Dec. 29, 1953 G. ÖSTERGREN 2,664,167

PROPELLER PITCH CHANGE MECHANISM

Filed April 25, 1949 2 Sheets-Sheet 1

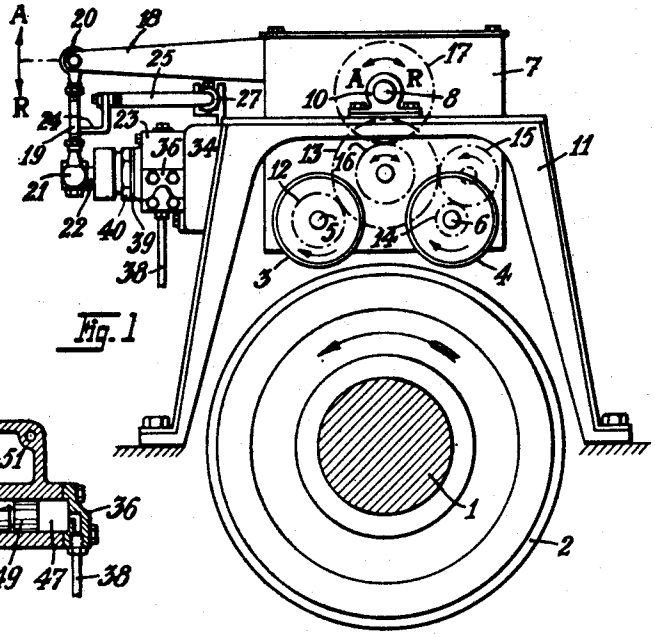
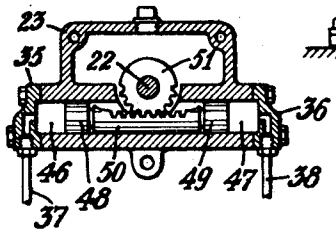


Fig. 1

Fig. 3



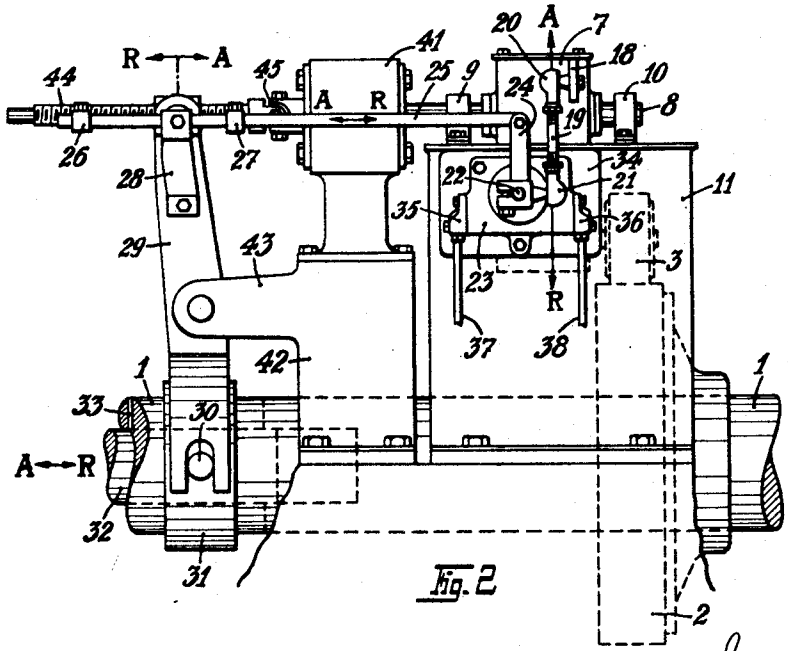


Fig. 2

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PROPELLER PITCH CHANGE MECHANISM

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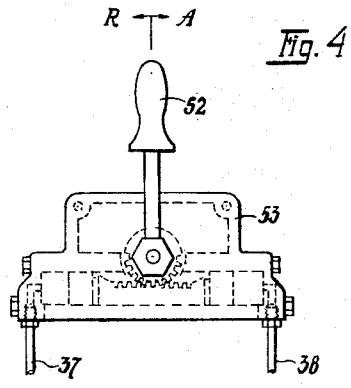

