. In accordance with conventional motor practice, the engine comprises a cylinder 19, a spark plug 20, and a crank case 21. The piston, crank shaft and other parts are not shown in detail, since they form no part of the present invention, but it will be understood that the propeller shaft is either an integral member with the crank shaft, journaled in bearings in the crank case 21, or rigidly and permanently secured thereto for rotation therewith. That is, the bearings furnishing rotatable support for the propeller shaft are a part of the motor, in the crank case 21. It will be understood that all the parts necessary for an internal combustion motor are provided, as the gasoline supply means 22, ignition control means 23, operative wiring, and the like. All of these are, however, fastened to or carried by the motor proper, and are removable therewith so that the entire driving means is a unit assembly.

The front ring of the fuselage of the model airplane is also a bulkhead or fire wall 24, being formed of plywood or any other desired material. A pair of sheet metal brackets 25 and 26 are bolted to the bulkhead 24 and project forwardly therefrom. These brackets are preferably triangular in shape and stamped so as to have flanges or rim-like portions along the edges to provide the maximum structural strength while maintaining the lightness of relatively thin sheet metal. The driving unit, the motor and associated parts, is supported or slung between the brackets 25 and 26 for movement about a horizontal axis through the outer ends of the brackets, transverse to the direction of movement of the airplane in flight. The motor is here shown as rigidly mounted on a carriage 27, which is in turn pivotally supported by the outer or forward ends of the brackets 25 and 26, as by the rivets 28 and 29. The carriage, and thus the motor, propeller shaft and propeller, are therefore all supported in such a way as to be rotatable or movable, at least to a limited extent, about an axis through the rivets 28 and 29.

Yieldable means is provided for normally maintaining the motor and propeller shaft in the desired operative position, here being shown in the form of a pair of springs 30 and 31 having their upper ends attached to the inner ends of the carriage 27, and their lower ends attached to the bulkhead 24 or some other fixed part of the model airplane. Means for preventing the motor from swinging too far under the pull of the springs is here shown as a pair of carriage stop members 32 and 33 on the brackets 25 and 26, respectively.

It will be readily apparent that under all normal conditions, whether the model airplane is on the ground or in the air, the motor and propeller shaft will be maintained in the desired normal position shown in the drawing by the force of the springs 30 and 31. Should the propeller be vertical, or substantially so, as the plane comes into a landing or strikes an obstruction during a run, the force thus generated will cause the lower blade of the propeller to move back and upwardly, the entire supporting mounting for it (here the entire motor and associated parts) correspondingly moving about the axis through the rivets 28 and 29 against the yielding resistance of the springs 30 and 31. This prevents breakage of the propeller blades while at the same time protecting the motor, crankshaft and crank case, for example, against undue strains or distortion. The cowling or inclosure for the motor must either be of sufficient size as to permit this turning movement within it, or slotted in some manner to enable the motor and propeller shaft to move to the abnormal position upon impact of the blade with some obstacle. It will be understood that the slotted arrangement shown here is not necessarily the best from the standpoint of design and appearance, but is one which well illustrates the invention.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims.

I claim:

1. A mounting of the character described for the propeller of a toy airplane having a retractable under-carriage, including: a shaft on which the propeller is mounted; bearing means within which the shaft is rotatable; means supporting the bearing means for movement about a horizontal axis transverse to the axis of the propeller shaft; and yielding means normally maintaining the bearing means in such a position that the propeller shaft is substantially horizontal.

2. A toy airplane of the character described, including: a body portion; a motor; a shaft rotatably supported and driven by the motor; a propeller mounted on the shaft; and means supporting the motor for movement about a horizontal axis transverse to the direction of movement of the airplane.

3. A toy airplane of the character described, including: a body portion; a motor; a shaft rotatably supported and driven by the motor; a propeller mounted on the shaft; means supporting the motor for movement about a horizontal axis transverse to the direction of movement of the airplane; and yielding means normally maintaining the motor in such a position that the propeller shaft is substantially horizontal.

4. A mounting of the character described for the propeller of a toy airplane having a fuselage, including: a shaft on which the propeller is mounted; bearing means within which the shaft is rotatable, the bearing means being a part of a driving motor; means supporting the entire motor, including the bearing means, for movement with respect to the fuselage about a horizontal axis transverse to the axis of the propeller shaft; and yielding means normally maintaining the bearing means in such a position that the propeller shaft is substantially horizontal when the fuselage is horizontal.

5. A toy airplane of the character described, including: a body portion having a bulkhead at the forward end thereof; a motor; a shaft rotatably supported and driven by the motor; a propeller mounted on the shaft; a pair of bracket

members extending forwardly from the bulkhead and supporting the motor therebetween for movement about a horizontal axis transverse to the direction of movement of the airplane; and yielding means normally maintaining the motor in such a position that the propeller shaft is substantially horizontal.

6. Apparatus of the character claimed in claim 3, wherein the motor is an internal combustion engine and the gasoline supply is movable therewith.

7. Apparatus of the character claimed in claim 2, wherein the body portion has a retractable under-carriage.

8. Apparatus of the character claimed in claim 2, wherein the tips of the blades of the propeller swing in an arc below any other portion of the airplane as it lands.

9. Apparatus of the character claimed in claim 5, wherein the tips of the blades of the propeller swing in an arc below any other portion of the airplane as it lands.

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