Feb. 7, 1939. M. W. MANCHESTER 2,146,401

INDICATOR FOR CONTROLLABLE PROPELLERS

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Fig. 1

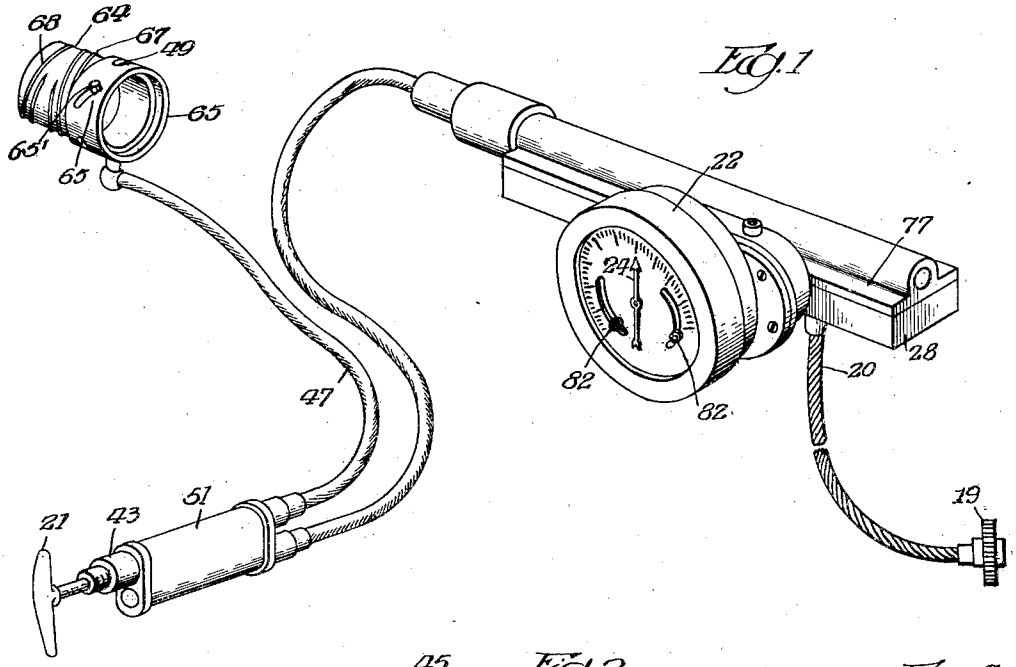


Fig. 2

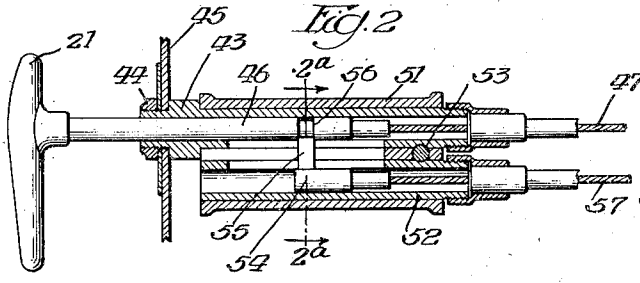


Fig. 2a

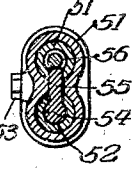
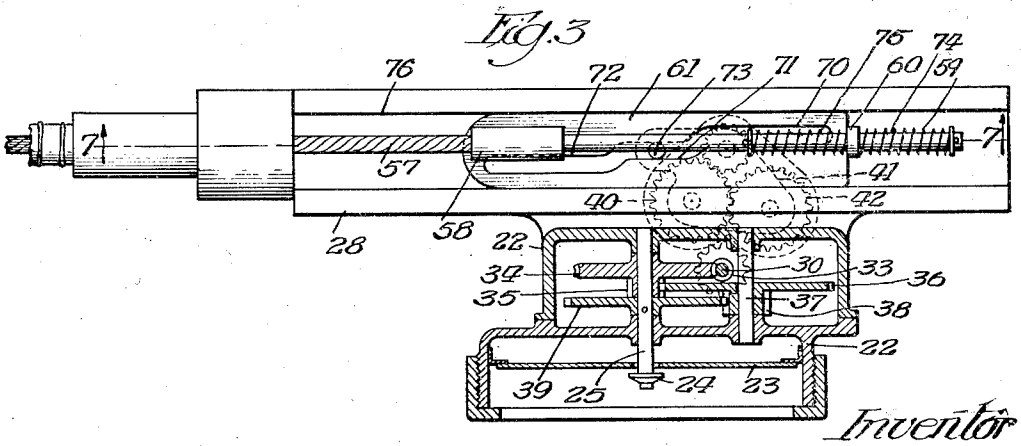