Fig. 4

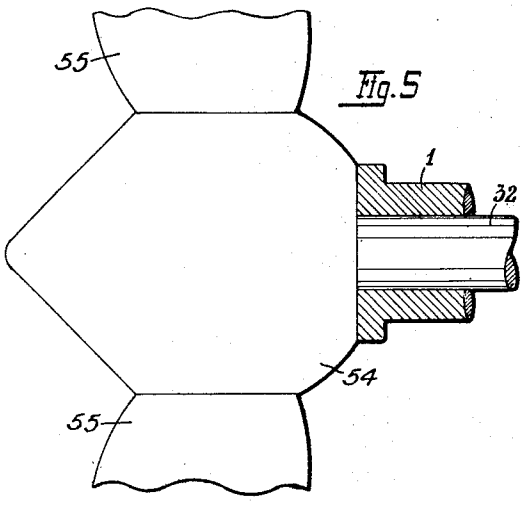

Fig. 5

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Patented Dec. 29, 1953

2,664,167

UNITED STATES PATENT OFFICE

2,664,167

PROPELLER PITCH CHANGE MECHANISM

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Application April 25, 1949, Serial No. 89,452

Claims priority, application Great Britain January 27, 1949

3 Claims. (Cl. 170—160.28)

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This invention relates to a device for varying the pitch of rotatable propeller blades, especially for water-craft.

One object of the invention is to derive the necessary power from the propeller shaft and to obtain an automatic disengagement of the coupling to the propeller shaft at the end positions of the propeller blades.

Another object of the invention is to provide a simple and reliably operating device for varying the pitch of rotatable propeller blades.

Further objects and advantages will appear from the following decription and the accompanying drawing, in which:

Figure 1 is an end elevation of a device according to one form of the invention, showing a section through the propeller shaft.

Figure 2 is a side elevation of the device,

Figure 3 is a vertical section through a fluid pressure operating device in a larger scale.

Figure 4 is an elevational view of a hand-actuated operating device. Figure 5 is a view partly in section of the end of the propeller shaft with a portion of the propeller.

Referring to the drawing, 1 is a propeller shaft of a watercraft, on which propeller shaft there is mounted a friction wheel 2, against which friction wheels 3, 4 can be alternately pressed. The friction wheels 3, 4 are mounted on pivots 5, 6 which are arranged in a reversing gear housing 7. The reversing gear housing is so mounted that it can be rocked about a rotatable intermediate shaft 8, which is mounted in bearings 9, 10 on a support 11. The reversing gear housing comprises toothed wheels 12, 13, 14, 15, 16 and 17 for the purpose of transmitting the rotational movement of the propeller shaft to the intermediate shaft. Secured to the reversing gear housing is an arm 18 which is connected through a link 19 and two ball joints 20, 21 to a shaft 22 of a fluid pressure operating device 23 for rocking the reversing gear and adjusting the automatic device for disengaging the friction wheels. One end of an angle arm 24 of the automatic device is rigidly connected to the shaft 22, and is hingedly connected at its other end to the operating rod 25 which is arranged substantially parallel to the intermediate shaft 8. The operating rod supports two limit stops, 26, 27 while a lever 29 and an arm 28 connected to the lever are guided between these stops. The lower end of the lever 29 is forked and is in engagement with pins 30 provided on a driving ring 31, which is arranged so as to be displaceable along the propeller shaft. The said driving

