July 9, 1940. C. R. WASEIGE 2,207,042

PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

Original Filed April 25, 1935 6 Sheets-Sheet 1

Fig. 1

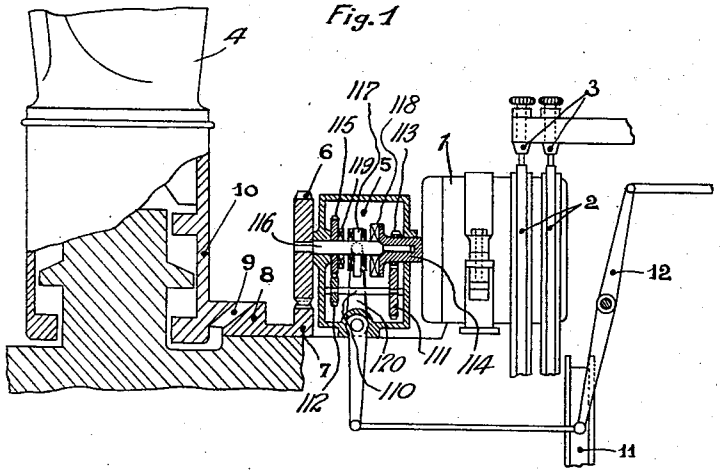


Fig. 6

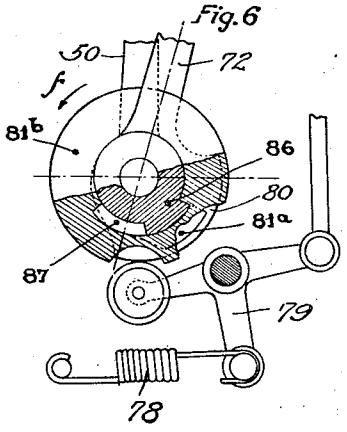
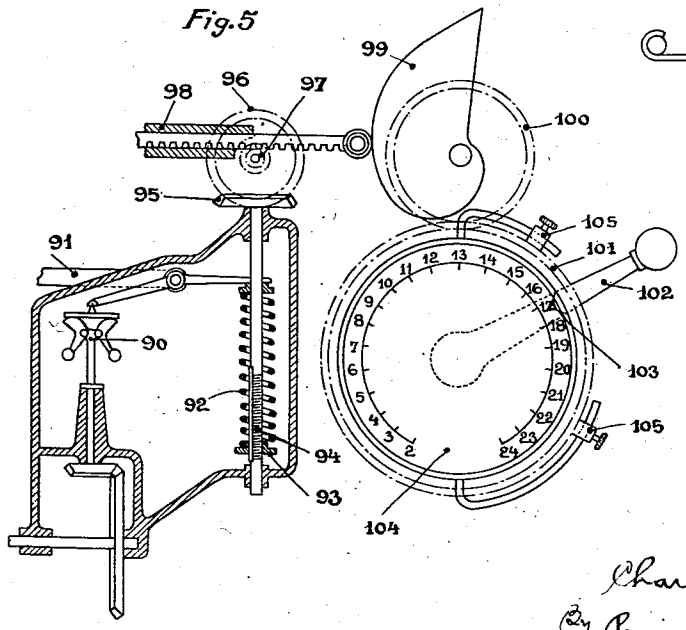


Fig. 5



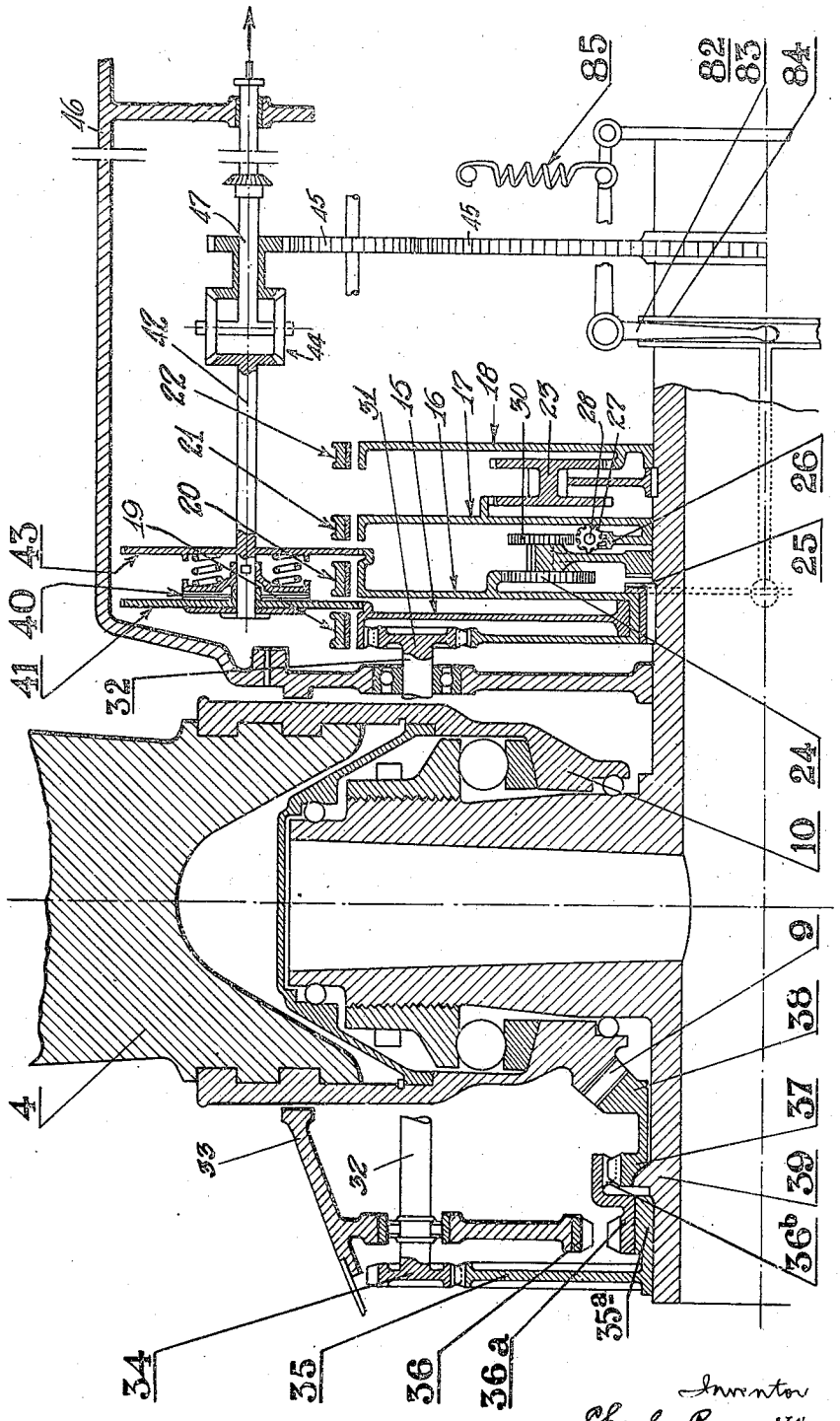
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PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

