R. F. SCHMIDT.

ADJUSTABLE METALLIC AIR PROPELLER.

APPLICATION FILED AP[illegible] 29, 1920.

1,411,644.

Patented Apr. 4, 1922.

3 SHEETS—SHEET 1.

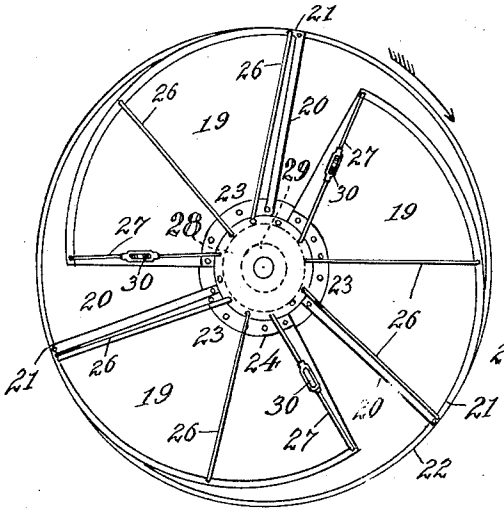


Fig. 1.

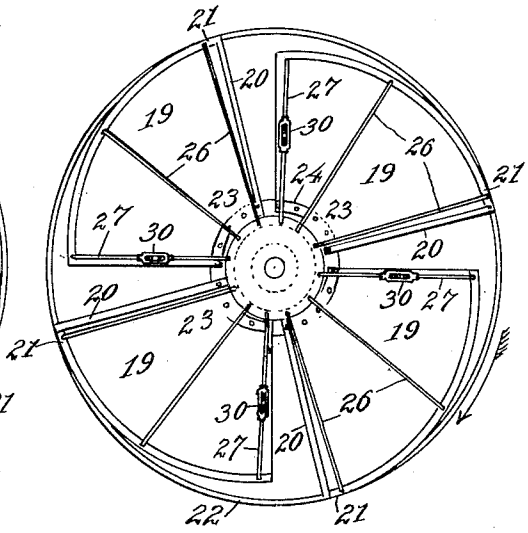


Fig. 3.

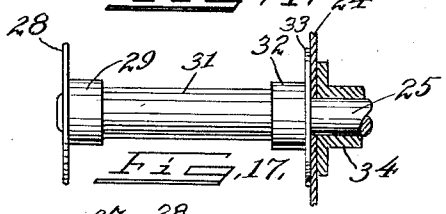


Fig. 17.

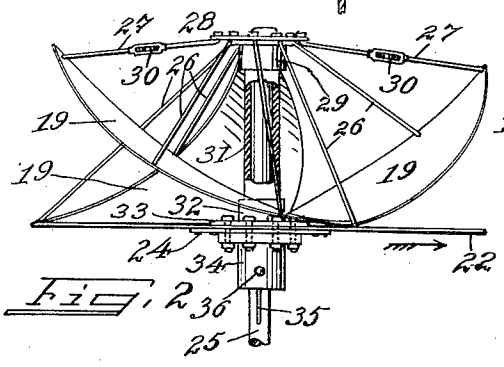


Fig. 2.

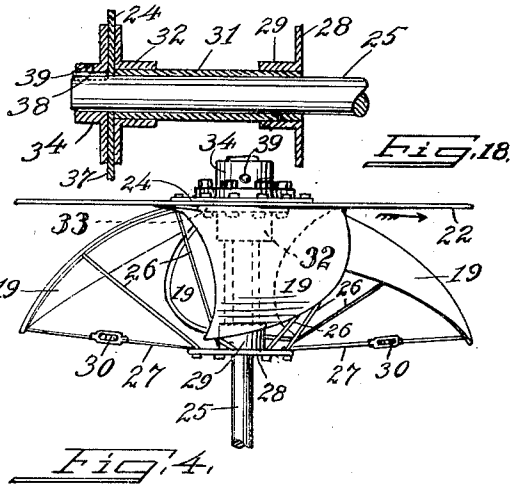


Fig. 18.

Fig. 4.

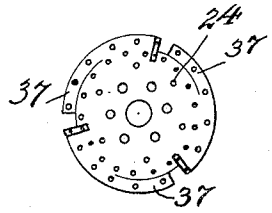


Fig. 5.

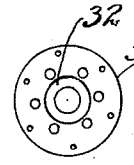


Fig. 7.

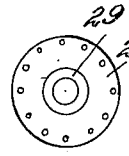


Fig. 9.