Fig. 3



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Fig. 4

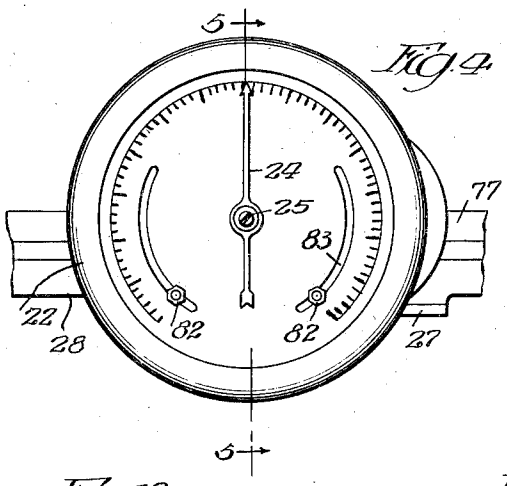


Fig. 5

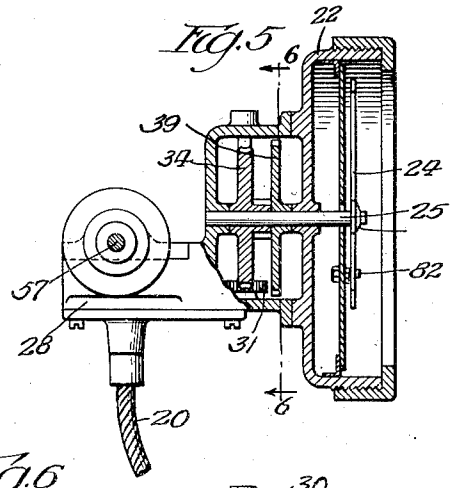


Fig. 10

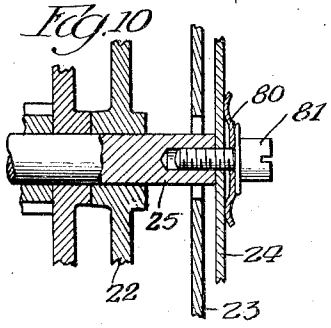


Fig. 6

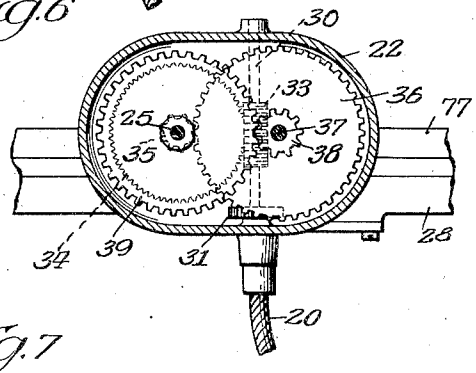


Fig. 7

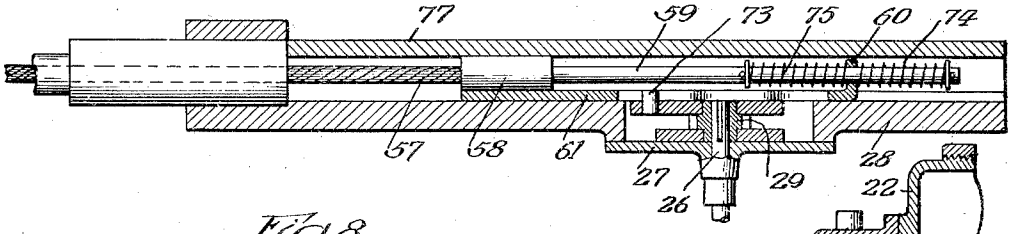


Fig. 8

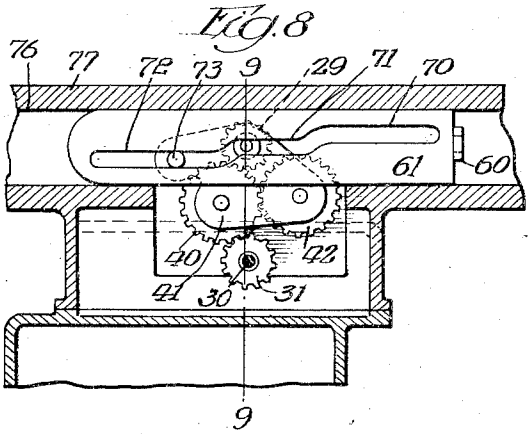
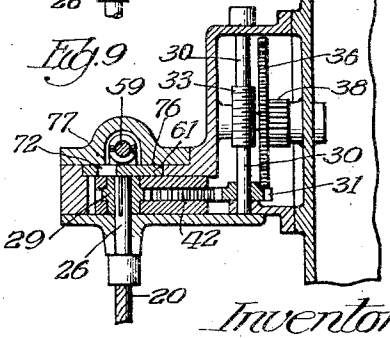


