

June 12, 1928.

1,672,985

J. V. MARTIN
HYDROAEROPLANE

Filed Dec. 7, 1922

3 Sheets-Sheet 1

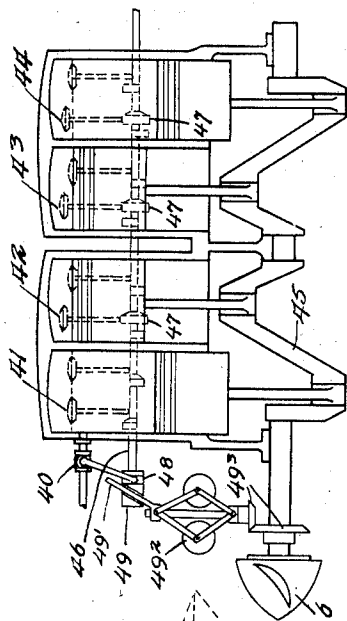


Fig. 6.

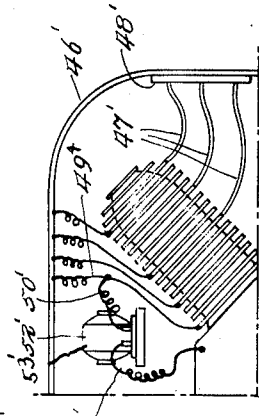
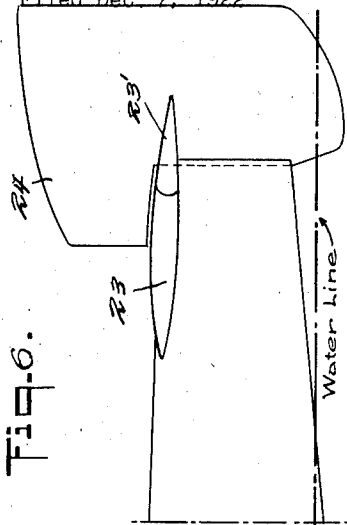


Fig. 7.

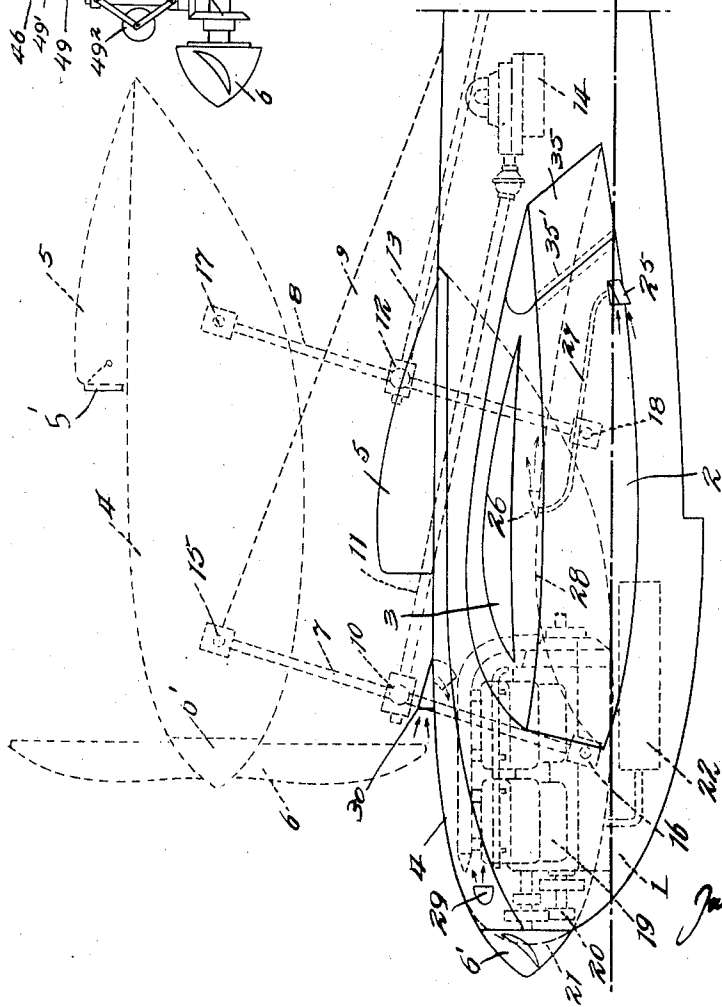


Fig. 1.