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Fig. 2



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PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

Original Filed April 25, 1935 6 Sheets-Sheet 3

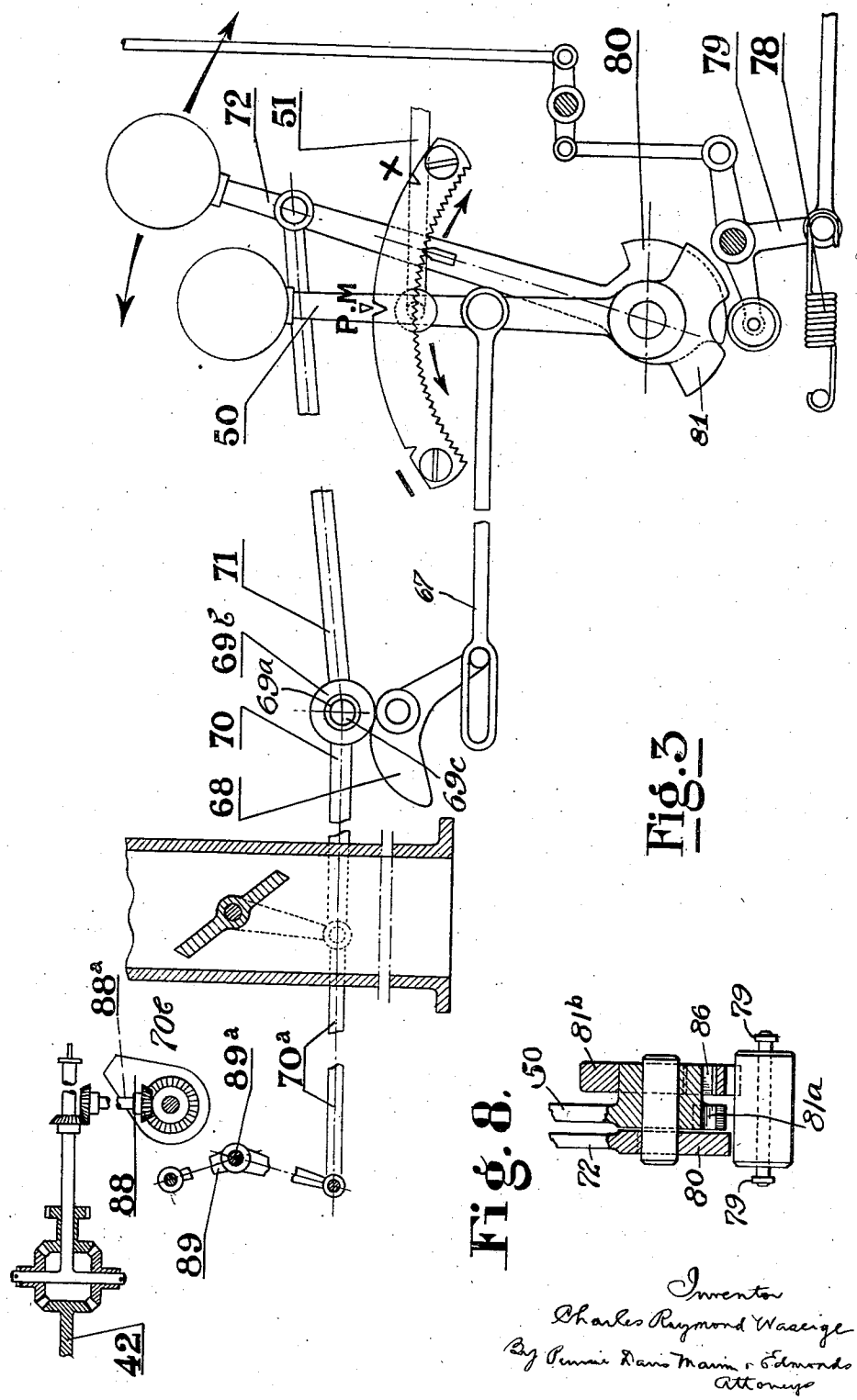


Fig. 3

Fig. 8.