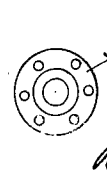


Fig. 11.

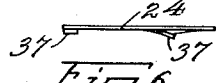


Fig. 6.

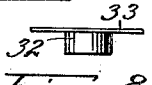


Fig. 8.

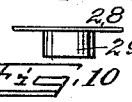


Fig. 10.

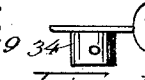


Fig. 12.

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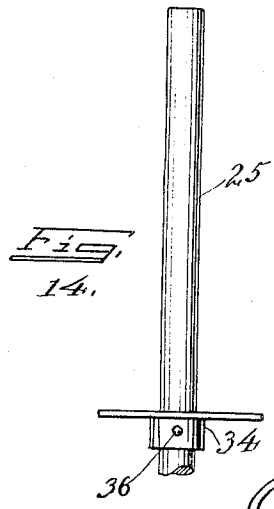


Fig. 14.

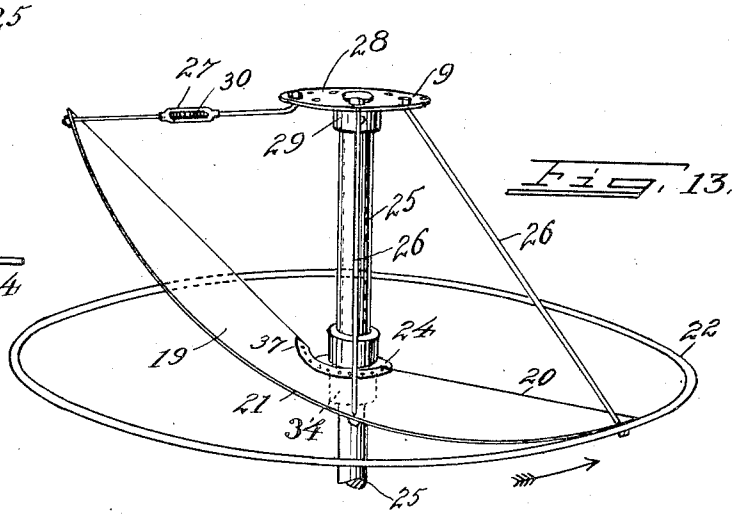


Fig. 13.