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Fig. 2.

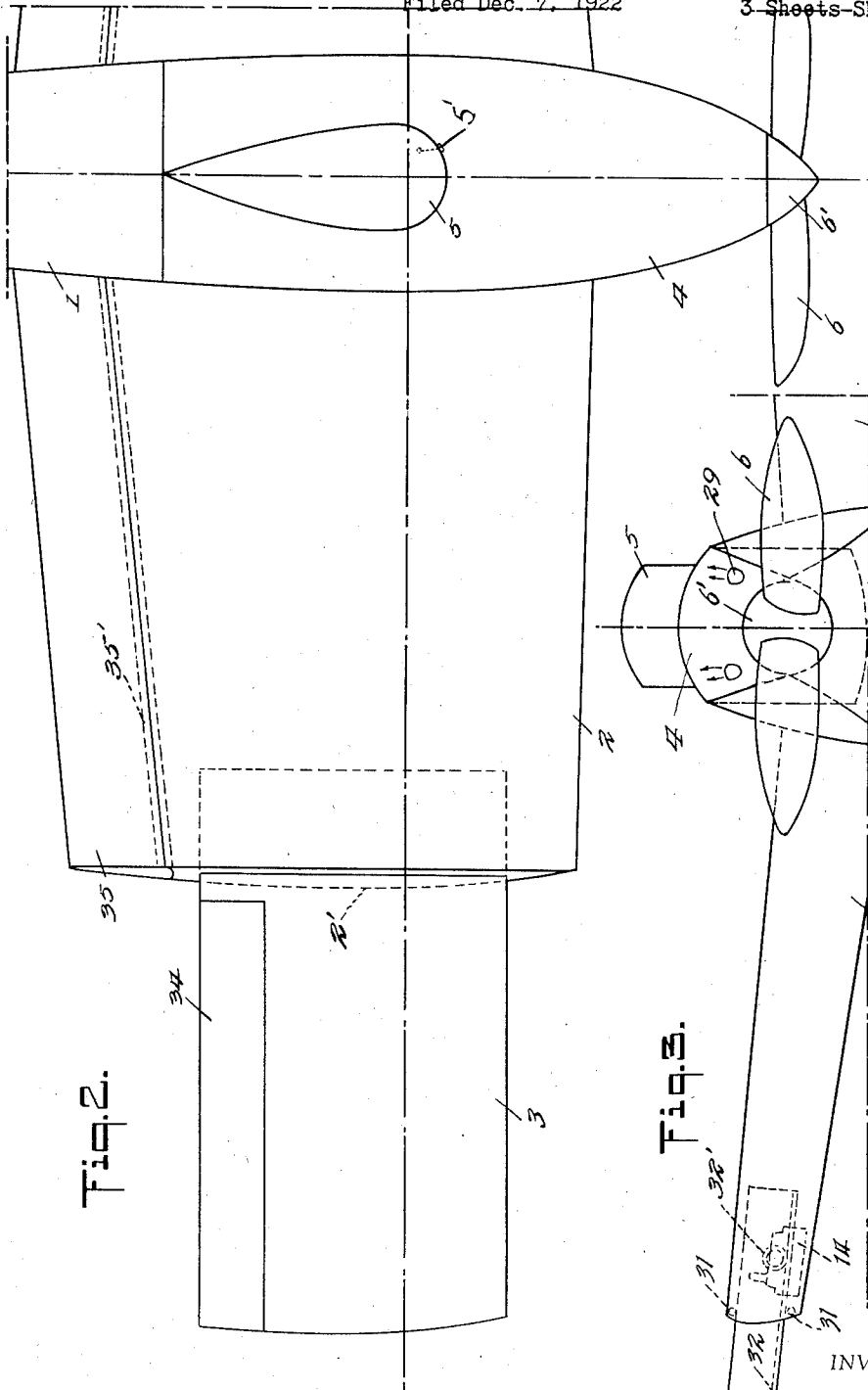
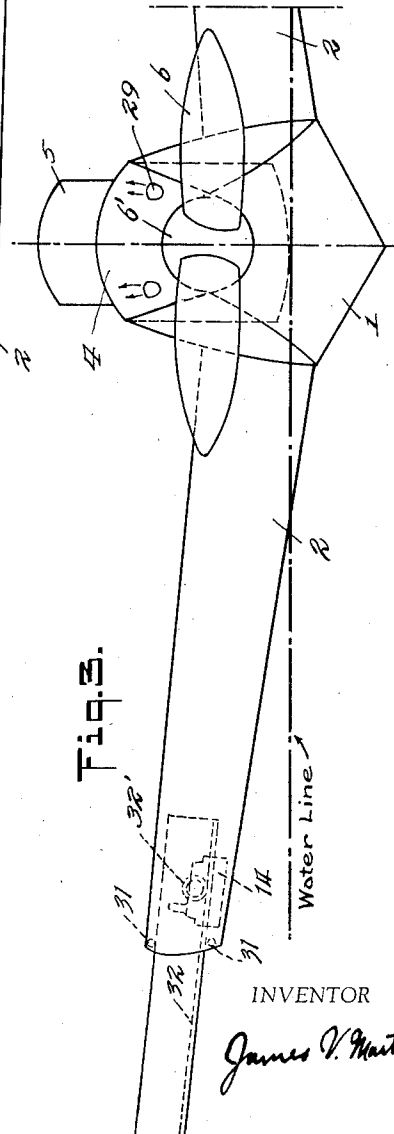