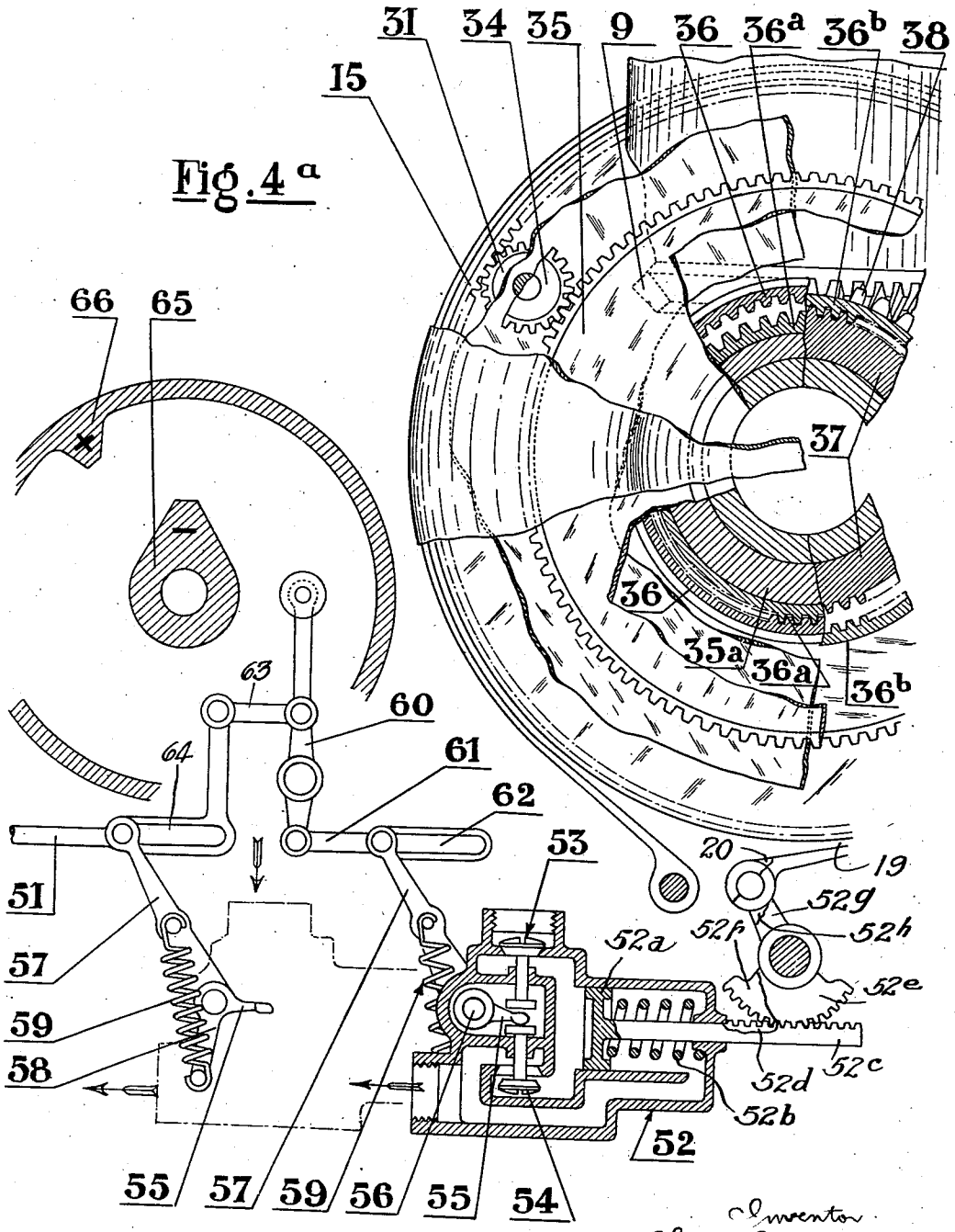
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PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

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Fig. 4a



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PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

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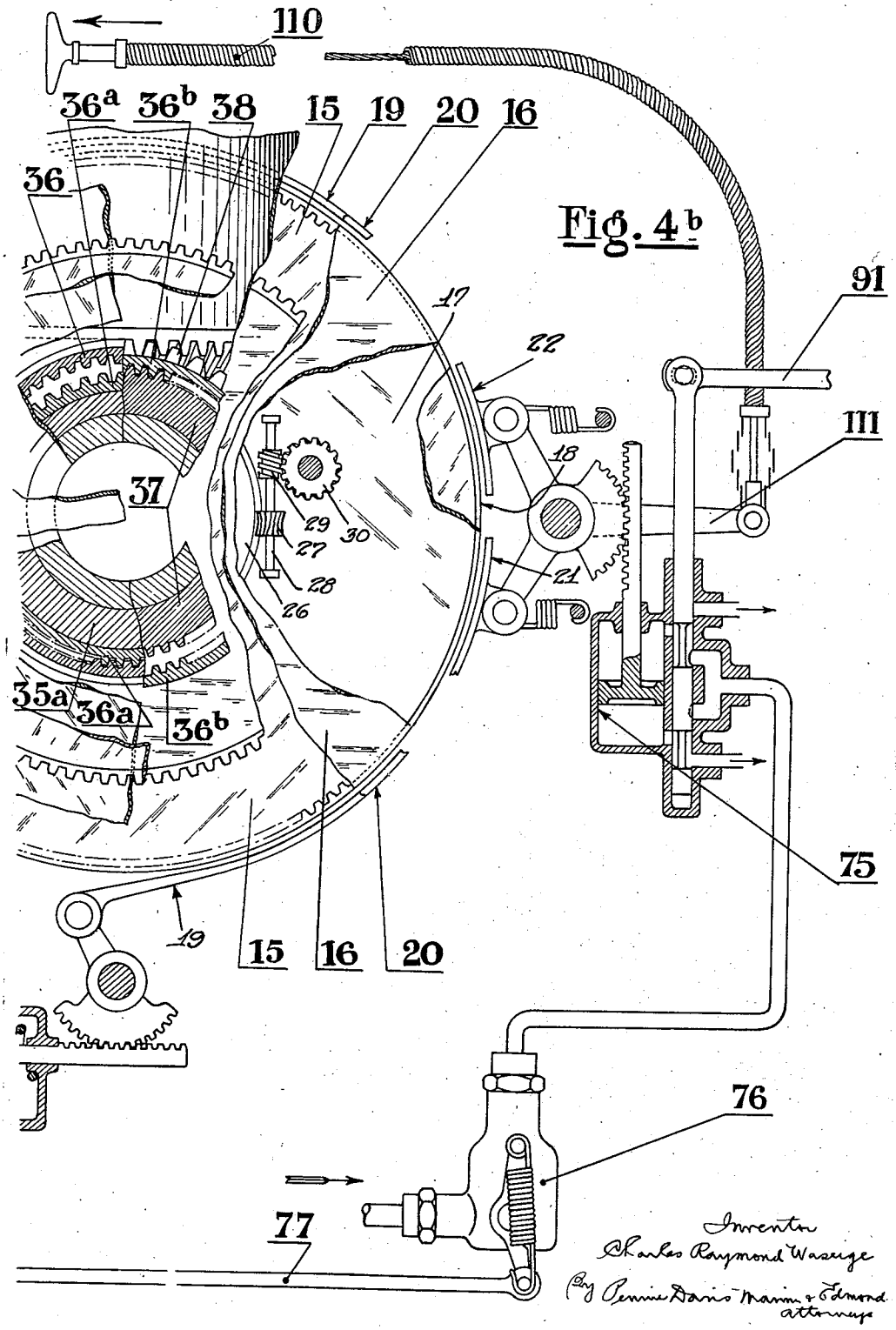


