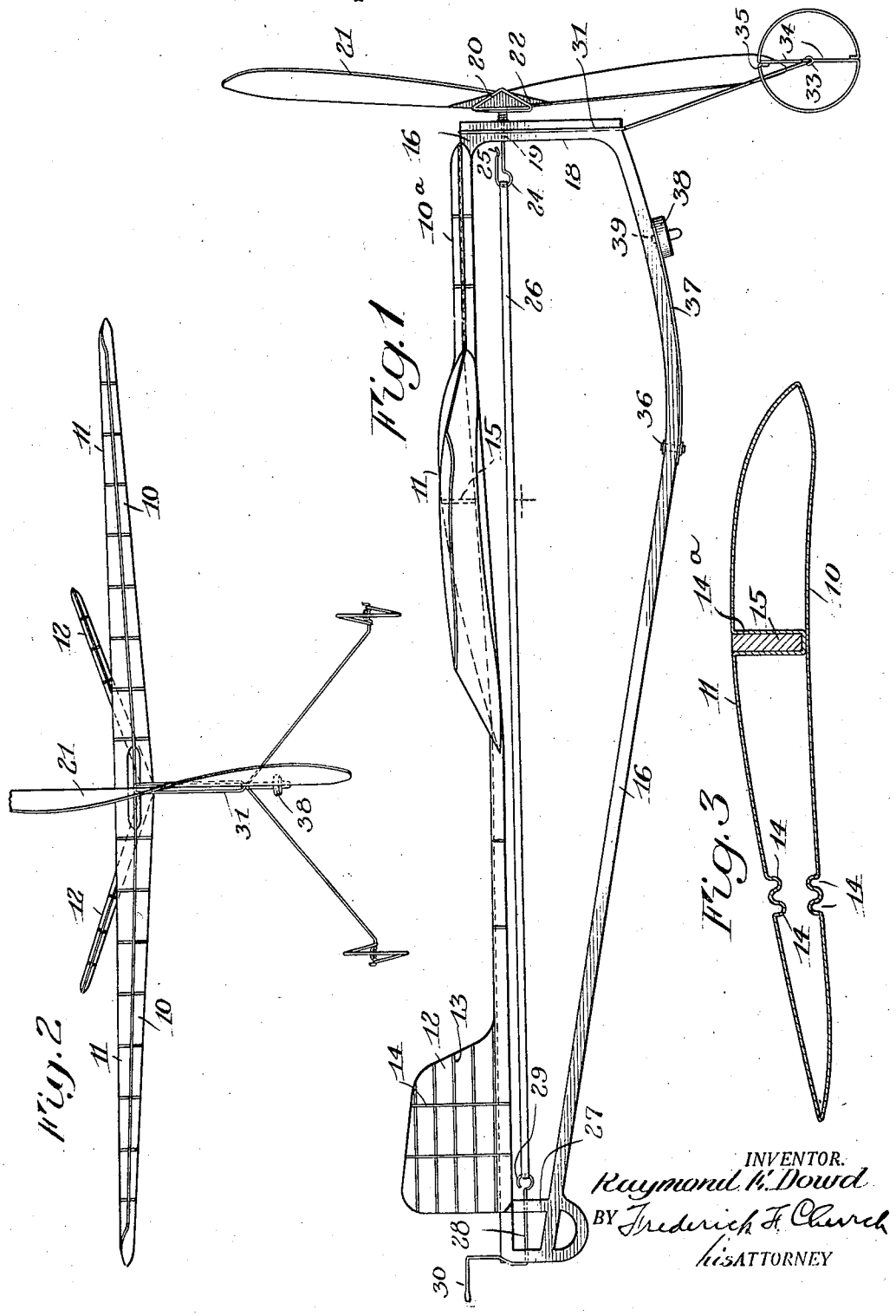
Dec. 20, 1927. 1,653,039

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TOY AIRPLANE

Original Filed Dec. 8, 1922 2 Sheets-Sheet 1



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Fig. 6

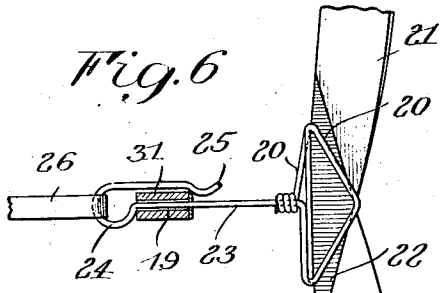


Fig. 4

Fig. 8

Fig. 7

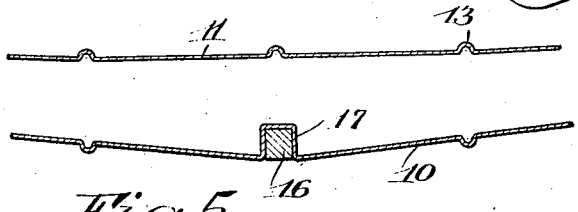


Fig. 5

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UNITED STATES PATENT OFFICE.