Fig. 3.



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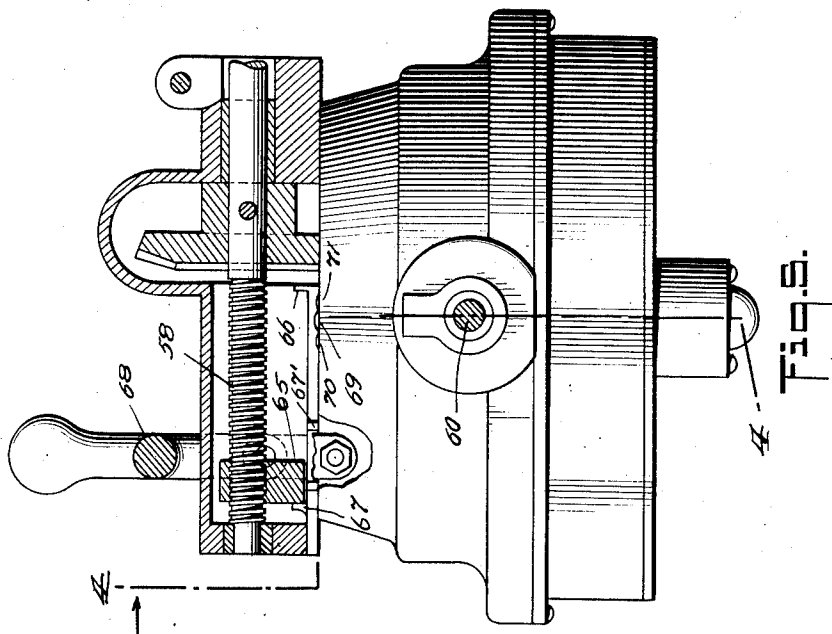


Fig. 3.