Fig. 4b

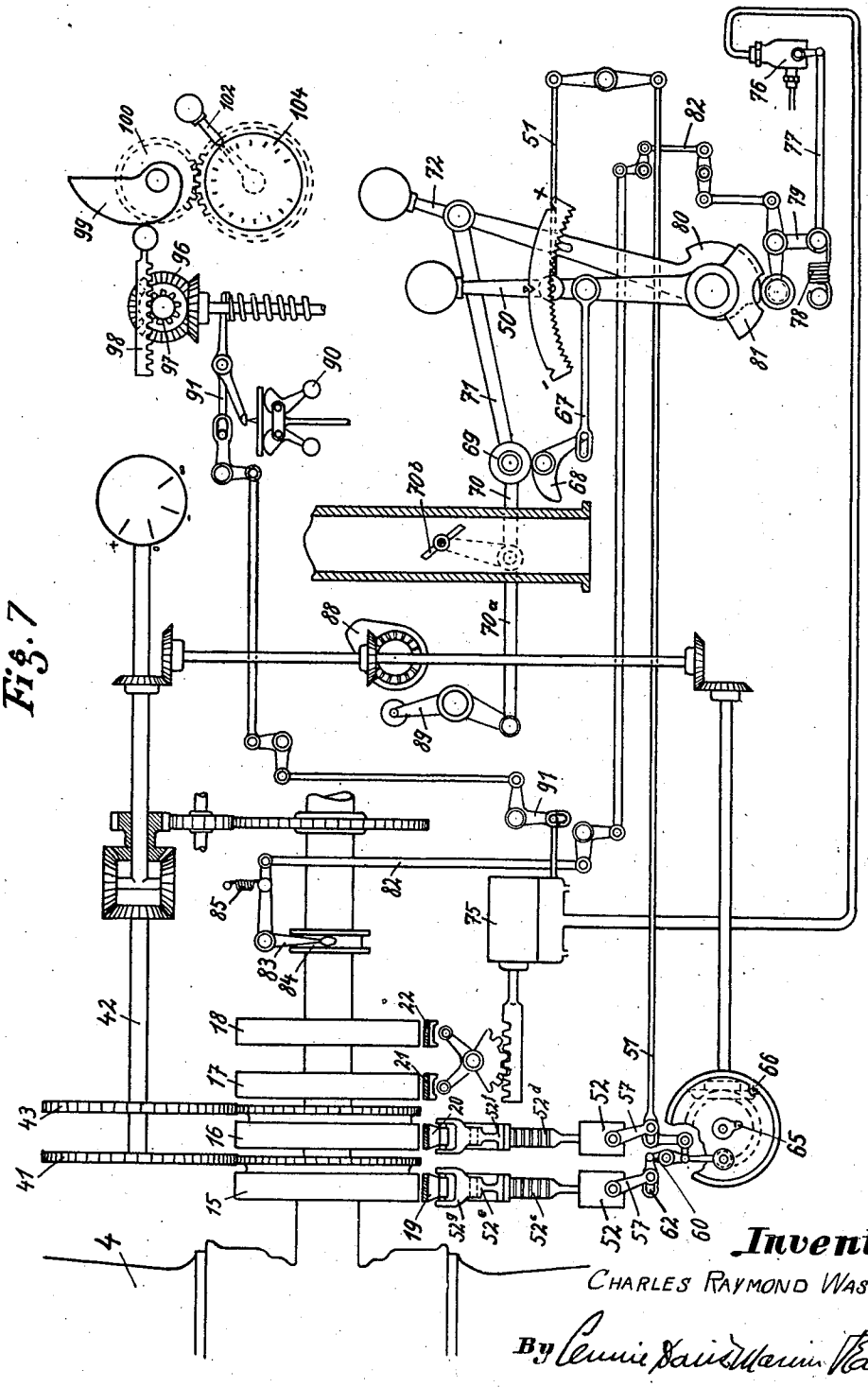
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PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

Original Filed April 25, 1935 6 Sheets-Sheet 6

Fig. 7



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Patented July 9, 1940 2,207,042

UNITED STATES PATENT OFFICE

2,207,042

PROPELLER CONTROL MECHANISM FOR ADJUSTABLE AND REVERSIBLE PITCH PROPELLERS

Charles Raymond Waseige, Rueil, France

Original application April 25, 1935, Serial No. 18,139. Divided and this application March 4, 1936, Serial No. 67,031. In France May 1, 1934

2 Claims. (Cl. 170—135.6)

My invention relates to airscrew propellers with variable and reversible pitch used on aircrafts, of the type described and claimed in my co-pending application Serial No. 18,139, filed on the 25th of April, 1935, of which the present application is divided out.

The main object of my invention is to provide connections between the pitch varying and reversing gear, its control means, the propeller driving engine and the control means of the latter, in order to make some of them dependent on the other or others in some predetermined occurrences with a view to reduce as much as possible the attention required from the operations to be made by the pilot.

This and other objects and advantages of my invention will appear thereafter from the description given below by way of example of two embodiments of my invention and this description should be read with the understanding that the form, construction and arrangement of the several parts may be varied within the limits of the claims hereto appended, without departing from the spirit of the invention as expressed in said claims. It is for instance to be understood that while my invention will be fully described in detail with reference only to one particular type of propeller where the driving power required for this variation and reversal is furnished by the propeller driving engine, it is also applicable to aerial propellers with variable and reversible pitch of any other type where the driving power is furnished by the pilot or by an auxiliary motor, electric or other.