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ring surrounds another driving ring, not shown in the drawings, which is so mounted as to be rotatable with the propeller shaft in the driving ring 31 and is connected to an adjustable rod 32 by a key, not shown in the drawings, which is guided in a slot 33 in the propeller shaft 1. 34 is a plate which is mounted on the support 11 and supports the fluid pressure operating device 23. 35, 36 are two cylindrical covers of the operating device, while 37, 38 are two pressure pipes. 39 is a packing and 40 an adjusting nut. 41 is a housing which contains a flange (not shown in the drawings) of the intermediate shaft 8 around which flange, ball thrust bearings are arranged on either side to prevent axial movement of the intermediate shaft. The housing 41 is mounted on a support 42 which is arranged, in the same way as the support 11, on a fixed part of the watercraft. The lever 29 is rockably connected to an arm 43. The intermediate shaft 8 has a threaded portion 44 provided with a left-hand thread and passing through the upper end of the lever 29. The intermediate shaft and the threaded portion are connected together by a universal joint 45. 46, 47 are two cylinders in which pistons 48, 49 are arranged. 50 is a toothed rod connected with these pistons. 51 is a toothed wheel.

A hand-actuated operating device 53 is placed preferably on the navigation bridge and is constructed substantially in the same manner as the operating device 23, to which it is connected by the pipes 37, 38. By turning the handle 52 in the directions A or R the fluid, such as oil, passes through the pipes 37, 38 and displaces the toothed rod 50. The handle may be kept normally in upright position by being spring or weight loaded.

The hub 54 is fastened to the rear end of the hollow propeller shaft 1, and the propeller blades 55 are journalled in the hub 54 and connected with the rod 32, by means of which they may be angularly adjusted.

The device according to the invention operates in the following manner:

By actuation the hand lever 52 of the fluid pressure operating device 53 in the direction A the fluid in the pressure pipe 37, for example oil, is forced into the cylinder 46 of the operating device 23, whereby the piston 48 and the rod 50 are displaced. The rod 50 is in engagement, by means of teeth, with the shaft 22 arranged at right angles to said rod, which shaft is in engagement with the teeth of the rod through a toothed wheel 51. The introduction of pres-

sure fluid into the operating device 23 therefore causes rotation of the shaft 22. By rotation of the shaft 22 to the left, the arm 19 is lifted in the direction A, whereby the reversing gear housing 7 is rocked about the intermediate shaft 8 through the arm 18, so that the friction wheel 4 is pressed against the friction wheel 2 rotating with the propeller shaft 1. At the same time the operating rod 25 is shifted together with the stops 26, 27 mounted thereon to the left in the direction A through the arm 24. Owing to the pressing of the friction wheel 4 against the rotating friction wheel 2, the rotational movement of the propeller shaft is transmitted with the necessary ratio to the intermediate shaft 8 and the threaded position 44 thereof through the toothed-wheels 14, 15, 13, 16 and 17. Since the portion 44 has a left-hand thread, that end of the lever 29 which is screwed thereon is screwed in the opposite direction to the operating rod 25, this direction being, however, also designated by A, whereby, owing to the rocking of the lever 29, the adjustable rod 32 receives a movement in the direction of the propeller, that is in the direction A, by displacement of the driving ring 31, and the propeller blades are rotated into the desired position for forward travel. By actuation of the other piston 49 in the fluid pressure operating device 23 through the pressure pipe 38, the shaft 22 is rotated to the right, whereby the arm 19 is guided downwardly in the direction R, and the reversing gear housing is rocked through the arm 18 in the other direction and consequently the other friction wheel 3 is pressed against the rotating friction wheel 2. The rotational movement is transmitted to the intermediate shaft and the threaded portion thereof in this case through the toothed wheels 12, 13, 16 and 17. Since only two toothed wheels 13 and 16 mounted on a common axis are provided between the toothed wheel 12 mounted on the pivot 5 and the toothed wheel 17 mounted on the intermediate shaft, the intermediate shaft is rotated in the opposite direction to that in which it would be rotated through the intermediate toothed wheels 15, 16 and 13 despite the fact that both friction wheels 3, 4 rotate in the same direction.

Preferably, an indicator is provided in the wheel house and this indicator may be coupled, for example, with the lever 29 and thus indicates the pitch of the propeller. As soon as the propeller blades have carried out the desired rotation, which can be seen from the indicator, the reversing gear and consequently the automatic device for disengaging the friction wheels is returned into the central position by actuation of the operating device by means of the aforesaid hand lever, in which position neither the friction wheel 3 nor the friction wheel 4 is in contact with the friction wheel 2. If for any reason, upon actuation of the operating device 23, the indicator should be overlooked, or if maximum rotation of the propeller blades should be desired, when this maximum setting of the propeller blades for forward or reverse travel is reached the automatic device for disengaging the friction wheels automatically comes into operation, the reversing gear housing being guided into its inoperative central position, whereby the rotation of the intermediate shaft ceases and damage to the plant is avoided.