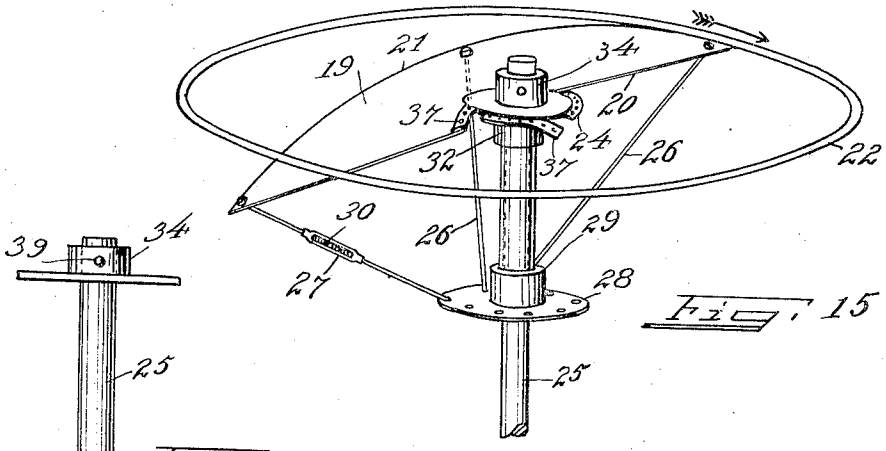


Fig. 15

Fig. 16

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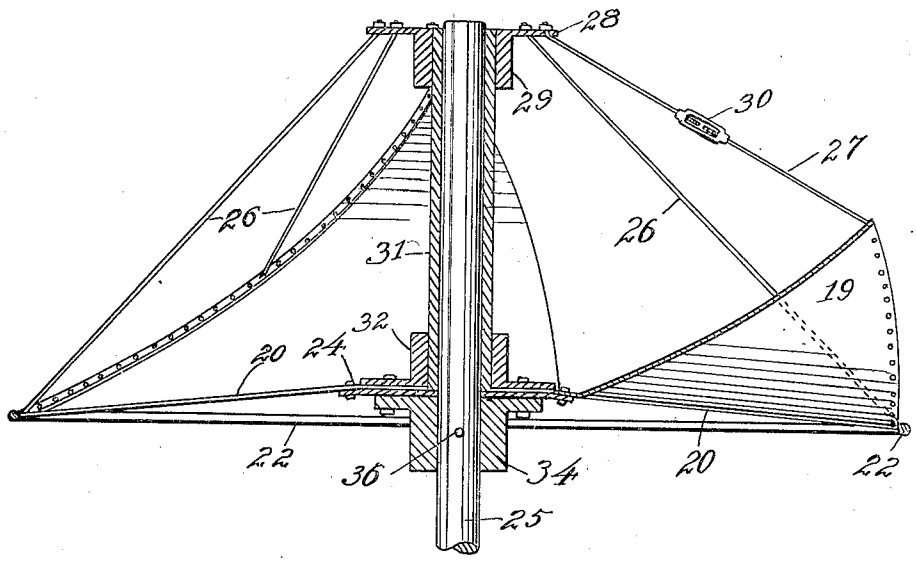
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3 SHEETS—SHEET 3.

Fig. 19.



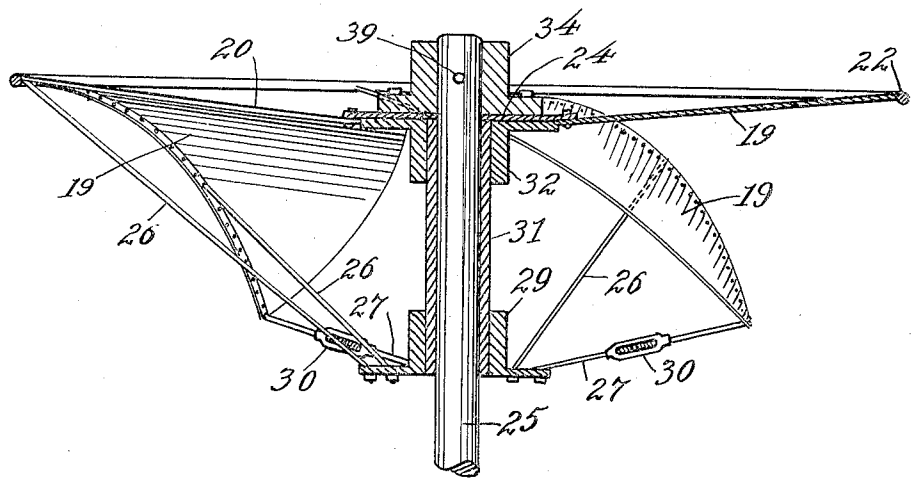


Fig. 20.

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UNITED STATES PATENT OFFICE.

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ADJUSTABLE METALLIC AIR PROPELLER.

1,411,644. Specification of Letters Patent. Patented Apr. 4, 1922.

Application filed April 29, 1920. Serial No. 377,618.

To all whom it may concern:

Be it known that I, RUDOLPH F. SCHMIDT, a citizen of the United States, residing in Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Adjustable Metallic Air Propellers, of which the following is a specification.

My invention relates more particularly to adjustable circular metallic air propellers for either pulling or pushing air or water crafts.

The objects of my invention are to provide a device of this character, the front edges of whose blades enter the air in a straight knife-like manner similar to a boring tool, thereby advancing through the air with the least resistance, each blade being gradually curved between its front and rear edges to direct the air backwardly from the front cutting edge of the blade, thereby preventing the circulation of air around the blades and also preventing side or lateral escape of the air being traversed; to provide bracing means to regulate the curved ends of the blades whereby the highest efficiency from the power of the engine is obtained; and to provide means whereby the strength, stability, safety, efficiency and momentum are increased by the larger part of thrust area or weight of blades at the extreme point of circumference thereby insuring a steady, smooth speed without variation or annoying soaring noise, thus indicating that the full power of the engine is converted, without waste, into propulsive energy. Other objects and advantages are also accomplished as herein set forth.

My invention consists in the details of construction and in the combination and arrangement of parts as herein set forth and claimed.