In the annexed drawings:

Fig. 1 is a diagrammatic view, showing a propeller with variable pitch, in which the mechanisms for slow variation and for pitch reversal comprise a common source of power and a speed-changing device.

Fig. 2 is a diagrammatic view of a propeller with variable pitch which employs, as a source of power for the variation of the pitch, the propeller driving engine itself.

Fig. 3 is a partial diagrammatic view of a form of the controls which can be employed, chiefly in the case of the propeller shown in Fig. 2, as well as the connections between the controls.

Figs. 4*a* and 4*b* are similar to Fig. 3 but show another part of the controls and their connections.

Fig. 5 relates to a device for the automatic control of the mechanism for the slow variation of the speed.

Fig. 6 represents a partial modification of the controls shown in Fig. 3.

Fig. 7 is a diagrammatic view showing the general arrangement of the controls of the invention.

Fig. 8 is a detail view, partly in section, of the mechanism shown in Fig. 6.

In the embodiment shown in Fig. 1, the source of power for the variation of the pitch is an electric motor 1 which is supported in such way as to participate in the rotation of the propeller, and it is thus supplied by means of conducting rings 2 which are coaxial with the propeller and work against fixed brushes, or inversely.

The said motor is connected with the propeller blades 4 by driving gear comprising a speed-changing device 5, which in this case is a speed-changing device having two ratios, of the type containing a secondary shaft 110 on which are keyed gear wheels 111 and 112 respectively in mesh with a gear wheel 113 keyed on the motor shaft 114 and with a gear wheel 115 loose on a shaft 116 on which is secured a spur gear wheel 6 engaging a gear wheel 7 coaxial with the propeller and formed in one with a set of conical teeth 8 engaging conical teeth 9 mounted on the supports 10 of the blades on the shaft 116 is slidably keyed a clutch member 117 adapted to alternately engage a cooperating clutch member 118 keyed on the motor shaft 114 or a clutch member 119 secured to the gear wheel 115.

The control of the speed-changing device 5 is effected by means of rod-and-link gear of any kind, comprising a member which is coaxial with the propeller and rotatable with the latter, but which is movable lengthwise, and herein, this consists of a grooved ring 11 co-operating with a member which is held against rotation but is movable lengthwise, in this case, a fork 12. A fork 120 engages the slidable clutch member 117 to alternately bring it into engagement with the clutch member 118 or 119.

The operating of the fork 12 will thus permit the use of either of the two ratios of transmission of the speed-changing device 5, thus affording a rapid change of pitch, which is preferably used for reversing the pitch, or on the contrary, for a slow variation of the pitch, and the change of direction for the pitch variation can be obtained for instance by reversing the motor by means of a usual reversing switch under automatic or manual control.

The embodiment shown in Fig. 2 is a particular embodiment of pitch-varying mechanism comprising differential gearings adapted to be

braked by means of a servo-motor using fluid under pressure, such as oil.

Herein, there are mounted concentrically with the propeller shaft four drums 15, 16, 17, 18 which are loose on their bearings, and co-operate with brakes 19, 20, 21, 22. The adjacent drums 17, 18 are connected together by a set of gearing having a negative ratio, i. e., a gearing such that the drums 17, 18 will rotate in contrary directions, for instance by means of a planetary device 23 whose support is secured to the propeller shaft. The drums 16, 17 are connected together by transmission gear comprising a planetary pinion 24 whose support can be coupled to or uncoupled from the propeller shaft, as to rotation, by means of any suitable clutch device 25, for instance of the tooth type; the said planetary pinion is engaged on the one hand with a set of teeth on the drum 16, and on the other hand with the drum 17 by means of a speed-reducing device which herein consists of a worm portion 26 located on the drum 17 and engaging a worm-wheel 27 keyed to a shaft 28 which is at right angles to the propeller shaft and carries another worm 29 (see Fig. 4b) engaging a suitable wheel 30 keyed to the shaft of the said planetary pinion. The drums 15—16 are also connected together by a set of gearing having a negative ratio, employing herein for this purpose a pinion 31 engaging external and internal sets of teeth located on the respective drums 15—16, said pinion being keyed to a shaft 32 operating in bearings mounted on the casing of the propeller, thus rotating together with the latter. The movement of rotation of the pinion 31 on its axis is transmitted to the several blades by the shaft 32 and a mechanism to be further described.

It will be noted that when none of the drums are braked, the whole of this mechanism will rotate as a unit together with the propeller shaft, without any internal movement. If one of the drums 15 and 16 is braked, and if the support of the planetary pinion 24 is not secured, as to rotation, to the propeller shaft, the pinion 31 will rotate on its own axis, in one or the other direction depending upon which one of the said drums is braked, and this will vary the pitch to a greater or less degree. On the other hand, the drums 17 and 18 continue to operate with the same movement of rotation as the propeller, and the support of the planetary pinion 24 has the speed which is suitable for the conditions now prevailing.

When one of the drums 17—18 is braked, and when the support of the planetary pinion 24 has been connected, as to rotation, with the propeller shaft by means of the clutch 25, this sets up a relative movement (in one or the other direction, according to the drum which is braked) of the drum 16 and the support of the planetary pinion 24 and of the devices 27 to 30. Hence, through the medium of the speed-reducing parts 26 to 29, the planetary pinion 24 will turn on its own axis, in one or the other direction, and this movement imparts to the drum 16 a displacement with reference to the drum 15 which results, as in the preceding case, in a rotation of the pinion 31 on its own axis in one or the other direction.

It will be noted that this affords two ratios of transmission having different values, for the rotation of the blades; the ratio corresponding to the braking of the drums 15 and 16 will be used for reversing the pitch of the propeller, and the other ratio, obtained by braking the drums 17 and 18 and by the clutching of the support of the planetary pinion 24, will be used for the gradual variations of the pitch.

