M. PALMER.

TOY AIRPLANE.

APPLICATION FILED MAR. 12, 1920.

1,359,619.

Patented Nov. 23, 1920.

2 SHEETS—SHEET 1.

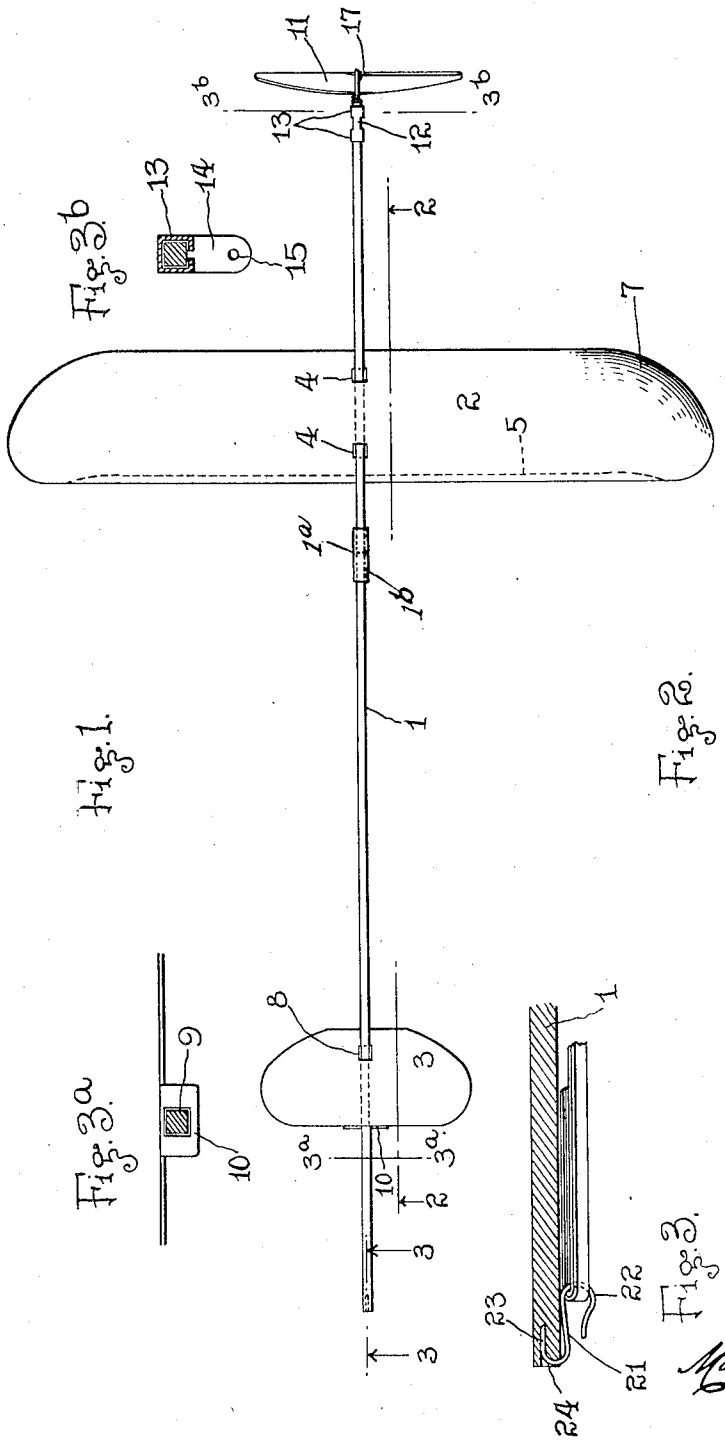


Fig. 3b.

Fig. 1.

Fig. 3a.

Fig. 3.