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TOY AIRPLANE.

Application filed December 8, 1922, Serial No. 605,624. Renewed May 31, 1927.

This invention relates to toy airplanes, one object being to provide an article of this type of high aerodynamic efficiency and a practical and inexpensive form of construction.

Another object is to provide a toy airplane having a form of construction affording flying efficiency and adapted to durably maintain its form in use, and embodying also advantageous features by means of which the article may be conveniently disassembled in part for packaging and shipment in small space.

A further object is to provide a toy airplane of the above character having propelling means of a simple and effective nature convenient to operate.

Further objects are to provide such an article with an efficient construction for the propeller and the undercarriage and for ballasting the airplane. To these and other ends the invention resides in certain improvements and combinations of parts as will hereinafter be more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a side elevation of a toy airplane embodying the present invention:

Figure 2 is a front elevation of the same, somewhat reduced in size;

Figure 3 is an enlarged sectional view on the line 3^a—3^a of Figure 4 of the construction of the main sustaining plane;

Figure 4 is a top plan view of the airplane;

Figure 5 is an enlarged sectional elevation on the line 5^a—5^a of Figure 4;

Figure 6 is an enlarged detail view illustrating the construction of the propeller and the supporting means therefor;

Figure 7 is a front elevation of a portion of the body illustrating the construction of the undercarriage; and

Figure 8 is an enlarged detail view of one of the undercarriage wheels.

Similar reference numerals throughout the several views indicate the same parts.

The preferred embodiment of the invention herein disclosed by way of illustration comprises an airplane having its sustaining and stabilizing planes and a portion of its fuselage or body integrally constructed of relatively thin material formed into a light, hollow shell. The material at present preferred for this purpose is celluloid because of its light, water-proof and relatively strong character and the ease and economy with which it may be moulded into the desired shape. The article may be moulded in parts subsequently fused or cemented together at their margins, as well understood in the art, and this method of manufacture may be practiced with a high degree of accuracy and uniformity in the product. But of course from some aspects of the invention, various other modes of construction may be employed.

Referring more particularly to the drawings there is shown in the present instance an airplane preferably of the monoplane type constructed as above described and with an auxiliary frame secured to the body on which is carried a propeller adapted to be rotated by motive means preferably in the form of an elastic strip or element extending longitudinally of the body and wound by means at the rear of the latter. The shell-like body portion described above is shown at 10 as having in plan view the usual monoplane outline but as being relatively thin or plane shaped in elevation. This portion is preferably moulded of celluloid integrally with a main sustaining plane formed by laterally extending wings 11 and at the rear of the body are integral stabilizing planes 12 extending laterally and upwardly from the body to produce what may be termed a dihedral tail. These parts may be moulded of celluloid in upper and lower halves, as well understood in the art, the halves being put together and cemented at their marginal edges to provide an integral hollow shell which has considerable inherent rigidity because of the character of the material and of the shell-like or double-walled form of construction. However it is preferred to further stiffen the walls of this shell by forming therein a series of corrugations 13 substantially parallel with the direction of flight and also with transversely extending corrugations 14 which latter are projected inwardly of the wall, as best shown in Figure 3 to avoid air resistance, as well understood in the art. The above construction embodies substantially the subject matter of my copending application for patent on "toy airplanes" executed October 9, 1922. It is also preferred to place a stiffening spar of wood or other light, rigid material be-

tween the walls of the main sustaining plane as shown, this spar having the form of a strip 15 extending substantially from tip to tip of the wings and snugly seated and cemented in a substantially U-shaped depression 14^a formed in the upper wing wall, as shown in Figure 3. The bottom of the depressed portion 14^a of the upper wall may be secured to the lower wall by providing series of small openings in the latter opposite the depression and brushing in cement. This form of construction affords a light but rigid article capable of being manufactured with accuracy and uniformity in accordance with aerodynamic principles and of maintaining its proper shape in use.