The movement of the pinion 31 itself and the movement of its shaft 32 may be transmitted to the different blades 4 by any suitable means. Herein, this transmission is advantageously obtained by the use of a pinion 34 which is mounted on the end of the shaft 32 and engages a gear-wheel 35 coaxial with the propeller shaft, thus actuating an epicycloidal speed-reducing device comprising a planetary pinion rolling on a fixed base 36 concentric with the propeller shaft, mounted on an eccentric part 35a of the wheel 35 and having a second set of teeth 36b, also eccentric, which engages a set of teeth 37 coaxial with the propeller shaft and rotating together with a bevel pinion engaging a bevel gear 9 formed on the base of the propeller. This device is practically irreversible.

To actuate the pointer of the pitch indicator, not shown, there is provided herein a shaft 42 on which is keyed a gear wheel 43 in mesh with teeth provided on the drum 16. The shaft 42 carries a conical gear wheel forming one sun-wheel of a differential mechanism 44 the other sun-wheel of which is driven from the propeller shaft through gear wheels 45. Shaft 42 is journaled in bearings internally carried by the stationary casing 46. The planet-carrier of the differential mechanism is secured on a shaft 47 connected to the pitch indicator. The gear wheels 45 are designed in order that the two sun wheels of the differential mechanism 44 are rotated at the same speed when the drum 16 rotates at the same speed as the propeller shaft, i. e., when none of the brakes 19 to 22 is applied; so that the planet-carrier and its shaft 47 remain motionless. As soon as a brake is applied and produces a relative rotation between this propeller shaft and the drum 20 the sun wheels of the differential mechanism 44 are no longer rotated at the same speed so that the planet carrier will rotate at a speed depending upon that of this relative rotation and drives the pitch indicator.

Fig. 3 shows the hand lever 50 for controlling the pitch-reversing mechanism. This lever is connected by a rod 51, or like connecting member, Figs. 3 and 4a with a device controlling servo-motors 52 so arranged as to separately throw on the brakes 19 and 20. In Fig. 4a is represented two servo-motors, one being disclosed in detail and the other represented in outline form only to render the disclosure perfectly clear. Each servo-motor, (Fig. 4a) only one of which need be described, operates by fluid under pressure, and comprises for each brake a cylinder and a fluid distributing valve mechanism preferably adapted to supply fluid at full rate at all times except when completely cut off. For this purpose, the two valves 53 and 54 for admission and exhaust of the fluid are oppositely disposed and between their discs is located the end of a lever 55 mounted on a shaft 56 which carries two other levers 57 and 58 which are urged together by a spring 59. One of these levers, 58, is keyed to the shaft 56, the other lever being loose between two stops secured to the shaft and situated on the respective sides of the extended part of the lever 58, and thus the lever 57 will turn abruptly in one or the other direction under the action of the spring 59 when it proceeds beyond the said extended part. The two levers 57 are connected together by rod-and-link gear or the like and thus the two valves 53 can be closed simultaneously, but only one of the valves can be opened at

a time. Herein, the rod-and-link gear consists of a two-arm pivoting lever 60; to one arm is pivoted a link 61 having a slot 62 in which is engaged a stud mounted on one of the levers, 57; to the other arm is pivoted a link 63, pivotally mounted on one arm of the rod 51, which is bent at right angles, the other arm of the rod which is pivoted to the said reversing lever 50 having a slot 64 in which is slidable a stud pertaining to the other lever 57. Thus the whole mechanism can have three definite positions, that is, a middle or neutral position in which both valves 53 are closed, and the two valves 54 open and two end positions in which one of the valves 53 is open whilst the other is closed.

In each cylinder 52 is accommodated a piston 52*a* to be urged against a return spring 52*b* by the fluid pressure. Each piston rod 52*a* extends out of the corresponding cylinder 52 and the outer rod portions are provided respectively with racks 52*c*, 52*d* in mesh with pivoted toothed sectors 52*e*, 52*f*, connected through cranks 52*g*, 52*h* to the brakes 19, 20, respectively, to actuate said brakes.

Consequently, when the hand-lever is moved either way from its neutral position, this will effect the abrupt opening of one of the valves 53, according to the direction of the displacement of the hand-lever, thus throwing on the corresponding brake. The automatic stopping of the reversal by the release of the brake is effected, in this apparatus, by means of two cams 65 and 66 corresponding to two predetermined values, positive and negative, of the pitch, said cams being positively operated by the mechanism of the pitch indicator, and one or the other cam, according to the position of the hand-lever 50, will act upon the lever 60 in order to bring the lever 57 of the valve 53 into a position of unstable equilibrium, beyond which the spring 59 will effect the instantaneous closing of said valve 53 and the opening of the valve 54, as well as the return of the rod-and-link gear and the reversing lever 50 into the neutral position herein represented, in which both valves 54 are open and the two brakes 19 and 20 are released.

Further the reversing lever 50 is herein connected with the device for the control of the supply of carburated mixture to the propeller driving engine through a rod 67 (Fig. 3) pivoted at one end to the said lever 50, and at the other end to a pivoting cam 68 which acts upon an articulated joint 69 located between two rods 70—71, one of which, 70, is connected with the engine throttle 70*b* and the other, 71, with the hand-lever 72 for the control of this throttle the joint 69 is made elastic by an elastic or resilient spring means arranged to urge and hold the rods 70—71 in a predetermined angular position. Said means may consist for instance in a rubber sleeve 69*a* the external face of which is adhered to the inner face of a metal sleeve 69*b* carried by one of the rods 70, 71 while the inner face of said rubber sleeve 69*a* is adhered to the external face of the stud 69*c* carried by the other of said rods 70, 71. The connection between the rod 67 and the pivoted cam however provides for some lost motion in order that the cam will not turn when the hand-lever 50 is moved from its neutral position into the position corresponding to the positive value of the pitch. On the contrary, when the lever 50 is moved into its other position, the cam 68 is turned, and it thus moves the joint 69 when this is located on its path, which takes place for positions of the hand-lever 72 corresponding to a small opening of the engine throttle. The movement of the joint 69 thus effects an increased opening of the engine throttle without any displacement of the throttle control lever 72. When the lever 50 returns to its neutral position, the levers 70—71 return into the position shown in Fig. 3.