Fig. 9



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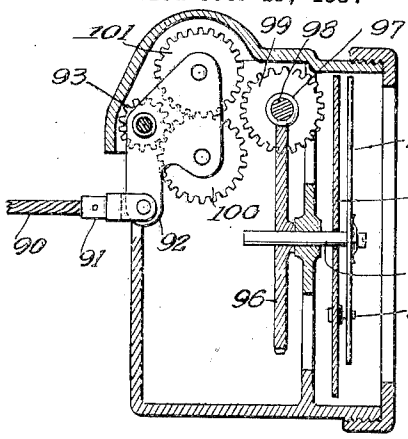
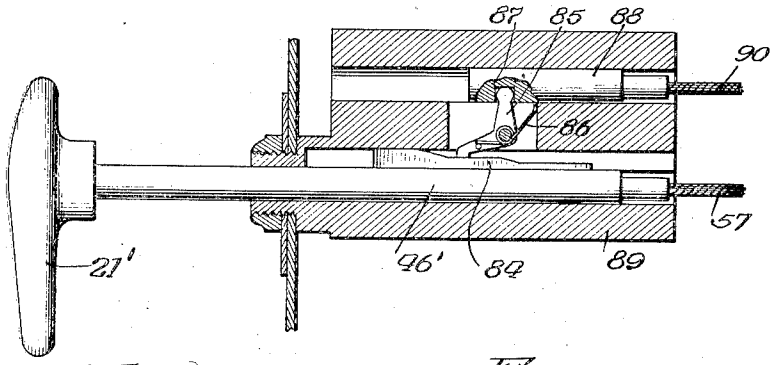


Fig. 12

Fig. 11



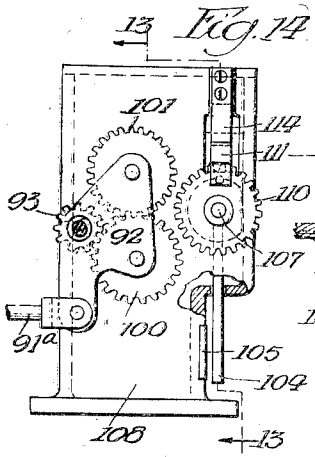


Fig. 14

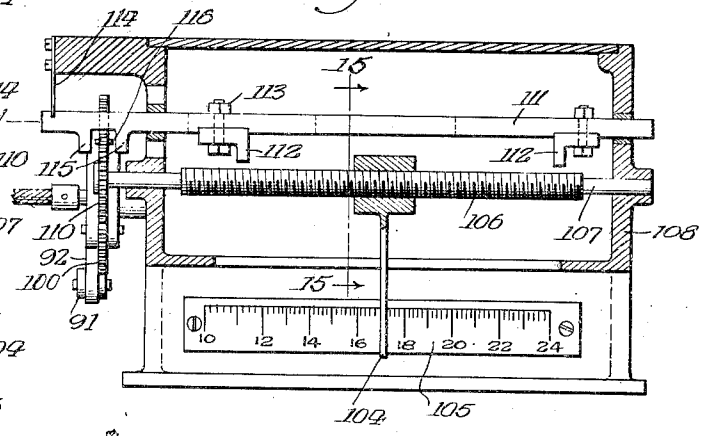


Fig. 13

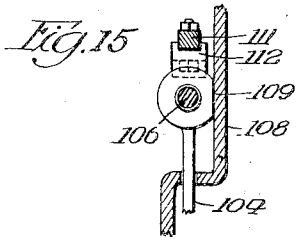


Fig. 15

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Patented Feb. 7, 1939

2,146,401

UNITED STATES PATENT OFFICE

2,146,401

INDICATOR FOR CONTROLLABLE PROPELLERS

Mitchell W. Manchester, Williamsport, Pa., assignor, by mesne assignments, to Aviation Manufacturing Corporation, Chicago, Ill., a corporation of Delaware

Application October 29, 1934, Serial No. 750,407

21 Claims. (Cl. 170—163)

The invention relates to pitch indicator mechanism for propeller blades.

One object of the invention is to provide mechanism for operating a pitch-indicator for controllable propeller blades, which is driven by the engine which drives the propeller, independently of the pitch changing mechanism, and is conjointly controlled therewith.

Another object of the invention is to provide pitch-indicator mechanism for controllable pitch propellers of the type exemplified in patent to Smith No. 1,886,602, which is provided with adjustable means for automatically limiting the pitch changes within predetermined limits.