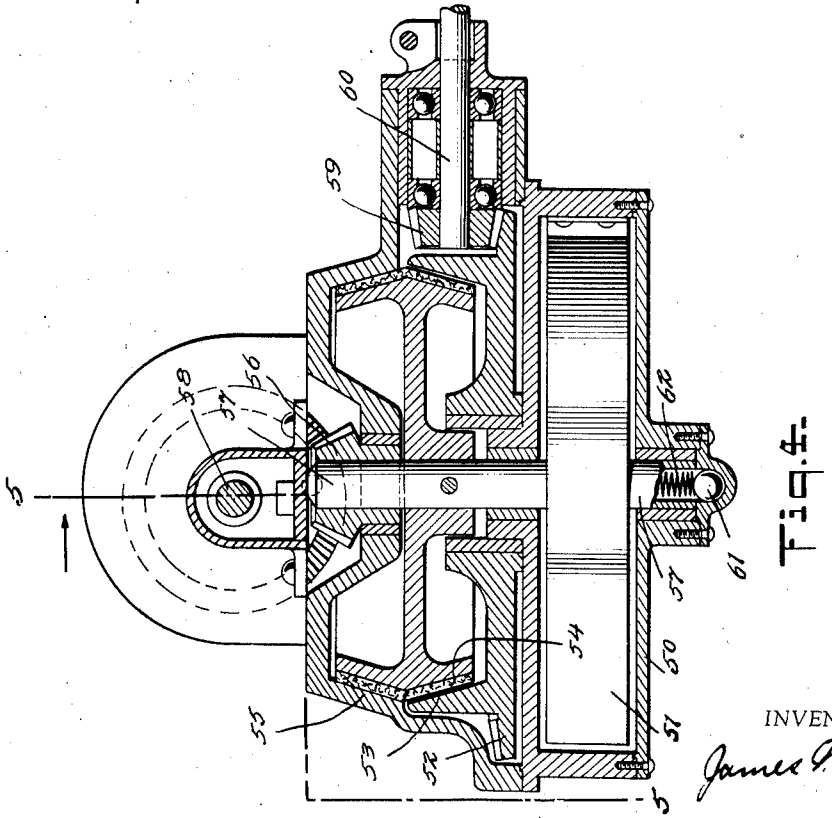


Fig. 4.

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HYDROAEROPLANE.

Application filed December 7, 1922. Serial No. 605,411.

It has long been known that the best flying and manœuvering aeroplanes have substantially concentric centers of gravity, lifts, head-resistance and thrust; the proximate location of these centers being known as the aeroplane cutex; but the attainment of this ideal has been particularly difficult in hydro-aeroplanes due to the requirement of a large buoyant float capable of sustaining the aeroplane on the surface of the water and creating a low centre of head resistance and the requirement for sufficient clearance of the water for the air propeller which occasions a high center of thrust.

To obviate these and other difficulties and as an alternative to my co-pending applications for collapsible retractable pontoons I now disclose means to alter, during flight, the respective relations of the above mentioned centers so as to adapt them to the differing requirements of free air flight and to resting or running on the surface of the water: with this as the primary object, other objects of my invention are:—

To provide means to reduce the resistance of seaplanes after they leave the surface of the water.

To provide a combination of means for slowing up the aeroplane in flight preparatory to alighting on the water.

To alter the relative positions of the wings and propellers during flight.

To alter the relative angles of incidence and thrust during flight.

To regulate the position in which the propeller shall remain when the motor is stopped.

To provide an extensible nacelle and novel means to extend and retract the same.

To provide protected positions for pilot and novel means of clearing obstructions to vision.

To provide means of covering the cracks between aeroplane controls and the parts to which they are hinged.

To provide an improved form of retractable wing and power means for retracting the same.

To provide two independent means of lateral control for an aeroplane.

To provide an improved form of motor capable of storing energy while performing an operation and means to utilize the said energy either to continue the operation or to reverse the same.

To provide a novel form of air circulation

for the interior of aeroplanes and for the improvement of the air flow about aerofoils.

To provide novel methods of cooling an aeroplane motor.

The further objects of my invention will become apparent from the following disclosure of the novel arrangement of elements as shown in the accompanying drawings, wherein—

Fig. 1, is a side elevation of my hydro-aeroplane showing the elevated position of nacelle and important internal parts in dotted lines.

Fig. 2, is a plan view and Fig. 3 a front elevation showing the propeller and nacelle in retracted position. Fig. 4, is a cross section through the center of my novel storage motor and Fig. 5, is a view of the same motor at right angles to that of Fig. 4, and broken away to show certain internal parts. Fig. 6 illustrates a means applicable to any motor to control the angle at which the propeller of land or water craft may be stopped automatically.

Fig. 7 illustrates novel means of cooling an engine. Similar numerals refer to similar parts throughout the several views.