The above described parts constitute primarily the aerodynamic surfaces of the airplane but the body portion 10 is provided with an attached frame for supporting the propeller and motor means, as well as an undercarriage and a gravity control or adjustable ballasting device. This frame 16 has the open or outline shape shown in Figure 1, its upper edge being seated in a recess or channel 17 formed in the under side of the body portion 10^a. These parts may be so constructed as to be frictionally or otherwise detachably connected with each other to facilitate disconnection for purposes of compactness in packaging and shipping, or the frame may of course be cemented in the channel of the body if found preferable. The frame has a forward end 18 in which is provided a bearing 19 for the propeller and to this forward end is also detachably secured the wheeled undercarriage hereafter described.

The propeller, as best shown in Figure 6, has a hub portion formed preferably of a single length of resilient wire bent into substantially coextensive loops 20 as shown which clamp between them the central portion of a strip 21 of celluloid or other suitable material the ends of which are curved into the shape of an efficient propeller blade.

A stiffening piece 22 of any suitable material may be inserted with the propeller strip between the loops or clips 20 of the hub portion and these parts may also be cemented together if desired. The hub comprises also a bearing portion 23 rotating and sliding longitudinally in a bearing opening 19 of the frame through which the wire bearing portion projects rearwardly with its rear end bent to supply a loop portion 24 and a spring locking portion 25. The propeller is rotated by motor means comprising preferably a torsionally resilient or elastic element or strip 26 one end of which is secured to loop 24. As may be seen by comparison of Figures 1 and 6, the propeller may be slid forwardly in its bearing to engage the locking portion 25 with the frame end 18 and thus temporarily lock the propeller against rotation, as, for example, while the motor means is being energized or wound preliminary to a flight. Movement of the propeller rearwardly to the position shown in Figure 1 releases the same for rotation.

The motor for rotating the propeller comprises as stated the elastic element or strip 26, of rubber for example, which extends longitudinally in the frame adjacent the rear end 27 of the latter which is also formed with a bearing rotatably and slidably carrying a winding device in the form of a stem or crank 28 having its end within the frame bent to provide an eye or loop 29 for the attachment of the other end of the element 26. Outside the frame, stem 28 is bent at an angle to form a crank or handle 30 by means of which the element 26 may be twisted or wound up for driving the propeller for a period sufficient to afford a substantial flight. In thus energizing the motor means, crank handle 30 is drawn rearwardly in its bearing and rotated, after which it is moved forward in its bearing either by hand or by the tension of the elastic strip so that it engages the frame and serves as a detent to prevent unwinding of the motor element at this end.

The undercarriage is preferably constituted by a single strip of wire 31 bent to form a loop adapted to embrace and grip the forward end 18 of the frame which may be grooved or channeled to receive the wire as shown. The sides of the loop are preferably crossed at the bottom of the frame as shown with the ends of the wire extended laterally in spaced relation, each end being turned horizontally to provide a journal portion 32 as shown in Figure 8. On each journal is a wire wheel preferably formed from a single length of wire looped at its intermediate portion at spaced points 33 to provide bearings. From each bearing the wire is directed outwardly in the form of a spoke 34 at the end of which it is curved circularly to form the wheel rims, the ends of the wire being turned inwardly and secured as at 35 to the spokes so that a smooth circular periphery is formed. This provides a wheel of ample strength and very light weight.

In the types of airplanes in which the stabilizing surfaces are disposed rearwardly of the sustaining surfaces, as distinguished from the type having the stabilizing surfaces in advance, it is preferable to provide weighting or ballasting means forwardly of the sustaining surface in order to bring the center of gravity of the airplane to its proper location substantially over the center of lift of the wing. This is accomplished in the present instance by pivotally securing to the frame as at 36 a strip 37 preferably of resilient metal extending forwardly for a distance as shown and carrying at its forward end a small weight 38. This end of

strip 37 may be provided with a lug or projection 39 adapted to be seated in a corresponding recess in the frame for holding the weight in central position. Preferably also the pivotal support of the strip is such as to introduce a frictional resistance to movement of the same sufficient to maintain it in adjusted position. This ballast or weight brings the center of gravity to the desired position described and by its adjustability provides for gravity control of the flight of the airplane, as, for example, to render the flight circular in direction.

In operation, the propeller being held or locked against rotation, crank 30 is rotated to twist or wind up the elastic element 26 and the crank is then held against unwinding movement by engagement with the frame as described. The airplane is then ready for flight which is started by releasing the propeller from the frame. The unwinding of element 26 rotates the propeller at high speed for a considerable period and the airplane "takes off" from any smooth surface and rises in flight which may be given a circular direction by shifting the weight 38. The launching is of course facilitated by the provision of the under carriage wheels for reducing the friction in starting.