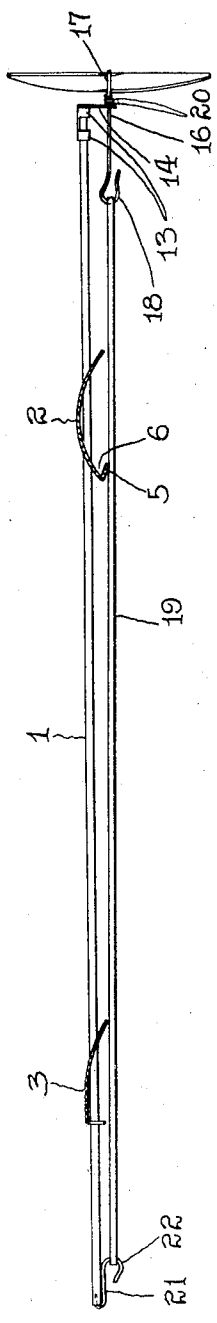


Fig. 2.

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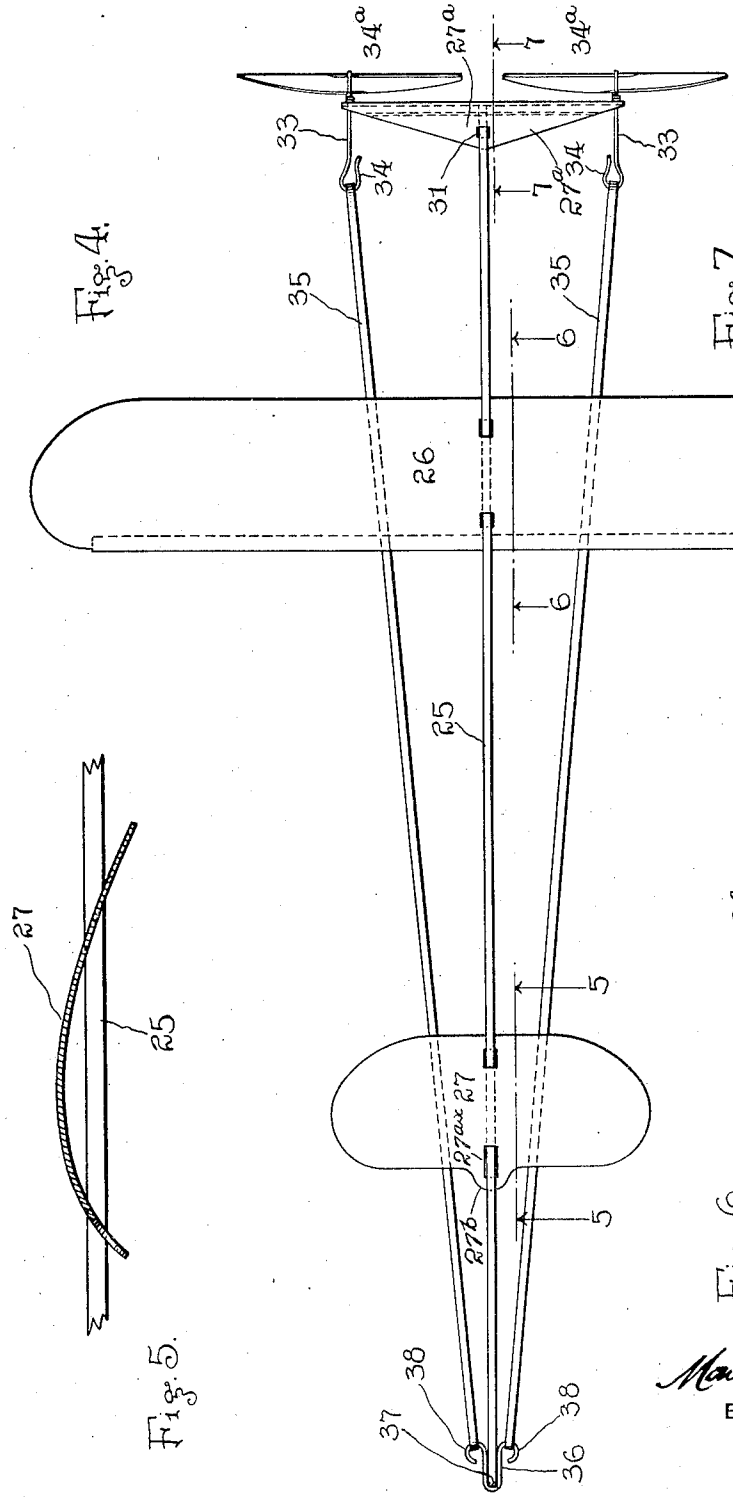


Fig. 4.