A further object of the invention is to provide a pitch-indicator adapted to be operated by reversible gearing driven by the engine which drives the propeller and means for conjointly controlling the direction of reversible pitch change gearing and the direction of the indicator.

A further object of the invention is to provide means for synchronizing the pitch indicator with the pitch-limiting means for the propeller blades.

Other objects of the invention will appear from the description.

This invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a diagrammatic perspective of the pitch indicator, the device for operating the reversible pitch change gearing, the pitch indicator, and the device for conjointly controlling said gearing and the driving mechanism for said indicator. Fig. 2 is a vertical longitudinal section of the manually operable control device for simultaneously engaging the engine driven driving mechanism for the indicator and for engaging the gearing for changing the pitch of the propeller blades. Fig. 2*a* is a section taken on line 2*a*—2*a* of Fig. 2. Fig. 3 is a horizontal section through the pitch-indicator. Fig. 4 is a front elevation of the pitch-indicator. Fig. 5 is a vertical section on line 5—5 of Fig. 4, through the pitch-indicator. Fig. 6 is a section on line 6—6 of Fig. 5. Fig. 7 is a section on line 7—7 of Fig. 3. Fig. 8 is a detail of the cam slide for coupling and uncoupling the pitch-indicator from the engine driven shaft for operating the indicator. Fig. 9 is a section taken on line 9—9 of Fig. 8. Fig. 10 is a detail of the slip connection between the pointer of the indicator and the shaft which shifts the pointer. Fig. 11 is a vertical section of a modification of the control device for simultaneously coupling and uncoupling the pitch-change gearing and the gearing for operating the pitch-indicator. Fig. 12 is a vertical section of a pitch indicator mechanism adapted to be controlled by the device shown in Fig. 11. Fig. 13 is a section taken on line 13—13 of Fig. 14, of a modified form of the invention in which the pointer of the pitch indicator is mounted to move rectilinearly.

Fig. 14 is a side elevation of the indicator shown in Fig. 13. Fig. 15 is a section taken on line 15—15 of Fig. 13.

The invention is exemplified in connection with a longitudinally shiftable collar 64 provided with right and left worms 67 and 68, for engaging and driving in either direction high-ratio speed-reduction gearing for controlling the pitch of the propeller blades, illustrated in patent to Smith No. 1,886,602, to which reference may be had for an exemplification of a controllable pitch propeller and gearing for increasing and decreasing the pitch of the propeller blades, which is engaged by said collar to cause the gearing to be operated while the propeller is revolving. A handle 21 is provided for shifting the collar 64 to the pitch-change gearing to increase or decrease the pitch of the propeller blades, as more fully set forth in said patent.

The collar 64, as set forth in Patent No. 1,886,602, is held against rotation and is movable from a neutral position into position to bring either of its worms 68, 67 into engagement with the reduction gearing for increasing and decreasing the pitch of the blades, which is mounted in the propeller hub, by a rotatable sleeve 65, which is provided with helical slots into which studs 65' on collar 64 extend, so that rotation of the sleeve will shift the collar axially.

The control handle 21 is slidably mounted in a sleeve 43 (Fig. 2) which is fixedly secured by a nut 44 on a panel 45 and within convenient reach of the pilot. The handle 21 is fixed to a stem 46 which is axially slidable in sleeve 43. To the inner end of stem 46 one end of a sheathed flexible cable 47 is fixed and this is connected to the rotatable sleeve 65, so that when the flexible cable 47 is shifted by inward movement of the handle 21, the sleeve 65 will be rotated in one direction and when the handle 21 is pulled outwardly, it will rotate the sleeve 65 in the reverse direction to control the axial movements of the gear collar 64 from its neutral position to positions to engage either of the worms 68, 67 with the pitch change gearing shown in Patent No. 1,886,602.

The pitch-indicator (Figs. 1–5) comprises a

suitable casing 22, a dial 23 having suitable calibrations thereon for pitch indications and mounted in a chamber in the front of casing 22, and a pointer 24 fixed to a shaft 25 to swing in front of the dial.

A flexible shaft 20 for operating the indicator is driven by a gear 19 which is adapted to mesh with the usual tachometer drive of the engine, so it will be driven at a speed corresponding to the speed of the engine. Shaft 20 terminates at and drives a shaft-section 26 which is journaled in a plate 27 which is secured to a bracket 28 which is rigid or integral with the casing 22 of the indicator. A pinion 29 is secured to the inner end of shaft-section 26 and is driven constantly while the engine is operating.

