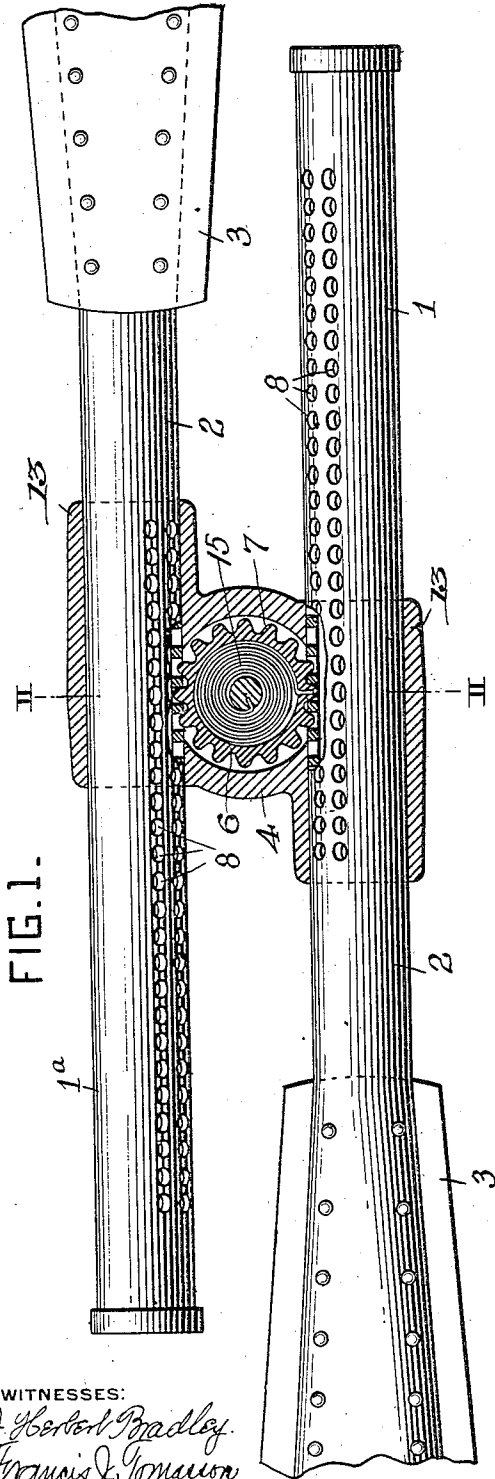
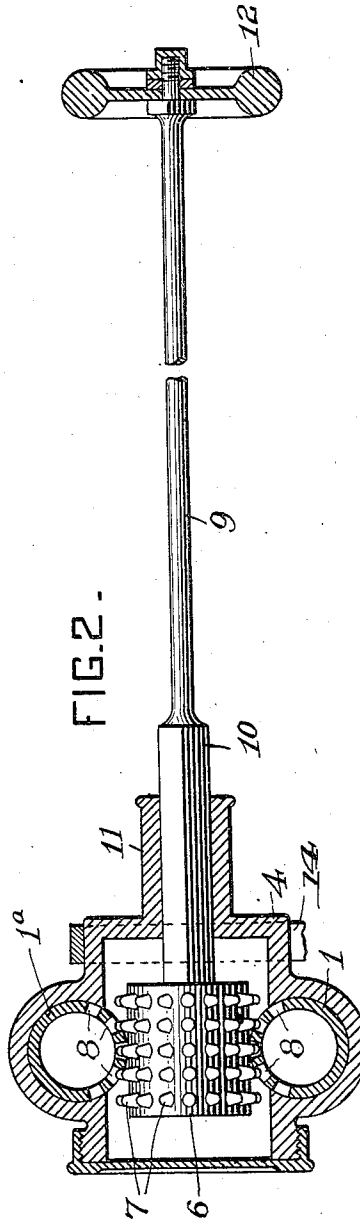


J. E. BISSELL.
PROPELLER.
APPLICATION FILED AUG. 26, 1911.

1,077,187.

Patented Oct. 28, 1913.



UNITED STATES PATENT OFFICE.

JOSEPH E. BISSELL, OF PITTSBURGH, PENNSYLVANIA.

PROPELLER.

1,077,187.

Specification of Letters Patent.

Patented Oct. 28, 1913.

Application filed August 26, 1911. Serial No. 646,244.

To all whom it may concern:

Be it known that I, JOSEPH E. BISSELL, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Propellers, of which improvements the following is a specification.

My invention relates to propellers, and has to do particularly with propellers used for air-ships.

The object of my invention is to provide a propeller blade having a radial adjustment with relation to its axis of rotation.