As the mechanism for the slow variation of the propeller pitch is also actuated, in this apparatus, by a servo-motor 75 using fluid under pressure, there is interposed in the conduit supplying the fluid under pressure, a valve 76 adapted for quick opening and closing, the mechanism for this purpose being, for instance, of the type of the mechanism 57—58—59. This mechanism is controlled by a rod 77 urged by a spring 78, Fig. 3, in such way that the valve 76 will be continually urged toward open position, said rod being pivoted at the other end to a pivoted lever 79 located in the path of the cam 80; said cam is connected with the throttle control lever 72, and its outline is such that the rod 77 will be maintained, against the action of the spring 78, in a position in which the valve 76 is closed, whilst the hand-lever 72 is in the position in which the opening of the engine throttle is below a predetermined value.

In order to avoid all improper working, it is necessary that the mechanism for the slow variation of the pitch should not be actuated while the pitch-reversing mechanism is in action. For this purpose, use may be made of a control device similar to the control of the mechanism for slow variation of the pitch, by the throttle lever, and it is preferable to employ a device, as herein represented. For this purpose, the lever 79 cooperates with a cam 81 mounted on the reversing lever 50, and the outline of the cam is such that it is only when the lever 50 is in the neutral position that the lever 79 may be brought by the spring 78 into the position corresponding to the opening of the valve 76.

Furthermore, in the construction shown in Fig. 2, it is necessary, in order that the reversing mechanism may operate, that the support of the planetary pinion 24 shall be released. For this purpose, a connection is made between the reversing lever 50 and the movable part of the clutch 25, and thus the displacement of the hand-lever 50 from its middle position will effect the release of the said support. Herein, this connection makes use of the said cam 81 and the lever 79 whose angular displacements are transmitted by suitable rod-and-link gear 82, or like device, to a pivoted fork 83 which moves the said movable part lengthwise, by means of a grooved collar 84 coaxial with the propeller shaft. The clutching, which might be effected by the pilot at will, is herein automatically effected by the action of an antagonistic spring 85.

A method for the control of the mechanism for the slow variation of the pitch, in such way that this mechanism cannot be actuated when the pitch has a negative value, is shown in Fig. 6, in which the control of the reversing mechanism is employed for this purpose. The cam 81, which cuts out the mechanism for slow variation during the operating of the reversing mechanism, is herein divided into two parts 81*a* and 81*b*; the part 81*a* is provided on the hand-lever 50 to turn therewith, whilst the part 81*b* is connected with the same with a certain angular play or lost motion, for instance by a tenon 86 provided on the hand lever 50 and engaged in a groove 87 in the said member 81*b*. These various members are set in such a way that when the hand-lever 50 is in its middle or neutral position as illustrated

in Fig. 6 one side of the tenon 86 is in engagement with the right hand end of the groove 87 while the part 81b is in a position allowing free operation of the mechanism for slow progressive variation of the pitch. When the control lever 50 is moved according to the arrow *f* (Fig. 6) from its neutral position into the position corresponding to the negative pitch, the tenon 86 will thus turn along with it the part 81b of the cam, which then bears upon the lever 79 and likewise as in Fig. 3 actuates the cut-out device 76 to 79, as well as the mechanism 82—85 which controls the clutch 25 and the mechanism for slow progressive variation of the pitch is thereby brought out of operation. When the handle 50 returns to the neutral position, the tenon 86 will slide back in the groove 87 without moving the member 81b, which thus continues to hold down the lever 79 and the left side of the tenon 86 comes into engagement with the left hand end of the groove 87. The mechanism for the slow variation of the pitch will thus remain out of action as long as the pitch is negative. When the hand-lever 50 is then moved into the position corresponding to the positive pitch, i. e. is turned in the clockwise direction the tenon 86 will turn along with it the member 81b back to the initial position where the part 81b does no longer hold inoperative the mechanism for slow pitch variation, but the part 81a which turns with the hand lever 50 has now come into engagement with the lever 79 and holds down the latter so that the mechanism for the slow variation of the pitch remains kept out of action. When the hand-lever 50 returns to the neutral position, the tenon 86 moves in the groove 87 without turning the cam piece 81b which remains in its initial position but turned out of engagement with the lever 79 which is thus allowed to be swung upwards by the spring 78, whereby releasing the mechanism for the slow variation of the pitch as described above with reference to Fig. 3.

Fig. 3 also shows an example of the construction of a device adapted to prevent the racing of the engine when the propeller pitch comes to zero and when the engine throttle is well open.

For this purpose, the present apparatus comprises a rotating cam 88 connected by a suitable transmission means 86a, including a differential, with the mechanism 42 controlling the pitch indicator. The said cam actuates a lever 89 pivoting on a stationary axle 89a, and also pivoted to the rod-and-link gear 70—70a controlling the engine throttle. It will be noted that the position of the lever 89 thus depends upon the position of the engine throttle, and when the latter is sufficiently closed, the cam 88 can rotate without meeting the lever 89 when the pitch passes through the zero value. On the contrary, when the throttle is well open, the lever 89 comes upon the path of the cam 88 and the cam will thus act upon the lever at the time when the pitch passes through the zero point, thus momentarily closing the engine throttle.

The same effect may be obtained by the cooperation of levers or cams mounted respectively on the throttle control lever and on the reversing lever, and adapted to act upon the throttle control in such way as to reduce the supply of carburated mixture to the engine for certain predetermined relative positions of the reversing lever and the throttle lever.

Fig. 5 shows a device for the automatic control of the mechanism for the slow variation of the pitch according to the engine speed. Herein, the centrifugal governor 90 is driven by the engine and it controls the valve-gear of the servomotor 75 by means of the lever 91. The tension of the spring 92 can be regulated while running, by the displacement of one of its supports consisting of a nut 93 mounted on a threaded rod 94 which can be rotated by suitable driving means, herein comprising the bevel gear wheels 95—96, the latter wheel being driven by the pinion 97 engaging a rack 98 actuated by a rotating cam 99 secured to a gear-wheel 100 engaging a like wheel 101 rotatable by means of a hand-lever 102 together with a pointer 103 moving over a dial 104 graduated in numbers of revolutions. Thus the displacement of the hand-lever 102 regulates the speed of the engine by causing a variation of the pitch, and the governor 90 will then keep this speed automatically constant by suitably actuating the mechanism for the slow variation of the pitch according to the conditions of flight, whether on a level, or for rise or descent, or the like.