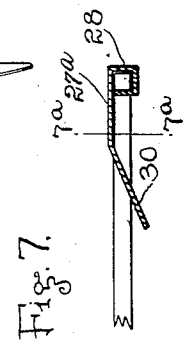


Fig. 7.

Fig. 5.

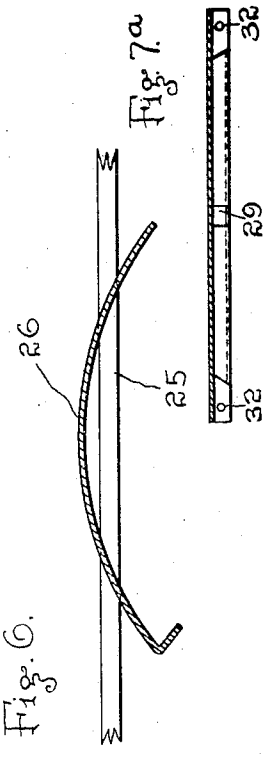


Fig. 7a

Fig. 6.

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UNITED STATES PATENT OFFICE.

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TOY AIRPLANE.

1,359,619. Specification of Letters Patent. Patented Nov. 23, 1920.

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To all whom it may concern:

Be it known that I, MONTAGUE PALMER, a citizen of the United States, and resident of the borough of Bronx, in the city, county, and State of New York, have invented certain new and useful Improvements in Toy Airplanes, of which the following is a specification.

This invention relates to model or toy airplanes, and my improvements are directed to certain novel characteristic features in the attachment of the aerofoils to the frame, whereby also the aerofoils are accorded a desired camber and angle of incidence, together with novel propeller fitting means and connecting devices for the propeller power element.

Therefore my invention consists of a frame element in the form of a single longeron that is rectangular in cross section, a main supporting aerofoil composed of spring-like sheet material, such as fiber, sprung to a chord-wise curvature or camber, and pierced with centrally alined orifices by which it is strung along said longeron, whereby the sprung and curved formation of said aerofoil is maintained in the attached relation between the aerofoil and its longeron; and said aerofoil having its leading edge reinforced through a folded back portion that stiffens said edge and permits some cavitation to occur and thus enhance the aerodynamical effect in flight.

The small forward aerofoil or elevator in this model or toy machine is similarly attachable to the longeron, but the longeron engaging orifices therein are differently provided, because with the elevator it is necessary to provide a set angle of incidence therefor. Thus the forward orifice is formed in a pendent tab or lug, which comes into alinement with a rearward orifice through the aerofoil when the latter is sprung into the desired cambered shape, thereby also according the elevator aerofoil the requisite angle of incidence whereby the device will be caused to ascend in its flight.

The propeller, in a single propeller machine, is revolubly mounted in the hanger portion of a socket fitting that fits over the rear end of the longeron, and a hook that comprises the terminal portion of the propeller shaft, engages the elastic power band that also engages a hook fitting carried by the front end of the longeron. This latter hook fitting also has a hook like portion whose point enters an axial hole therefor in the longeron end, while the shank portion thereof lies in a longitudinal slot in the longeron end to secure the fitting from turning under the twisting tension of the power band.

Also, for a two propeller machine I provide a transverse member of stiff material, like sheet metal, having alined orifices to centrally thereof receive the rear end portion of the longeron, and the opposite lateral ends of said member having bearings for the shaft of the respective propellers; the forward engaging means for the respective power bands comprising a double hook whose shank lodges in an endwise slot in the forward end of the longeron.

Other features and advantages of my said invention will hereinafter appear.

Figure 1 is a plan view of my invention as applied to a single propeller model airplane.

Fig. 2 is a side sectional view, taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail sectional view taken on the line 3—3 of Fig. 1.

Fig. 3^a is a section on the line 3^a—3^a of Fig. 1.

Fig. 3^b is a section on the line 3^b—3^b of Fig. 1.