The pointer 24 is operated through speed reducing gearing by a pinion 31 which is fixed to a vertical shaft 30 which is journaled in the casing 22, so that the movement of the pointer 24 over the scale on the dial 23 will correspond to the pitch changes of the propeller blades. The reduction-gearing between shaft 30, to which pinion 31 is fixed, and the pointer-shaft 25 comprises (Fig. 3) a worm or screw 33 on shaft 31; a worm gear 34 meshing with worm 33 and mounted to rotate on the pointer-shaft 25 which is journaled in the casing 22; a pinion 35 integral with worm gear 34; a gear 36 which is mounted on a shaft 37 journaled in bearings in the gear casing 22 and meshes with pinion 35; a pinion 38 integral or rigid with gear 36; and a gear 39 which meshes with pinion 38 and is secured to the pointer-shaft 25.

Reversible gearing is provided between the engine-driven pinion 29 and the gear 31 for driving the speed reducing gearing for the pitch indicator in opposite directions according to the change effected in the pitch of the propeller blades responsively to the movements of the gear collar 64. This reversible gearing comprises a gear 40 which is journaled in a pair of plates 41 which are pivoted on the hub of pinion 29 and a gear 42 which is also journaled in said hangers or plates. Gear 40 is in constant mesh with pinion 29 and gear 42 is in constant mesh with gear 40. By shifting the plates 41 around the axis of pinion 29, gears 40, 42 may be brought into neutral position so that both gears 40 and 42 will be disengaged from pinion 30 which operates the pitch indicator when the pitch change gearing is idle, or shifted to bring gear 40 into mesh with pinion 30 to drive the indicator gearing in one direction, or shifted to bring gear 42 into mesh with and simultaneously disengaging gear 40 from, pinion 31 to operate the indicator-gearing in the reverse direction. This exemplifies gear mechanism for engaging the indicator gearing to the indicator in either direction from the pinion 29 and the constantly driven engine driven shaft 20.

The handle 21 which controls the gear-collar 64 for the pitch change gearing is also connected to control the reversible gearing for operating the pitch indicator. A bracket 51 (Fig. 2) is secured on the sleeve 43 in which the stem of the handle 21 is mounted and a lower sleeve 52 is fixed in said bracket. A bolt 53 rigidly and removably secures this bracket 51 and sleeves 43, 52 together. A plunger 54 is slidably mounted in lower sleeve 52 and is provided with a lug 55 which extends through a slot in sleeves 43—52 into an annular groove 56 in the stem 46 of handle 21. A sheathed flexible cable 57 has one of its ends fixed to the plunger 54 and its other end extends into the bracket 28 on the gear casing 22 of the pitch indicator, and is secured to a plunger 58. Said plunger is slidable in bracket 28 and is provided with a stem 59 which extends through a lug 60 on a cam slide 61 which is slidably mounted in bracket 28 under the stem. Said slide is provided with a cam slot comprising communicating portions 70, 71 and 72. One of the pivotally movable plates 41 in which gears 40, 42 are mounted is provided with a stud 73 which extends into the cam slot so that longitudinal movement of the slide 61 will swing plates 41 and gears 40, 42. When stud 73 is confined in the portion 71 of the slot, both gears will be in neutral position, or disengaged from pinion 31, and the gearing between pinion 31 and the pointer 24 will be idle. When the stud 73 is in the portion 72 of the cam slot, gear 40 will mesh with pinion 31 and drive the latter from pinion 29. When stud 73 is in portion 72 of the cam slot, gear 40 will mesh with, and gear 42 will be disengaged from pinion 31, so the gearing between pinion 31 and the pointer will be driven in one direction. When the stud 73 is in portion 70 of the cam slot, gear 40 will be disengaged from, and gear 42 will mesh with pinion 31, so the latter will be driven through gears 40, 42 in the reverse direction. The longitudinal movement of the cable 57 and stem 59 is transmitted to the cam-slide 61 through a pair of springs 74 and 75 interposed between washers on the stem 59 and the opposite faces of lug 60 on said slide. By means of these springs, the slide is yieldingly shifted to prevent locking of the gears 40, 42 and pinion 31 as they are engaged. The cam-slide 61 is mounted to slide in a guideway or slot 76 in the bracket 28. A cover plate 77 is secured to the top of bracket 28 to enclose plunger 58, stem 59 and cam-slide 61. This exemplifies mechanism controlled by the handle which controls the pitch change gearing for simultaneously controlling the operation of the pitch indicator in either direction from the constantly running shaft 20, which is driven from the engine in one direction only.