The automatic device for disengaging the friction wheels acts in the following manner:

When the intermediate shaft 8 and the threaded portion 44 thereof have been set in rotation for forward travel in the manner described, by the friction wheel 2 in conjunction with the friction wheel 4, and the operating rod 25 together with the steps 26, 27 thereon is moved in the direction A, then, provided that the reversing gear housing has not already been manually brought into the central position from the wheel house, the upper end of the arm 28 connected to the lever 29 reaches the stop 27 and returns the operating rod, and consequently also the reversing gear, into the central position, so that no further rotation of the intermediate shaft 8 takes place. When the intermediate shaft rotates in the other direction, the end of the arm 28 is guided against the other stop 26 which is moved into the necessary position, whereby the arm 28, during its further movement in the direction R, after reaching the stop 26, drives the said stop together with the operating rod and the reversing gear into their central positions.

What I claim is:

1. In combination, a propeller shaft, angularly adjustable propeller blades mounted on one end thereof, a rod passing through said shaft and connected to the blades to adjust the same when moved longitudinally, a rocking lever connected with the rod for moving the same longitudinally, a rotatable intermediate shaft having a threaded portion, a nut on the rocking lever threaded on to said portion of the intermediate shaft, a driving friction wheel on the propeller shaft for rotating the intermediate shaft, a gear housing rockingly mounted on the intermediate shaft, and a gear mechanism mounted in said gear housing in driving connection with the intermediate shaft, said gear mechanism comprising two friction wheels alternately engaging said driven friction wheel in two operative end positions of the gearing housing for driving the intermediate shaft in opposite directions.

2. In combination, a propeller shaft, angularly adjustable propeller blades mounted on one end thereof, a rod passing through said shaft and connected to the blades to adjust the same when moved longitudinally, a rocking lever connected with the rod for moving the same longitudinally, a rotatable intermediate shaft having a threaded portion, a nut on the rocking lever threaded on to said portion of the intermediate shaft, a driving friction wheel on the propeller shaft for rotating the intermediate shaft, a gear housing rockingly mounted on the intermediate shaft, a gear mechanism mounted in said gear housing in driving connection with the intermediate shaft, said gear mechanism comprising two friction wheels alternately engaging said driven friction wheel in two operative end positions of the gearing housing for driving the intermediate shaft in opposite directions, a movement transmitting mechanism connected with said gear housing for turning the same, two shoulders on said movement transmitting mechanism located in the path of the rocking lever and at opposite sides of the lever, and means on the lever for actuating said shoulders and for turning thereby the gear housing from an operating position to an inoperative position.

3. In combination, a propeller shaft, angularly adjustable propeller blades mounted on one end thereof, a rod passing through said shaft and connected to the blades to adjust the same when moved longitudinally, a rocking lever connected with the rod for moving the same longitudinally,

a rotatable intermediate shaft having a threaded portion, a nut on the rocking lever threaded on to said portion of the intermediate shaft, a driving friction wheel on the propeller shaft for rotating the intermediate shaft, a gear mechanism mounted in said gear housing in driving connection with the intermediate shaft, said gear mechanism comprising two friction wheels alternately engaging said driven friction wheel in two operative end positions of the gearing housing for driving the intermediate shaft in opposite directions, and a fluid operated servo-motor for rocking said gear housing, comprising a piston connected with the housing.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
571,745	Brinkman	Nov. 24, 1896
703,660	Laval et al.	July 1, 1902
1,481,706	Goodwin	Jan. 22, 1924
1,929,435	McCollough	Oct. 10, 1933

FOREIGN PATENTS

Number	Country	Date
451,280	France	Feb. 10, 1913