Fig. 4 is a plan view of my invention as applied to a two propeller model airplane.

Fig. 5 is an enlarged section on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged section on the line 6—6 of Fig. 4.

Fig. 7 is an enlarged section on the line 7—7 of Fig. 4, and

Fig. 7^a is a section on the line 7^a—7^a of Fig. 7.

In Figs. 1 and 2 I have shown a frame portion composed of a single longeron 1, rectangular in cross-section, and of equal cross-sectional area throughout. Strung along said longeron, at suitable distances apart, are the aerofoils 2 and 3, of which the aerofoil 2 comprises the main supporting unit of the model airplane, and 3 an auxiliary or elevator unit. Said aerofoi's may be composed of spring-like sheet material, such as fiber, though obviously other material of suitable nature may be used.

The aerofoil 2 is provided with the rect-

angular orifices 4, 4, and, assuming said aerofoil to have been curved or sprung into the cambered-like curvature indicated in Fig. 2, then said orifices 4, 4, which are in alinement centrally of the aerofoil span, admit the reception of longeron 1, that is passed therethrough above the leading and trailing edges of said aerofoil and beneath the central portion of its material lying between said orifices, whereby said longeron, through the tension of the aerofoil, as sprung, localizes the latter in a set position relatively to the length of the longeron, and engagement of the aerofoil with the longeron serves to maintain the cambered form of the aerofoil.

Also the aerofoil 2 has a folded under portion 5 along its leading edge, that provides a forward pocket 6 for cavitation, and constitutes reinforcement for said leading edge, whereby it is better able to withstand fracture and distortion.

Since the torque developed by the operation of the model airplane with a single propeller, such as it is contemplated to employ with this example of my invention, would have a tendency to rotate the device about its longitudinal axis in the direction of propeller rotation, I may provide the aerofoil, at that wing side which would be pressed downwardly, with a warped portion such as at 7, to resist such turning tendency.

The elevator aerofoil 3 is applied to longeron 1 in a manner similar to aerofoil 2 to impart camber thereto, excepting that only one orifice 8 is provided in the aerofoil, being located centrally of the span thereof and near its trailing edge, a complementary orifice 9 however being formed in a forwardly pendent tab or lug 10 at the leading edge of said aerofoil, so that thereby the said leading edge is elevated above the longitudinal plane of the longeron and a desired set angle of incidence is accorded said aerofoil, to enable it to function as an elevator.

The single propeller 11 employed with this type of model airplane is applied thereto as by a fitting 12, which comprises a strip of metal having the arms 13 folded to form a rectangular socket to receive the longeron end portion, and an arm 14 that is folded against the socket to comprise an end closure therefor, and also to serve as an abutment wall or stop for the longeron end, said arm extending below the socket and there having an orifice 15 to serve as a bearing for the propeller shaft 16. As is usual, this shaft 16 consists of a piece of wire that is wrapped at one end 17 about the central portion of the propeller, and at its other end terminates in a hook 18 for engagement with a power band 19.

I provide however a novel form of thrust bearing which consists of one or more perforated metal beads 20, strung along shaft 16 and interposed between the arm 14 and the junction or hub like portion of wire end 17.

A fitting 21 at the forward end of longeron 1 has the hook portion 22 to engage the power band, and a reverse hook 23 whose pointed end engages in an axial orifice therefor in the longeron end, while an end slot 24 in said longeron, adjoining said orifice, receives the shank portion of hook 23 and thereby localizes fitting 21, precenting it from rotating under the twist tension of the power band.