In the controllable propellers of the type in which the engaging gear is manually controlled as in the propeller of the aforesaid Smith patent, there is automatic means for limiting the pitch variation which acts at the end of predetermined high and low pitch changes and this mechanism is independent of the manually controlled gear-collar 64. To cause the pointer 24 of the pitch indicator to cease its movement when the pitch change ceases or at the end of the predetermined pitch limits, while the gear collar 64 remains engaged with the pitch change gearing, a slip-connection is provided between the pointer 24 and its shaft 25 which permits the reduction gearing for the indicator to continue to run after the pitch changes cease. This slip-connection consists of a spring-washer 80 between a screw 81 which is threaded into the front end of shaft 25 and the front of the pointer. Adjustable stops, such as screws 82, are carried by the dial 23 to positively arrest the pointer, if the control handle 21 is not shifted to disengage collar 64 from the pitch change gearing and the indicator is not uncoupled from shaft 20 before the blades reach the predetermined pitch limits. Screws 82 are secured in arcuate slots 83 in the dial so that they may be set to stop the pointer to correspond with the pitch limits provided for in the adjustable automatic pitch limit mechanism. These stops and slip-connections also rectify any slight variations

which result from slight variations in the coupling of the pitch-change gearing and of the indicator drive gearing, because the pointer will be arrested to correspond to the predetermined pitch limits of the blades, at the end of each adjustment of the blades to their high and low limits. This exemplifies mechanism for operating the pitch indicator which is self-correcting when the blades reach the predetermined pitch limits.

The operation of the mechanism will be as follows: Normally, the handle 21 will be in a position to hold the gear collar 64 in its neutral position and the cam-slide 61 in position to hold gears 40 and 42 disengaged from pinion 31, while the propeller and shaft 20 are driven by the engine. When a pitch increase is to be effected the pilot will shift the handle 21 in one direction to cause the appropriate worm on collar 64 to engage and drive the pitch change gearing, and to simultaneously shift through flexible shaft 57 the cam-slide 61 to bring one of the gears 40, 42 into engagement with the pinion 31 so that the reduction gearing of the pitch indicator will be driven to shift the pointer 24. As the pitch of the blades is increased, the pointer 24 will swing to correspondingly indicate the pitch increase on the dial 23. If the blades reach the high pitch limit, while the collar 64 remains engaged, the pointer 24 will strike one of the stops 82 and be arrested to retain the proper pitch indication while the indicator gearing and a portion of the pitch change gearing continue to operate. When the pitch change has been completed the pilot will shift the handle 21 to its neutral position. This will simultaneously disengage gear collar 64 and disengage the gears 40, 42 from the pinion 31 which drives the indicator. When the pitch of the blades is to be decreased the pilot will shift the handle 21 in the opposite direction to cause shaft 47 to simultaneously shift the gear-collar 64 to bring the other worm into engagement with the pitch change gearing carried by the hub and to simultaneously, through flexible shaft 57, shift the cam-slide 61 to bring the other of the gears 40, 42 into engagement with the pinion 31 so that the pitch change gearing will be driven to reverse the movement of the pointer 24 and to correspondingly indicate the degree of pitch decrease. If the pilot does not shift the handle 21 to its neutral position when the blades are shifted to their low-pitch limit, the pointer 24 will be arrested by one of the stops 82 to indicate the minimum pitch of the propeller blades.

In Figs. 11 and 12 there is illustrated a modified form of the invention in which the stem 46' of the handle 21' to which the flexible shaft 57 is connected, is provided with a cam 84 which is adapted to rock an elbow lever 85, one arm of which is normally pressed against the cam by a spring 86. The other arm of the lever is seated in a socket 87 in a plunger 88 which is slidably mounted in the bracket 89 in which the stem 46' is also mounted. The plunger 88 is connected by a flexible connector 90 to a fork 91 (Fig. 12). This fork is pivoted to a bracket 92 which is pivoted to swing around the axis of a pinion 93 which is constantly driven from the flexible engine driven shaft 20. In this form of the invention the pointer 24' has the slip connection with its shaft 94 which is journalled in the indicator case. This pointer moves across a calibrated dial 95. A worm gear 96 is fixed to the pointer shaft 94 and a worm 97 is fixed to a shaft 98 which is journalled in the indicator case. Worm 97 meshes with the worm gear 96 and a gear 99 is fixed to shaft 98. A gear 100 meshes constantly with the pinion 93 and with a gear 101. Gears 100, 101 are mounted in the bracket 92 so that by swinging the bracket either of the gears 100, 101 may be engaged with the gear 99 to selectively shift the pointer of the indicator in either direction according to the pitch changes. In this form of the invention cam 84 shifts the lever 85 and connector 90 to control the movements of the bracket 92 and operation of the indicator gearing from pinion 93.