The construction is rigid and durable in character so that it maintains its original accuracy of shape and aerodynamic efficiency. The motor means is simple and practical in form and convenient to manipulate. The propeller and undercarriage constructions are exceedingly simple and effective in character and these parts may be readily disassembled for packaging as may also the frame 16 in case the latter is detachably associated with the body portion 10. The various parts may be manufactured and assembled in an economical and uniformly accurate manner and the airplane as a whole presents a realistic appearance which may be enhanced by pleasing color schemes.

I claim as my invention:

1. A toy airplane comprising a body, a sustaining plane, stabilizing dihedral tail planes, said body and planes being integrally constructed of material formed into a light, hollow shell adapted to rigidly maintain its shape in use, a frame carried by said body, a propeller rotatably supported adjacent the forward end of said frame, power storing means for rotating said propeller, and manual means adjacent the rear end of said frame for energizing said power storing means.

2. A toy airplane comprising a sustaining plane and a body portion integrally constructed of material formed into a light, hollow shell, and a spar extending lengthwise of said plane and located within the cross sectional outline thereof to stiffen said plane.

3. A toy airplane comprising a sustaining plane and a body portion integrally constructed of moulded material in the form of a light, hollow shell having in one of the opposite walls thereof a substantially U-shaped depression extending into supporting contact with the opposite wall thereof, and a spar disposed in said depression for stiffening said shell.

4. A toy airplane comprising plane and body portions integrally constructed of material formed into a light hollow shell, a propeller supported on said body portion, an energy storing motor for driving said propeller, manual means adjacent the rear of the airplane for energizing said motor and a detachable wire undercarriage for said body provided with spaced journals and a wire wheel rotatably carried by each of said journals.

5. A toy airplane comprising a substantially plane shaped body portion, sustaining and stabilizing planes therefor, a frame depending from said body portion, a propeller carried by said frame at the forward end thereof, a winding device adjacent the rear end of said frame, an elastic element connected with said winding device and propeller for driving the latter and a wheeled undercarriage on said frame.

6. A toy airplane comprising a hollow, shell-like body portion of moulded material having a channel formed therein, an open frame depending from said body portion with its upper edge seated in said channel and serving to stiffen said body portion, a propeller rotatably carried in the forward side of said frame, a winding stem rotatable in the rear side of said frame, and an elastic element connecting said stem and propeller to serve as a motor for rotating the latter, said stem having an angular portion adapted to be drawn into engagement with said frame by said element to prevent unwinding movement of said stem.

7. A toy airplane comprising a body, a propeller rotatably carried thereby and slidable axially thereon, manually actuated energy storing means on said body for rotating said propeller, and a device on said propeller adapted to be engaged with said body by sliding said propeller axially for releasably locking said propeller against rotation.

8. A toy airplane comprising a body provided with a bearing opening, wire means formed to provide a pair of substantially coextensive loops, a strip of sheet material embraced centrally between said loops and shaped at its ends to serve as a propeller, said wire means having a bearing portion rotating in and extending through said bearing opening, and motor means on said body connected with said bearing portion for rotating said propeller.

9. A toy airplane comprising a body pro-

vided with a bearing opening, wire means formed to provide a propeller hub portion forwardly of said bearing and a bearing portion extending rearwardly through said bearing opening, propeller means carried by said hub portion, said bearing portion being slidable longitudinally in said bearing opening and provided with means for releasable locking engagement with said body, and motor means on said body connected with said bearing portion for rotating said propeller.

10. A toy airplane comprising plane and body portions, a propeller supported on the body portion, manually energized motor means for driving said propeller, and a weight carried by the forward end of an arm having its rear end pivoted on said body portion for adjustment on said body portion to control the flight of said airplane.

11. A toy airplane comprising plane and body portions, a propeller supported on the body portion, manually energized motor means for driving said propeller, an undercarriage in the form of a length of wire detachably looped about said body portion with its ends extended in spaced relation to form wheel journals, and wheels rotatably carried thereby.

12. A toy airplane comprising plane and body portions, a propeller supported on the body portion, manually energized motor means for driving said propeller, an undercarriage for said body provided with spaced journals, and a wheel on each journal formed of a single length of wire having its central portion looped to provide bearing means and its end portions extended to provide the spokes and rim.

13. A toy airplane having a sustaining plane portion integrally constructed of moulded material in the form of a light, hollow shell and a reenforcing spar for said plane portion located within the cross sectional outlines thereof for strengthening the same.

RAYMOND E. DOWD.