In the drawings:

Fig. 1 is a front view of a three-blade pushing propeller, showing swivel braces for regulating the pitch of the air deflecting portions of the blades;

Fig. 2 is a side view of the same, partly in section, showing shaft for connecting to engine;

Fig. 3 is a back view of a four-blade pulling propeller showing swivels for regulating the pitch of the air deflecting portions of the blades;

Fig. 4 is a side view of Fig. 3 showing means for fastening to the engine shaft;

Fig. 5 is a front view of the plate to which the inner ends of the blades are fastened;

Fig. 6 is an edge view of the same;

Fig. 7 is a front view of a flanged collar;

Fig. 8 is an edge view thereof;

Fig. 9 is a face view of a brace-holding collar;

Fig. 10 is a side or edge view thereof;

Fig. 11 is a face view of propeller shaft coupling;

Fig. 12 is a side or edge view thereof;

Fig. 13 is a perspective view showing only one blade in the pushing propeller of the three-blade type, for more clearly illustrating the construction and principle of operation of a three-blade propeller;

Fig. 14 is a side elevation of the propeller shaft and coupling;

Fig. 15 is a perspective view showing but one blade in the pulling propeller in the four-blade construction;

Fig. 16 is a side elevation of the propeller shaft and coupling;

Fig. 17 is a view, partly in elevation, and partly in section, showing the propeller shaft, flanged tube, holding disk, and coupling when used in connection with a three-blade propeller; and

Fig. 18 is a view, partly in section and partly in elevation of said parts when used in connection with a four-blade propeller.

Figs. 19 and 20 are views, partly in section and partly in elevation of a three blade and four blade propeller, respectively, showing a modification.

In the embodiment of my invention as illustrated, and which shows preferred constructions, in Figs. 1, 2, 13, 14 and 17, I show a pushing propeller, that is, a propeller which is adapted to be placed in the rear or at the stern of a boat within the gunwales, while in Figs. 3, 4, 15, 16 and 18, I show a pulling propeller, which is adapted to be mounted in front of an aeroplane.

In the construction of my propeller, I employ a plurality of arc-shaped concavo-convex propeller blades 19, each having an air cutting edge 20. Said blades are each fastened at the front of its arc 21 to momentum rim 22 and at its inner tapered end 23 to holding disk 24 mounted on propeller shaft 25. In Figs. 1 and 2, I have shown three such propeller blades so mounted and in Figs. 3 and 4, I have shown four propeller blades so mounted. Each propeller blade is also supported and held in fixed

relation to each other by means of braces 26 and swivel-brace 27, said braces being connected at one end to the arc 21 and at the other end to flange 28 of brace holding collar 29 mounted and fixed upon propeller shaft 25. The brace which is connected to the arc near the rear edge is provided with swivel 30 to regulate the pitch of the concavo-convex form of the blade to correspond with the power of the engine, so that when it is desired to use an engine of greater power, each swivel-brace is shortened to give greater concavity or dish to the blade and thereby increase its resistance to the air, whereas when it is desired to use a less powerful engine, each swivel brace is lengthened to reduce the resistance of the air.

The front air cutting edge 20 of each propeller blade is preferably disposed a short distance back of the rear edge of the adjacent propeller blade. In the three blade propeller, the outer arc 21 of each blade comprises one hundred degrees, leaving a space of twenty degrees tapering inwardly between each blade. The particular width may be varied and in the four-blade propeller, the arc of each blade is seventy-five degrees, and the space between each at the outer edge is fifteen degrees, and tapers inwardly therefrom toward the center.

The outer or peripheral cutting edge of each blade is preferably five degrees in advance of the inner or central edge, in order to bring the air within the sweep of the blades more effectually than otherwise, as illustrated in Figs. 19 and 20.

The propeller shaft 25 extends into tube 31, having flanged collars 29 and 32 respectively brazed thereon and is provided with a coupling 34 secured thereto by means of key 35 and pin 36. Holding disk 24 is clamped between said coupling and collar 32 having flange 33 which are all securely bolted together. Disk 24 is provided with a series of peripheral wings 37 curved out of its plane in the form of an arc for attachment by rivets of the inner tapering end 23 of each blade.

It will thus be seen that the propeller blades are securely and firmly braced and held in fixed relation to each other.

Referring now to the four blade propeller illustrated in Figs. 3, 4, 15, 16 and 18, the construction and arrangement of the several parts are the same as in the three blade propeller, except that the propeller is coupled to the end of propeller shaft 25 by means of coupling 34 secured thereon by means of key 38 and pin 39 with the further difference that the propeller is secured on said shaft in reversed position to that of the three blade propeller.

Rim 22 adds to the momentum and serves to strengthen and hold the blades in rigid fixed relation to each other, thereby rendering the device more secure against accidents.

It will be seen that by means of my construction, I obtain a much greater thrust area and deeper pitch, whereby the long desired quick ascent of aeroplane is rendered possible and I am enabled also to make a much more compact construction than is possible with the use of wood propellers, thereby producing greater speed with a given engine power.