In Figs. 12 to 14, the invention is exemplified with a pointer 104 which is adapted to move in a rectilinear path across a fixed scale 105. The hub of the pointer 104 is threaded to a screw 106 on a shaft 107 which is journalled in the sides of a casing 108. The hub of pointer 104 has a flattened front portion 109 which engages the front wall of the casing so that it will be held against rotation so the rotation of the screw will move the pointer longitudinally of the shaft 107. A gear 110 is fixed to one end of the shaft 107. This gear is adapted to be driven by reversible gearing comprising constantly driven pinion 93 and gears 100 and 101 which are mounted in bracket 92 which is pivoted to swing around the axis of pinion 93. A shifter rod 91a is adapted to swing the bracket to engage either of the gears 100, 101 and gear 110 on shaft 107. A bar 111 is slidably mounted in the casing 108 above the shaft 107 and carries adjustable stops 112 for limiting the movement of the pointed to the predetermined pitch limits for the pitch limits provided for in the pitch change gearing. These stops are adjustably mounted on bar 111 by bolts 113 which extend through elongated slots in the bar. The bar 111 is normally positioned by a resilient strip 114, which has one of its ends extended into a notch in the bar 111 and its other end fixed to casing 108. This spring permits the bar 111 to be shifted slightly by the hub of the pointer 104 when it engages one of the stops 112. Bar 111 is provided with a yoke 115 which straddles the gear 110. Pins 116 project from the faces of gear 110 and when the bar 111 is shifted in either direction the yoke 115 will engage one of the pins 116 and prevent further rotation of the gear 110. In this form of the invention the pinion 93 is frictionally driven from its shaft 93' so that when gear 110 is arrested by bar 111 the shaft which is continuously driven from the engine may continue to rotate without driving the screw shaft 107.

The invention exemplifies conjointly controlled pitch change gearing and gearing for the pitch indicator which is adapted to be driven from the engine. The invention also exemplifies a pitch indicator in which provision is made for arresting the pointer at the predetermined pitch limits provided for in the pitch change gearing to maintain the correct indications and to permit rectification at the pitch limits for any differential movement resulting from the coupling and uncoupling of the engaging elements for the pitch change gearing and the pitch indicator. Also pitch indicator mechanism which is simple in construction and efficient in operation.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent is:

1. The combination of an element for operating mechanism for changing the pitch of propeller blades, operable by rotation of the propeller, a pitch-indicator, a connection for driving the indicator from the engine, said connection being separate from the pitch-changing mechanism, and means for conjointly controlling said element and said indicator driving connection.

2. The combination of an element for operating mechanism for changing the pitch of propeller blades, operable by rotation of the propeller, a pitch-indicator, a connection for driving the indicator in opposite directions from the engine, said connection being separate from the pitch-changing mechanism, and means for conjointly controlling said element and said indicator driving connection.

3. The combination of an element for operating mechanism for changing the pitch of propeller blades which is operable by rotation of the propeller, a pitch indicator, a connection for operating the indicator in opposite directions from the tachometer of the engine, and means for conjointly controlling said element and said connection.

4. The combination of means for operating mechanism for changing the pitch of propeller blades in opposite directions, operable by rotation of the propeller to increase or decrease the pitch, a pitch indicator, a driving connection for said indicator adapted to be driven from the tachometer of the engine and including reversible gearing, and means for conjointly controlling said operating means and said reversible gearing.

5. The combination of an element for operating power driven mechanism for changing the pitch of propeller blades, a pitch indicator, mechanism for operating the indicator proportionately to the pitch changes, means for conjointly controlling said element and indicator operating mechanism and means for limiting the indicator for predetermined pitch changes independently of said operating mechanism.

6. The combination of means for operating power driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism for operating the indicator in opposite directions proportionately to the pitch changes and adapted to be driven by the engine, means for conjointly controlling said mechanisms, and means for limiting the indicator to predetermined pitch changes independently of said means for operating the pitch change mechanism.

7. The combination of means for operating power driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism, separate from the pitch changing mechanism, for operating the indicator proportionately to the pitch changes and adapted to be driven by the engine, means for conjointly controlling said operating means and said mechanism, and means for limiting the indicator to predetermined limits of pitch changes independently of the operating means.

8. The combination of means for operating power driven mechanism for changing the pitch of propeller blades, a pitch indicator, engine driven mechanism, separate from the pitch changing mechanism, for operating the indicator proportionately to the pitch changes, means for conjointly controlling said operating means and mechanism, adjustable stops for the indicator, and a slip connection for permitting the indicator to be arrested by the stops to correspond to the predetermined limits of pitch adjustment of the blades while the indicator operating mechanism continues to run.