Fig. 5 also shows a form of construction of a device for limiting the possible variation of the propeller pitch to a range comprised between two extreme positive values. Said device herein consists of two stops 105 located on the path of the hand-lever 102, in such way that this lever cannot assume a position outside of the sector which is thus defined and which corresponds to engine speeds on either side of the normal working speed and not far from the latter. The extreme positions of the hand-lever 102 correspond to the extreme speeds which the engine cannot exceed as long as the automatic mechanism for slow variation of the pitch is enabled to act. On the contrary, when this automatic pitch-varying mechanism is out of action due to the position of the throttle control lever 72, which position determines a reduced admission of carburated mixture, the engine can run at slow speed at different speeds which depend upon the different positions of throttle lever 72, while stopping the action of the automatic mechanism for the slow variation of the pitch.

Fig. 4b shows a form of construction of a hand control 110 for bringing the propeller blades in line with the direction of the wind, in the case in which the oil pressure becomes reduced, or in case of other defective action. The said control 110 herein consists of a device of a known type operating by cable and acting directly upon a lever 111 controlling a brake shoe 22, and when this lattcr is applied, it will cause a gradual reduction of the pitch.

The general operation of the devices above described is as follows:

When I move the control lever 50 from the position shown in Fig. 7 to the left to the position indicated by the sign — I pull on the rod 51 and move the latter to the left, whereby turning the lever 60 contrary to the clockwise direction and the lever 57 to the right through the medium of the lever 61. The spring 59 then urges the lever 55 to turn contrary to the clockwise direction, whereby opening valve 53 and enabling valve 54 to be closed by its return spring. Fluid under pressure is thus admitted in the cylinder 52 and moves the piston 52a carrying the rack 52c which turns the sector 52e contrary to the clockwise direction and thereby applies the brake 19 through the crank 52g. The pitch reversing gear is thus set in operation and the pitch is rapidly reversed from a positive to a negative value, as above described with particular refer-

ence to Figs. 2, 3 and 4. It will be noted that during this movement of the rod 51 to the left the stud of the lever 57 of the servo-motor connected to the brake 20 slides idly in the slot 64 of the rod 51 so that this movement of the rod 51 is without effect on this servo-motor.

At the same time the displacement of the control lever 50 to the left produces a clockwise rotation of the pivoted cam 68 through the medium of the connecting rod 67 and in turn the cam 68 will stretch out the knee 69, whereby opening the throttle 70b through the rod 70.

The operation of the pitch varying gear causes the shaft 47 to rotate as above described and the latter in turn rotates the cam 88 through the shaft 88a. This cam 88 will thus come into engagement with the lever 89 and turn it contrarily to the clockwise direction when the pitch is approaching the value zero. This rotation of the lever 89 is transmitted by the connecting rod 70a to the throttle 70b which is thus brought to the position corresponding to the slow speed running of the engine, and the rod 70 is moved to the right. As the control lever 72 has not been moved and is held fixed this motion of the rod 70 will produce a bending of the knee 69 whatever may be the position of the cam 68 but as soon as the cam 88 releases the lever 89 this elastic joint 69 will resume its former position, whereby opening again the throttle 70b.

If the lever 72 is initially in a position such that it holds the throttle 70b in the position of slow speed running of the engine, it will readily be understood that the lever 89 will be held by the connecting rod 70a out of the path of the cam 88.

The shaft 47 rotates also the cams 65, 66 connected to said indicator. At the same time where the pointer of the pitch indicator comes substantially in register with the mark — on the dial, i. e., when the pitch has a predetermined negative value, the cam 65 comes into engagement with the pivoted lever 60 and swings it back to the position of Fig. 7, whereby pulling back the rod 51 and the control lever 50 to their initial neutral position, closing valve 53 and opening the exhaust valve 54. The return spring 52b will then move back the piston 52a to its rest position, whereby releasing the brake 19 and stopping the operation of the pitch reversing gear.

When I move the control lever 50 to the right, I push on the rod 51 and operates the lever 57 directly pivoted to said rod; this lever 57 in turn operates the valves of the corresponding servo-motor 52 in the same manner as above described with reference to the other servo-motor 52. The latter remains inoperative since the link 61 is moved to the left and the slot 62 slides on the corresponding lever 57 without actuating the latter. The brakes 20 are thus applied by the operating servo-motor 52 and the pitch value is reversed from a negative to a positive pitch value until the cam 66 rotated from the pitch indicator comes into engagement with the pivoted lever 60 and moves it back to its neutral position together with the link 51, its associated lever 59 and the control lever 50, whereby stopping the reversing gear. The operation of the cam 88 during this pitch reversal from a negative value to a positive value is exactly the same as during the inverse pitch reversal.

It will be noted that the motion of the control lever 50 to the right does not operate the cam 68 owing to the lost motion connection between them.

I claim:

1. Control means for a variable pitch propeller provided with an automatic pitch varying mechanism adapted to slowly and progressively decrease and increase the pitch in dependence on the rotating speed of the propeller and a pitch reversing mechanism adapted to far more rapidly reverse the pitch from a positive value to a negative value and vice versa at the will of the pilot, said control means including means operable from the pilot to selectively cause operation of said mechanisms, means adapted to automatically control the fuel supply to the engine in dependence on the pitch value, and a further means adapted to vary the fuel supply and operatively connected to said means operable from the pilot to be actuated thereby.

2. Control means for a variable pitch propeller provided with an automatic pitch, varying mechanism adapted to slowly and progressively decrease and increase the pitch in dependence on the rotating speed of the propeller and a pitch reversing mechanism adapted to far more rapidly reverse the pitch from a positive value to a negative value and vice versa, said control means including locking means of said automatic pitch varying mechanism and a member operable by the pilot and connected both to said pitch reversing mechanism to control operation of the latter and to said locking means in order that said locking means will lock the automatic pitch varying mechanism as long as the pitch reversing mechanism is in operation.

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