

G. F. WEIHER.
AEROPLANE PROPELLER.
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1,389,609.

Patented Sept. 6, 1921.

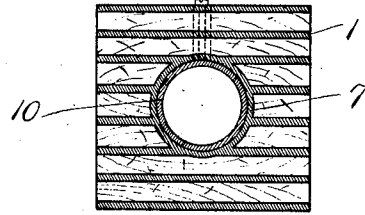
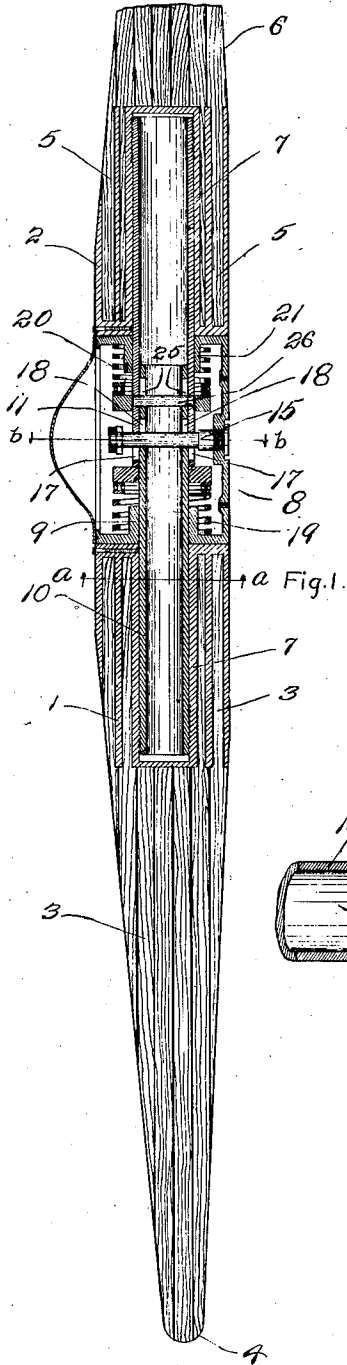


Fig. 3.

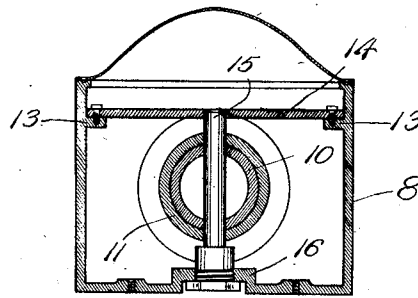


Fig. 4.

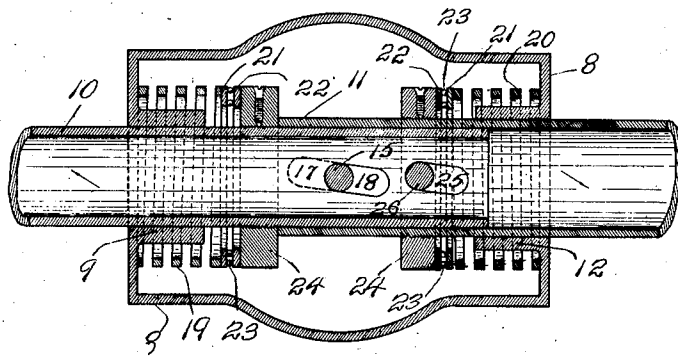


Fig. 2.

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AEROPLANE-PROPELLER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE F. WEIHER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Aeroplane-Propellers, of which the following is a specification.

The principal object of the invention is to provide an aeroplane propeller, the pitch or lead of whose blades is automatically controlled or regulated in accordance with the speed of the engine. When the speed of the engine increases, my improved regulating means under the influence of centrifugal force, will automatically increase the pitch or angle or incidence of the blades, to give them a greater lead per revolution of the propeller, thereby driving the aeroplane faster than it would be driven under the same conditions by a fixed pitch propeller.

When the motor is being started, the pitch of the blades will be automatically reduced to a point where the pull on the engine will not be great enough to stall it, nor prevent it from developing power quickly after it is started.

In the above respects my invention performs a function similar to that of the transmission mechanism of an automobile, by providing the reduced resistance of low speed gears at the start, and increasing the gear ratio thereafter.

The preferred form of embodiment of my invention is illustrated in the accompanying drawings, of which Figure 1 is a longitudinal section taken horizontally through my improved variable pitch propeller. Fig. 2 is a longitudinal section taken vertically through the same. Fig. 3 is a cross sectional view taken on the line *a-a* of Fig. 1. And Fig. 4 is a cross sectional view taken on the line *b-b* of Fig. 1.

Throughout the specification and drawings, similar reference characters denote corresponding parts.

Referring to the accompanying drawings, the numerals 1 and 2 each designate a longitudinally shelved casting preferably made of aluminum, to receive the laminated propeller blades. The casting 1 firmly receives the laminated wood sections 3 of a propeller blade 4, while in the casting 2 are firmly secured the inner ends of the laminated wood sections 5 of a propeller blade 6. (See Fig. 1.)

Each aluminum casting has axially disposed within it, an integral tubular central portion 7 internally threaded at its inner end to receive the externally threaded outer end of a slidable tube now to be described.

Adapted to be connected to the engine shaft (not shown) is a housing 9. Into the latter there projects through a bushing 8, the inner end of a tube 10 whose outer end is threaded into the tubular central portion 7 of the aluminum casting 1. Within the housing 8 the tube 10 telescopes into a tube 11 which passes through a bushing 12 in said housing to project its threaded outer end into the tubular central portion 7 of the aluminum casting 2. (See Figs. 1 and 2.) The tubes 10 and 11 are moved into and out of the housing 8 by the following means, to vary the pitch of the blades which they carry, to conform to the speed of the motor.