9. The combination of means for operating engine driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism separate from the pitch changing engine driven mechanism for operating the indicator in opposite directions proportionately to the pitch-changes, means for conjointly controlling said mechanisms, adjustable stops for the indicator, and a slip connection for permitting the indicator to be arrested by the stops to correspond to the predetermined limits of pitch adjustment of the blades while the indicator operating mechanism continues to run.

10. The combination of means for operating power driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism for operating the indicator proportionately to the pitch changes and adapted to be driven by the engine, and means for automatically synchronizing the indicator to correspond to predetermined limits of pitch adjustment of the blades.

11. The combination of means for operating power-driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism for operating the indicator from the engine separately from the pitch change mechanism and in accordance with pitch-changes, comprising reduction gearing and reverse-gearing to shift the indicator for operating the reduction gearing in opposite directions, and a control device for the indicator-operating and the pitch-change mechanisms connected to control the reverse gearing.

12. The combination of means for operating power-driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism for operating the indicator from the tachometer of the engine in accordance with pitch-changes and comprising reduction gearing and reverse gearing for shifting the indicator in opposite directions, and a control device for the indicator-operating and the pitch-changing mechanisms connected to control the reverse gearing.

13. The combination of means for operating power-driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism, separate from the pitch change mechanism, for operating the indicator from the engine, a control handle, a flexible control connection between the handle and the pitch changing mechanism, and a flexible control connection between the handle and the mechanism for operating the indicator.

14. The combination of means for operating power-driven mechanism for changing the pitch of propeller blades in either direction, a pitch indicator, mechanism for operating the indicator in accordance with pitch changes, comprising reduction gearing and reverse gearing, a pivotal mount for the reverse gearing, and a control device connected to said mount and to said operating-mechanism to simultaneously control the operation of the indicator and to control said operating-mechanism.

15. The combination of means for operating power-driven mechanism for changing the pitch of the propellers in either direction, a pitch indicator, comprising a rectilinearly movable pointer, mechanism for operating the indicator in accordance with pitch changes comprising reduc-

tion gearing, reverse gearing, and a screw thread for shifting the pointer, and means for simultaneously controlling the pitch-change and indicator-operating mechanisms comprising means for limiting the movements of the pointer, to correspond with predetermined pitch limits independently of the operating means.

16. The combination of means for operating power-driven mechanism for changing the pitch of the propellers in either direction, a pitch indicator, comprising a rectilinearly movable pointer, mechanism for operating the indicator from the engine responsively to pitch changes comprising reduction gearing, reverse gearing and a screw-thread for shifting the pointer, a movable bar provided with stops for arresting the pointer, and means operable by the bar for limiting the movements of the pointer, to correspond with predetermined pitch limits.

17. The combination of means for operating power driven means for varying the pitch of propeller blades in either direction, a pitch indicator, mechanism for operating the indicator from the engine responsively to pitch changes, comprising gearing for operating the indicator in opposite directions, a control device connected to conjointly control the pitch change gearing in either direction and to control the operation of the indicator in opposite directions, and means for arresting the indicator at predetermined limits, independently of the control device.

18. The combination with a variable pitch propeller, its propeller shaft, shaft-operated means for changing the pitch of the propeller and a controlling means for said pitch-changing means, of a pitch indicator comprising an indicating member, a driving connection from the propeller shaft to the indicating member independent of said pitch changing means, and means governed by said controlling means for causing said driving connection to selectively drive said indicating member in opposite directions.

19. In combination, a variable pitch propeller, a propeller shaft, shaft-operated means for changing the pitch of the propeller, and a pitch indicator comprising an indicating member, two driving connections from the propeller shaft to said indicating member independent of said pitch changing means, one of said driving connections tending to drive the indicating member in one direction and the other of said driving connections tending to drive the indicating member in the opposite direction, a clutch included in each of said driving connections, and means for selectively engaging said clutches dependent upon the direction of operation of said pitch-changing means.

20. In combination, a variable pitch propeller, a propeller shaft, means for changing the pitch of the propeller, a controlling means for the pitch-changing means movable in opposite directions for respectively effecting an increase or decrease in the pitch of the propeller, and a pitch indicator comprising an indicating member, two driving connections from the propeller shaft to said indicating member, one of said driving connections tending to drive the indicating member in one direction and the other of said driving connections tending to drive the indicating member in the opposite direction, a normally disengaged clutch included in each of said driving connections, and means governed by the direction of movement of said controlling means for selectively engaging said clutches.

21. The combination with a power source, a mechanism, and a controllable operating means for operating said mechanism in reverse directions by means of power derived from said power source, of an indicator, controllable operating means independent of said first operating means for operating said indicator in reverse directions by means of power derived from said power source, and a common means for simultaneously controlling both operating means.

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