A further object of my invention is to provide a radially adjustable propeller blade with a further adjustment, whereby the blade may be shifted at the will of the operator so that it may incline at various angles to its axis of rotation.

My invention is illustrated in the accompanying drawing, which forms part of my specification, and in which—

Figure 1 is an elevation of the inner portion of a pair of propeller blades, the hub to which they are secured being shown in section; and Fig. 2 is a sectional view taken on the line II—II, Fig. 1.

Like numerals are used to designate like parts.

While I do not wish to limit myself to any specific details of construction, for the sake of illustration I have shown the propeller blades 1 and 1^a as each consisting of a cylindrical inner shank 2 and an outer substantially plane surface 3. The shank 2 of each blade is slidably mounted within a suitable sleeve 13 of the hub 4, which may be secured in any suitable manner to the source of power, as by a belt 14.

It is well known to those skilled in the art that, as an air-ship ascends to higher altitudes, the resistance offered by the air to the rotation of the propellers becomes less, and as a consequence thereof the motor speeds up and less efficiency is obtained from it. By providing a radially adjustable propeller blade I am able to increase or diminish its effective length to obtain the maximum motor efficiency. Such adjustment may be provided so as to be controlled by the operator, but I preferably provide an automatic adjustment to the end that, as the speed of rotation of the propeller blades in-

creases, the blades will move outwardly by virtue of their centrifugal force. To accomplish such an automatic radial adjustment, I preferably mount the blades 1 and 1^a on opposite sides of a sleeve 6, which sleeve is provided externally with teeth 7, registering with the holes 8 in the blade shanks 2, and which is mounted within the hub 4. A shaft 9, provided with an angular portion 10, extends into the sleeve 6 and along the axis of rotation of the said hub and propeller blades, and is mounted so as to be slidable within the collar 11, but rotatable therewith. Between the outer end of the shaft 9 and the inner surface of the sleeve 6 a coiled spring 15 is placed, one end of it being secured to the said shaft and the other end to the sleeve, as shown; the arrangement being such that, as the centrifugal force of the propeller blades causes them to move outwardly or axially, the toothed sleeve 6 (engaged by the shank holes 8) will revolve around the axial shaft 9 and increase the tension of the spring. It will readily be seen that the spring may be adjusted (as to its strength and mounting), so that the propeller blades will always extend at such distance from their axis of rotation (such axis being the center of the shaft 9) as to present the most efficient resistance to the motor.

To the end that the inclination of the blades may be altered, I arrange the teeth of the sleeve 6 and the holes 8 in the shanks 2 in alinement, as shown, and I provide the shaft 9 with a loosely mounted handle 12 which may be located within reach of the operator.

In operation, the hub member 4 is rotated by the belt 14; and the blades 1 and 1^a, being mounted in the sleeves 13 of the hub, will of course be driven with it. The inclination of the blades is under the control of the operator and is effected by moving the shaft 9 longitudinally, the teeth 7 of the sleeve 6 engaging the holes 8 of the blade shanks 2 and turning the shanks on their own axes. The radial extension of the blades 1 and 1^a is controlled automatically by the spring 15, the arrangement being such that the increase in the centrifugal force of the blades, caused by their greater speed of rotation, is resisted by the tension of the spring 15 which tension, however,

is so proportioned that within a permissible range the blades move radially in proportion to their speed of rotation.

I claim herein as my invention:

- 5 1. In a propeller construction, the combination of a rotatable shaft, a pair of radially extensible blades rotatable with said shaft, means (increasing in strength in proportion to the speed of rotation of said shaft) for
10 resisting the radial extension of said blades, and independent manually operable means for adjusting the inclination of said blades and for holding said blades in their adjusted position.
- 15 2. In a propeller construction, the combination of a rotatable shaft, a hub provided with a radially extensible blade, yielding connection between said hub and said shaft effective to resist the radial extension of the
20 said blade, and independent means for adjusting the inclination of said blade substantially as described.

3. In a propeller construction the combination of a hub, a propeller blade slidably mounted within said hub, a rotatable member within said hub and engaging said propeller blade, a shaft, and yielding connection between said shaft and said rotatable member, substantially as described. 25

4. In a propeller construction the combination of a hub member, a pair of propeller blades slidably mounted within said hub, a rotatable sleeve mounted within said hub and provided with a plurality of teeth adapted to engage corresponding holes in said propellers, a shaft extending within said sleeve, and a spring secured to said shaft and said sleeve. 30 35

In testimony whereof I have hereunto set my hand.

JOSEPH E. BISSELL.

Witnesses:

BAYARD H. CHRISTY,
PAUL N. CRITCHLOW.