My propellers are well adapted for use in connection with naphtha engines for the propulsion of pleasure boats, house boats, small and large packets, upon canals or any navigable waters for commercial intercourse, as well as upon waters undergrown with weeds, where heretofore navigation was only negotiable by tiresome hand poles. This device, when used in connection with a naphtha engine, is clean, convenient and economical and can be installed and operated in very small space.

Furthermore, my propellers may also be utilized for drying, exhaust and ventilation in various situations.

My improved circular adjustable metallic air propellers are of very simple construction, powerful, substantial, safe and reliable at any speed; are uniform in construction and with parts interchangeable to size, light in weight in comparison to thrust area and the material for same is procurable anywhere.

The advantages of my circular adjustable metallic air propellers over wood propellers are manifold; in wood propellers the width and pitch are scant and could not withstand the enormous pressure at high speed, while their long blades with ends unsupported and unprotected add to danger and vibration and result in an annoying soaring noise, partly due to the vibration and partly to the circulation of air around the blades, all of which I effectually overcome by means of my peculiar compact construction and arrangement.

Furthermore, this soaring noise of the long wooden propellers plainly indicates waste of power, and the length of blades is an undue heavy strain upon the engine which is avoided by my device, whereas in my circular adjustable metallic air propeller, with its momentum rim and the greater weight of blades at the rim, adds to strength and momentum, while the braces prevent vibration. The knife-like entry of air by my blades similar to a boring tool, prevents the air circulation around the blade and also side discharging of the air and the long gradual curve with far greater thrust area offers ample resistance against the atmosphere, so that I obtain a steady, smooth run without vibration or soaring noise, indicating that the full power of the engine has

been converted into propulsive energy, and the highest efficiency thereby attained.

My propeller is adapted to be turned end for end for either pushing or pulling by merely reversing the engine.

My propeller with three or four blades offers the same thrust area and pitch in one revolution, but the blades in the four blade propeller are more condensed, allowing a higher speed and less strain upon the engine and are better suited for aviation than the three blade propeller.

The air-cutting edge 20 of each propeller blade 19 is preferably reinforced and strengthened by a metallic strip. Air propellers of an extremely large size constructed in accordance with my invention, are preferably provided with additional braces to hold them rigid and prevent buckling.

It will be understood that modifications of my device may be made without departure from the scope or spirit of the invention.

Having thus fully described my device, what I claim as new and desire to secure by Letters Patent is:

1. In an adjustable metallic air propeller, a propeller shaft suitably connected to an engine and adapted to be rotated thereby, a flanged sleeve or tube mounted on said shaft, a coupling fixed on said shaft, a disk secured on said shaft between said coupling and one flanged end of said tube, a plurality of arc-shaped concavo-convex propeller blades secured to said disk at their smaller ends respectively, a circular momentum rim, means for attaching said rim to the outer arc-shaped end of each propeller blade, and a plurality of braces connecting the outer arc-shaped edge of each blade to said flanged tube.

2. In an adjustable metallic air propeller, a propeller shaft, means for rotating said shaft, a flanged member mounted on said shaft, a coupling fixed on said shaft, a disk interposed between said flanged member and said coupling and securely fastened therebetween, said disk having wings extending out of the plane thereof, a momentum rim, a plurality of arc-shaped concavo-convex tapering blades each attached at its inner tapered end to one of said wings and attached near its front cutting edge to said momentum rim and braces connecting and supporting the outer arc portion of each blade to said flanged member.

3. In adjustable metallic air propellers, a propeller shaft, a tube having a flanged collar brazed to each end thereof, said flanges having a series of holes therein, a hollow flanged coupling mounted on said shaft and keyed and pinned thereon, a holding disk interposed between said coupling and said flanged tube and secured therebetween, a circular momentum rim, a plurality of metallic curved blades attached at one end to said disk and at a portion of its other end to said momentum rim and braces connecting said flanged member and said blades.

4. An adjustable circular metallic air propeller comprising a propeller shaft, a hub fixed on said shaft, a circular momentum rim, a plurality of arc-shaped concavo-convex propeller blades attached to said hub and to said momentum rim and having straight air cutting edges and braces attached to said blades and to said hub respectively, whereby said blades are held rigidly and firmly relative to each other, the peripheral cutting edge of each blade being about five degrees in advance of the inner or central cutting edge, substantially as set forth and for the purposes specified.

RUDOLPH F. SCHMIDT.