The example of my invention shown in Fig. 4, which relates to a two-propeller model airplane, has longeron 25 with aerofoils 26 and 27 that correspond in their essential characteristics respectively with the aerofoils 2 and 3, as to their camber, and means of attachment to said longeron, and differ from the device of Fig. 1 in that the rear end or fitting is in the form of a transverse member 27^a, here shown as a strip of metal, whose rear portion is folded under to produce the rectangular structure 28, having a central, squared orifice 29 to receive the rear portion of the longeron whose end butts against the rear wall of structure 28—said structure also having a downwardly inclined portion 30 with a central rectangular orifice 31 to admit the reception of the longeron and localize the latter; and said structure having in its vertical rear wall, equi-spaced from the center thereof, orifices 32, 32, which respectively serve as bearings for the shafts 33, 33 of the oppositely rotatable propellers 34^a, 34^a. The shafts 33, 33 each have a hook 34 to engage separate power bands 35 for the operation of the propellers, said bands 35 respectively engaging with a forward fitting of novel character. In effect said fitting comprises a U-shaped wire member 36 which is lodged against rotation in a slot 37 provided in the longeron forward end, the opposite ends of member 36 terminating in hooks 38, 38, that respectively engage said power bands.

In the example of Fig. 4, the forward orifice 27^{ax} is shown as being formed partly in the extension 27^b of aerofoil 27, but located so as to permit the leading edge of said aerofoil to have a set angle of incidence.

It will be obvious that if the reception orifices in the aerofoil for the longeron are symmetrical with the transverse axis of said aerofoil then camber will be provided therein with a zero angle of incidence, but if the orifices are advanced relatively to the aerofoil, then camber will be provided with positive angle of incidence.

In some cases where it is desirable for disassembling purposes to break the length of the longeron, as at 1^a in Fig. 1, then I provide a sleeve 1^b as of aluminum, to unite the two members of said longeron for service.

Variations may be resorted to within the spirit and scope of my invention and parts thereof used without others.

I claim:

1. A demountable toy airplane comprising an aerofoil of spring-like sheet material, having orifices through its span center, in chord-wise spaced alinement when said aerofoil is sprung in cambered form, and a longeron to engage said orifices and maintain the cambered form of said aerofoil in its attached relation to said longeron.

2. In a demountable toy airplane having a longeron comprising its frame, an elevator aerofoil of spring-like sheet material, having a rearward orifice through its span center, a forward pendent extension or tab having an orifice, said orifices being alined when the aerofoil is sprung in cambered form, and said longeron serving to engage said orifices to maintain the cambered form of said aerofoil and impart a set angle of incidence thereto in its attached relation to said longeron.

3. In a demountable toy airplane having a longeron comprising its frame, an elevator aerofoil of spring-like sheet material, having a rearward orifice through its span center, and a forward orifice, said orifices being alined when the aerofoil is sprung in cambered form, and said longeron serving to engage said orifices to maintain the cambered form of said aerofoil and impart a set angle of incidence thereto in its attached relation to said longeron.

4. In a toy airplane, in combination, a longeron having an axial orifice in one end thereof, and a vertical slot extending from said orifice to the under surface of said longeron, a fitting comprising a member having opposite hook portions, whereof one hook portion serves to engage a power band, and the other hook is engageable in said axial orifice, the shank of said fitting being engageable with said slot to prevent turning of said fitting under the twist tension of the power band.

5. In a toy airplane having a longeron, two propellers, shafts therefor, and power bands engageable with said shafts, the combination of a fitting composed of stiff, sheet material, folded to form a transverse rectangular hollow structure, with a forwardly inclined portion, the front wall of said structure and said inclined portion having alined orifices to receive the end portion of the longeron, and the rear wall of said structure comprising an abutment terminal for said longeron end.

6. In a toy airplane having a longeron, two propellers, shafts therefor, and power bands engageable with said shafts, the combination of a fitting composed of stiff, sheet material, folded to form a transverse rectangular hollow structure, with a forwardly inclined portion, the front wall of said structure and said inclined portion having alined orifices to receive the end portion of the longeron, the rear wall of said structure comprising an abutment terminal for said longeron end, and the lateral portions of said fitting having bearing orifices for the propeller shafts.

7. In a toy airplane, in combination, a longeron having a transverse slot at one end, said slot opening into grooves at the opposite sides of said longeron, two propellers mounted at the opposite end of said longeron, a power band for each propeller, and a U-shaped wire fitting engageable in said slot and grooves, said fitting having opposite terminal hooks for respective engagement with said power bands.

Signed at the borough of Manhattan, in the city, county and State of New York this 10th day of March, A. D. 1920.

MONTAGUE PALMER.