Describing the invention more in detail, I show a conventional V shaped hydro boat or float 1, to which internally trussed wings 2, are rigidly attached and which assist the boat in sustaining the aeroplane on the water. Smaller wings 3, are of a higher lifting form than the larger ones and telescope into and out of the ends of the larger especially to permit slower landing than flying speeds. 4 is a nacelle adapted to be raised or lowered or to have its angle altered relative the wings and boat, while 5 is a streamlined glass observation hood for the pilot and 5' a means of clearing the outside of the glass of dirt or water. 6 is the propeller shown in different positions and 6' the spinner therefor. 7 and 8 are struts of the device for raising and lowering and adjusting the angle of the nacelle 4, while 9 indicates a towing wire to transfer part of the thrust when plane is being driven over the surface of the water. 10 illustrates a familiar form of traveling block to which the struts 7, upper and lower are pivoted, this block travels on the worm shaft 11 driven by the motor 14 while the similar block 12 traveling upon a shaft 13 having a different worm pitch and driven by a similar motor 14 will permit any desired variation in the angle

of the nacelle relative the boat and wings. 15—16—17 and 18 are the pivoted attachments of the struts 7 and 8. 19 represents a typical motor of any desirable type, while 20 shows a speed altering gear between the motor and propeller 6 which also may be of any desirable form. 21 represents the air inflated bag adapted to be filled with compressed air from the tank 22 after the manner illustrated in my co-pending Serial 376,351 and my Patent No. 1,431,017; it will be observed that the air bag will start the raising movement of the nacelle, 4. 23 shows the type of elevator control and flap more clearly illustrated in my co-pending application Serial No. 229,664; 23' being the hinged flap closed flush with part 23 to which it is hinged as illustrated in Fig. 17 of my Patent No. 1,418,008. 24 is a rudder of the form of that shown in my co-pending application Serial 229,664 excepting that its lower portion is adapted for steering in the water as shown in my co-pending Serial No. 581,702. 25 shows a scoop or air funnel after the fashion of that shown in my co-pending Serial No. 376,351.

The diagonal face of the scoop is flat and when not in use closes flat with the wing surface the side walls being of fabric. The pipe 27 allows the air to flow from the rear under side of the wing to the forward upper surface where it escapes through outlet 26 which is also capable of closing flush with the upper wing surface, 28.

30 shows a scoop entrance for air to cool the motor compartment, while 29 permits the hot air to escape. Fig. 3, 31 denotes a roller at top and bottom of the retractable wing and as many of such rollers or anti-friction devices are contemplated as needed along the path of retraction for the wing 3; 32 represents a rack and 32' a pinion for retracting and extending the wing 3, operated by the motor 14.

34 is an aileron attached to the extensible wing 3, and operable from either the elevated or lowered position of nacelle quite independently of the main aileron 35 which extends the trailing edge length of main wing 2. 35' shows my method of closing the crack where the aileron is hinged to the wing, this may be accomplished, as exemplified in Fig. 17 of Patent No. 1,418,008, i. e. a thin piece of rubber stretched from the surface of the wing to the surface of the aileron or other aeroplane control or it may consist of a thin piece of metal or other material attached to the rigid member and lapping over the crack to the surface of the flexible member.

Fig. 6, schematically illustrates my preferred method of regulating the position in which the propeller must automatically remain when the motor stops; 41—42—43 and 44 represent the usual valve arrangement of

typical gas engines although the detail of operation, being well known is omitted, however the portions of the conventional arrangement which I modify to accomplish my improvement are clearly shown, for example I place two sets of cams on the cam shaft in place of the usual one set, and as illustrated I arrange to move the cam shaft 46 by means of a slide lever 49', sliding in the grooved portion of camshaft extension 49; 49² represents a familiar form of governor driven by any suitable means as the bevel gears 49³ off of the crankshaft 45 of any motor; it will be observed that on slowing of the motor the governor draws the cam shaft to the position shown in Fig. 6, thus holding open through cams 47 the exhaust valves 42—43 and 44 and permitting valve 41 to remain closed; the movement of the camshaft 46 further operates the valve 40 by lever 48 to permit compressed air to enter the cylinder having closed valves, as 41, while the slide block 49 is free to turn relative camshaft 46 and said shaft 46 extends on its opposite end to a control reaching into the pilot's cockpit for manual control of the valves, the purpose being to afford both manual and automatic means of opening all cylinders but one and closing that to be filled with compressed air, thus to force the piston of the closed cylinder to the bottom of its stroke; obviously by attaching the propeller to the crank shaft at any desired angle when the closed cylinder has its piston at the bottom of its stroke will predetermine the position in which the propeller shall remain whenever the motor is stopped and the mechanism illustrated is free to operate.