Referring to Fig. 4, there are provided within the housing 8, at its front portion, a pair of oppositely disposed lugs 13, 13 to which is bolted a transverse member 14. To the middle portion of the latter is secured one end of a pin 15. The latter terminates at its opposite end in an enlarged threaded portion which enters a lug 16 on the inner side of the housing 8. This pin projects through a pair of oppositely angled slots 17 provided in the tube 11, and a pair of oppositely angled slots 18 provided in the tube 10, whereby, when said tubes are drawn outwardly by centrifugal force, the pin 15 will turn them to increase the pitch of the blades which they carry. This is due to the engagement of the pin 15 with the walls of the inclined slots 17 and 18 in the tubes 11 and 10 respectively, when the latter are forced outwardly by centrifugal force as the speed of the engine increases.

For the purpose of forcing the tubes 10 and 11 inwardly to reduce the pitch of the blades connected to them, when the speed of the engine is reduced, the following construction is provided. Surrounding the tube 10 at one end of the housing 8, is a coil spring 19, while a similar spring 20 encircles the tube 11 at the other end of the housing. Bearing against the inner end of each spring is an annular member 21 between which and a collar 22 there are disposed ball bearings 23 to reduce friction when the collar 22 is turned by the following means.

On each of the tubes 10 and 11 there is threaded a sleeve 24 adapted to engage a re-

spective collar 22 to compress the spring between it and the end of the housing when its respective tube is moved outwardly by centrifugal force. During this outward movement of the tubes, the stationary springs 19 and 20 will interpose but little resistance to the turning movement which said tubes are given by the slot and pin construction described, for the ball bearings 23 provide an anti-friction contact between the stationary annular member 21 which engages a spring, and the rotatable collar 22 which is turned by a respective sleeve. When the speed of the motor decreases, the compressed springs 19 and 20 will force the tubes 10 and 11 inwardly, and during their inward movement the slot and pin construction described will turn them in a reverse direction to reduce the pitch of the blades which they carry. It will thus be seen that when the speed of the motor increases, centrifugal force will move the tubes outwardly to increase the pitch of the blades; and that when the speed of the engine decreases, the force of the compressed springs will return the tubes to their normal inward positions to decrease the pitch of the blades connected to them.

For the purpose of preventing one blade from obtaining a greater lead over the other, due to a slight variance that might occur in the tension of one of the springs 19 or 20; or in other words, to keep the pitch of the blades uniform at all times, the following means are provided. Formed in the extreme inner end of the tube 10 is a pair of oppositely inclined slots 25 through which there loosely projects a pin 26 diametrically secured within the tube 11. Accordingly, when the tubes are turned by the pin 15 that projects through the slots 17 and 18, the pin 26 that projects through the slots 25 will not permit one tube to obtain a greater lead than the other. In other words, the blades carried by the tubes 10 and 11 will be maintained at a uniform pitch at all times.

Having described my invention, I claim:

1. A propeller for aeroplanes comprising a central housing, two telescoping tubes projecting outwardly, in opposite directions, from said housing, a blade carried by each tube, each tube being provided with a pair of oppositely inclined slots, and a pin secured within the housing, that projects loosely through each pair of slots, for the purpose of turning said tubes to vary the pitch of the blades which they carry, when moved outwardly by centrifugal force.

2. An aeroplane propeller comprising a central housing, two telescoping tubes projecting outwardly, in opposite directions, from said housing, a blade carried by each tube, each tube being provided with a pair

of oppositely inclined slots, a pin secured within said housing, that projects loosely through each pair of slots, an annular member on each tube within the housing, and a spring interposed between each annular member and its respective end of the housing, to return said tubes to their normal inward positions after they have been centrifugally moved.

3. An aeroplane propeller comprising a central housing, two telescoping tubes projecting outwardly, in opposite directions, from said housing, means for turning said tubes when the latter are moved outwardly by centrifugal force, a shelved casting threaded on the outer end of each tube, and a laminated propeller blade firmly secured to said shelved casting.

4. An aeroplane propeller comprising a central housing, two telescoping tubes projecting outwardly, in opposite directions, from said housing, a blade carried by each tube, means for automatically turning said tubes when the latter are moved outwardly by centrifugal force to increase the pitch of said blades, and means for holding the pitch relation of said tubes to each other, uniform at all times.

5. An aeroplane propeller comprising a central housing, two telescoping tubes projecting outwardly, in opposite directions, from said housing, a blade carried by each tube, means for automatically turning said tubes when the latter are moved outwardly by centrifugal force, and a pin secured within one tube projecting through a pair of oppositely inclined slots in the other, automatically to prevent the blade carried by one tube from securing a lead over the blade carried by the other tube.

6. An aeroplane propeller comprising a central housing, two telescoping tubes projecting outwardly, in opposite directions, from said housing, a blade carried by each tube, means for automatically turning said tubes when the latter are moved outwardly by centrifugal force to increase the pitch of said blades, a coil spring surrounding each tube within the housing, an annular member encircling each tube, in engagement with its respective spring, a collar surrounding each tube, a sleeve threaded on each tube, in engagement with said collar, and ball bearings between each collar and its respective annular member, to provide an anti-friction contact between them when the tubes are turned to vary the pitch of the blades which they carry.

In testimony whereof I have hereunto set my hand this 20th day of December, 1919.

GEORGE F. WEIHER.

Witness:

HOWARD S. SMITH.