In Fig. 7, I illustrate diagrammatically my novel and efficient cooling means for gas motors, 46' represents the metal, preferably aluminum or copper, cowling of a motor on automobile or aeroplane or the metal cover of an aeroplane wing, 48' represents a metal compartment extending in the plane of and in firm contact with the said cowling and adapted to contain such fluid as mercury or other rapid heat conductor which also fills the tubes 47' which are in contact with the flanged exterior of the motor cylinders as illustrated. Wires 51'—50'—49⁴ and 53' illustrate my novel means of electrically expediting the heat radiation through the course of energy 52' which in a manner hitherto unknown increases the heat conductivity of the wires so that the cylinder heat is radiated to the air through wires 49⁴ and cover 46'.

Figs. 4 and 5 show in detail the mechanism of motor 14, a development of that shown in Patent No. 1,431,017, Figs. 9 and 10 and in my co-pending Serial Nos. 522,877 and 581,702. 50 is a cover plate, removable from the housing of the motor parts, 51 a spring of the flat clock type attached to the housing at

one end and to the shaft 57 at the other end. 52 is a wheel in mesh with bevel 59 driven by flexible drive shaft 60 from the secondary shaft of the aeroplane motor or by a servo motor: 54 is a friction wheel rigid with shaft 57 which is held in an upward or brake position by spring 62 from ball seat 61, so that the friction surface of wheel 54 engages with the friction surface 55 of housing: 56 is the small bevel gear which drives the larger bevel pinned to drive shaft 58 which is the flexible power output of the motor; 58 as shown in Fig. 5, is threaded and has a traveling nut 65 on it, which automatically operates the slide 67, to which hand lever 68 is secured, 66 is one of the upturned portions of slide 67 which are at each end of said slide and which engage the nut 65 at the end of its travel in both directions. Notches 69—70 and 71 in the slide 67 regulate the distance which shaft 57 has to move to cause the wheel 54 to stop, to reverse or to drive forward. It will be evident that the nut 65 is an indicator of the position of the aeroplane parts to be moved or retracted and for ready observation the casing which incloses shaft 58 may be partly broken away as shown in drawing Fig. 5 or it may be made of transparent material.

The operation and function of my invention will be readily apparent from an inspection of the drawings; for example when the seaplane is to be flown the nacelle 4, should be in the raised position shown by dotted lines in Fig. 1, the propeller will thus be clear of and protected from the water while the hydroaeroplane gets sufficient speed to lift from the surface of the water, the wing panels 3 will be in extended position to aid in the lift at low speed; the center of thrust will be high, as is present practice, but in the raised position of the nacelle the centre of gravity will be aft of its location when nacelle is lowered and the thrust corresponds to the head resistance more closely in location.

The inflated air bag 21 will keep water out of the place the nacelle is to occupy when the aeroplane is in the air. The air bag is also helpful in raising the nacelle when it is in its lowest positions.

The flexible driving shafts between the aeroplane motor and storage motor 14 are not shown in their entire length to avoid confusion in the illustrations; it being obvious that they can be led in any desired direction like a cable. Since the elevating means for the front and rear of the nacelle are independent and driven by separate though similar motors the angle of the line of thrust can be varied at will by operating one end set of the elevating struts more than the other set.

Once the aeroplane is in the air the air bag

can be allowed to collapse by opening the air valve, and the nacelle can be lowered into place and the wing sections retracted. The pilot's house has a glass stream lined form to completely protect the pilot from wind and a device, 5' is provided for clearing the outside of the glass of water or mist.

It is unnecessary in order to alight, to again raise the nacelle since I have disclosed a means to predetermine the position in which the propeller shall stop on stoppage of the aeroplane motor, see Fig. 7, which is a variation from the gear type of drive shown in Fig. 1, but which can be fitted to any motor.

As disclosed the motor 14, shown in detail in Figs. 4 and 5 may be used wherever it is desired to accomplish an object, such as retracting a wing, where normal conditions pertain during the retraction and energy can be stored during this normal period to be immediately available to extend the wing on emergency. The drive shaft 60 operates the bevel wheels 52 and 59 continuously when the aeroplane motor is running. When it is desired to operate anything like retracting a wing, the hand lever 68 is moved either directly or through a flexible control, to bring the shallowest notch 71 over hardened end of shaft 57 thus forcing friction wheel 54 into driving engagement with moving wheel 52, this revolves shaft 57, which winds up spring 51 and drives shaft 58 through spline attachment to bevel 56, nut 65 travels on shaft 58 until it engages part 66 of slide 67 and pulls the slide to bring large groove 69 over end of shaft 57 which causes wheel 54 to return to brake on 55 and, since hand lever is attached to and moves with slide 67, said hand lever is returned to neutral. When it is desired to reverse the action caused by the motor 14, lever 68 is moved to bring intermediate notch 70 over shaft 57 thus permitting wheel 54 to be free of engagement with either 55 or 53 and thus the stored energy in spring 51 can reverse the action and the shaft 58 will again bring the hand lever automatically to neutral and brake the wheel 54 against 55 at end of movement.

By this disclosure I reveal a most efficient form of seaplane adapted to leave the water under present practice conditions of relative high center of thrust, but in the air to alter these conditions, reduce wind resistance by power means and to have available for emergency alighting storage power to extend the wings and automatic means of stopping the propeller in a horizontal position, this combined with my new means of electrical cooling through circuits 53', 46—49 and 51 of Figure 7 provides a type of high speed plane suitable as a pursuit plane for the Navy.

Since the drawings are merely a disclosure of one application of my invention I do not care to limit myself to the form and arrangement shown, but what I claim is:—

5 (Notice, additional claims have been applied for in a copending divisional application, Serial No. 270,302).

1. In combination with an aeroplane provided with an air propeller, means operated
by the speed of the motor to cause the said propeller to gradually come to a predetermined position.

2. In combination with an aeroplane provided with a propeller, a motor and driving
5 connections between said propeller and motor, said driving connections provided with a governor means to bring the said propeller into a predetermined position when the motor stops.

20 3. In combination with an aeroplane, a propeller therefor and automatic motor governor means to gradually bring the said propeller to a predetermined position.

25 4. In combination with an aeroplane, an aeroplane motor and propeller and automatic means including a governor to cause the propeller to assume a predetermined position when the motor is stopped.

30 5. In combination with an aeroplane propeller, means including gas compression means to hold the said propeller in a predetermined position when the said propeller is stopped.

35 6. In combination with an aeroplane propeller, automatic means to gradually stop and hold the said propeller in any desired

position, during the flight of the said aeroplane.

7. In combination with an aeroplane motor, a propeller shaft means to alter the position of the said shaft relative to other parts
40 of the said aeroplane and means including adjustment of the motor valves to bring the propeller to a given position.

8. In combination with an aeroplane a
45 propeller and a propeller shaft, means to predetermine the position in rotation at which the propeller shall stop and means to alter the axis of rotation relative other parts
50 of the said aeroplane.

9. In combination with an aeroplane provided with a nacelle and a hydroplane bottom, means to move the said bottom relative
55 the said nacelle, and said bottom provided with an inflatable upper portion.

10. In combination with an aeroplane provided with an alighting gear and a propeller axis, means to vary the relative position of
said gear and axis and automatic means for
60 bringing the aeroplane propeller into approximately horizontal position when said propeller is not rotating.

11. In combination with an aeroplane propeller driven by an aeroplane motor having
poppet valves, means including the said
65 valves to bring the said propeller to a predetermined position.

12. In combination with an aeroplane motor and propeller, air pressure means to hold
the said propeller in a given position.

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