

July 1, 1924.

1,499,716

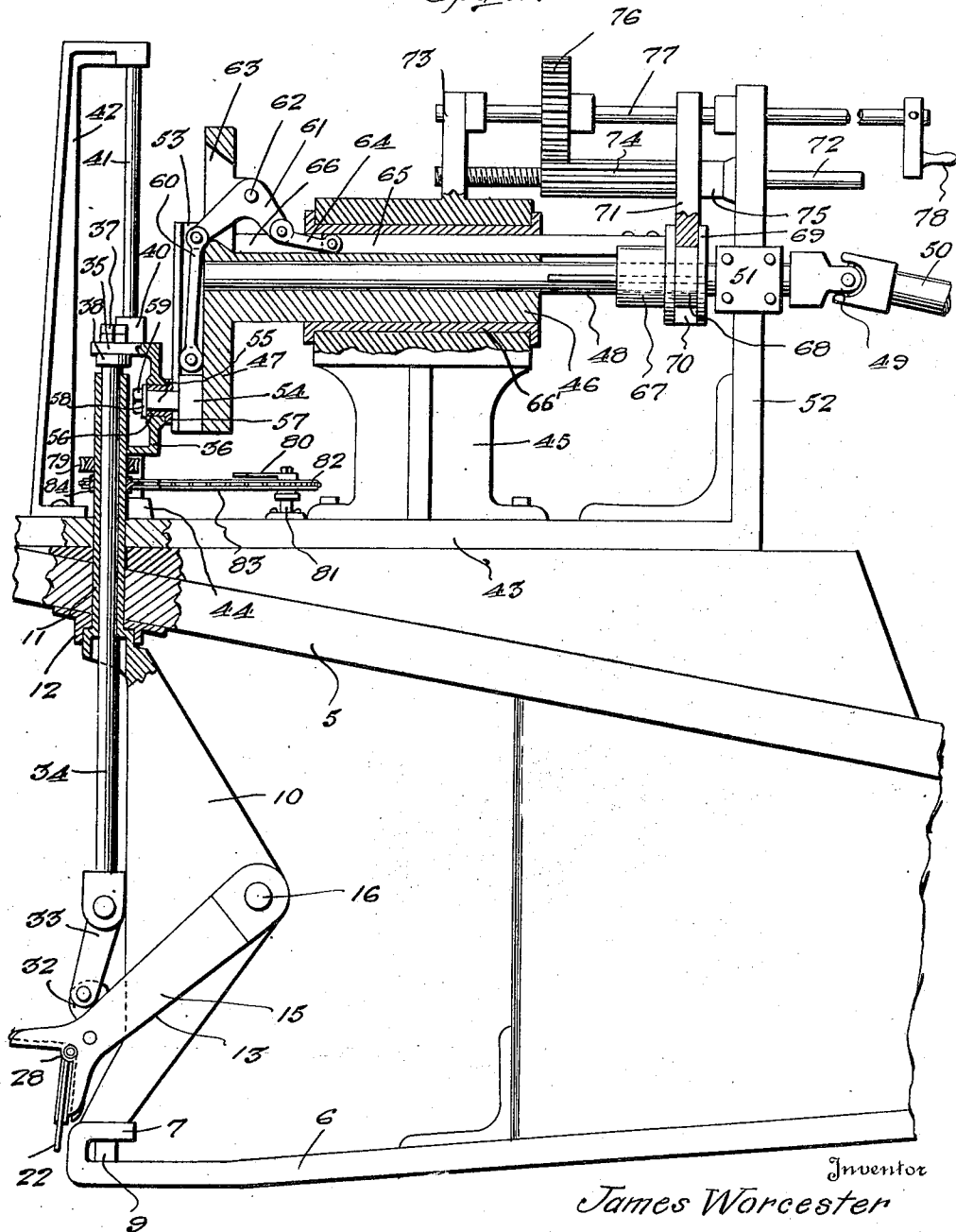
J. WORCESTER

PROPELLING MECHANISM FOR SHIPS

Filed March 27, 1922

2 Sheets-Sheet 1

Fig. 1.



Inventor

James Worcester

By *Johnston & Co.*

Attorney

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Fig. 2.

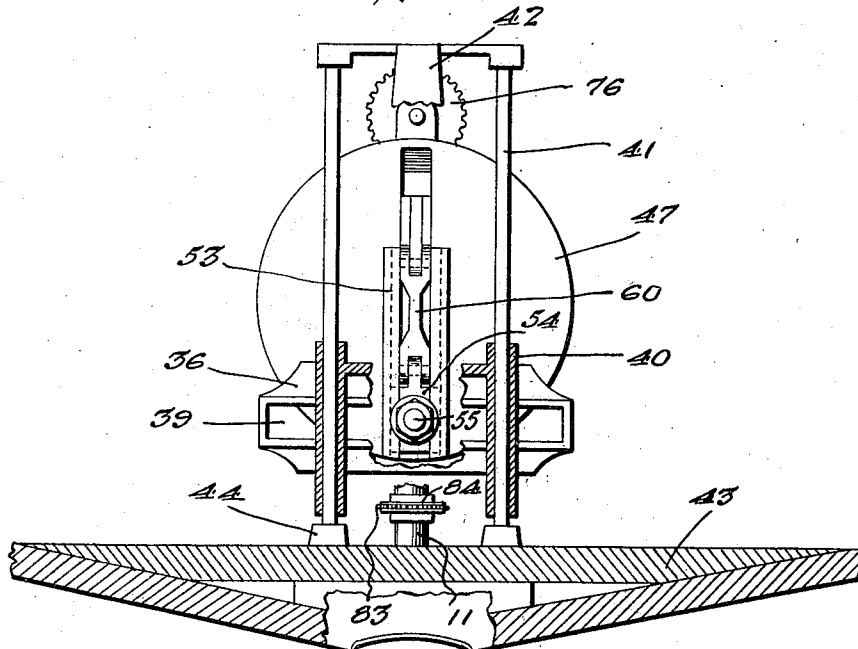


Fig. 4.

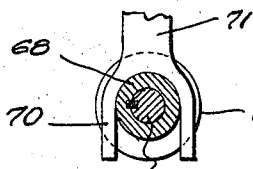
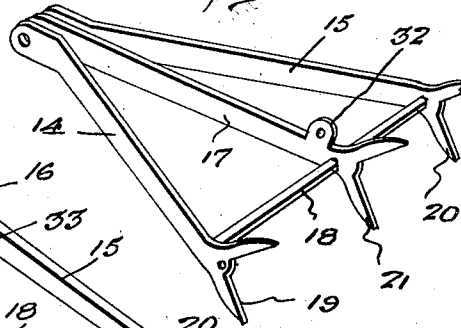
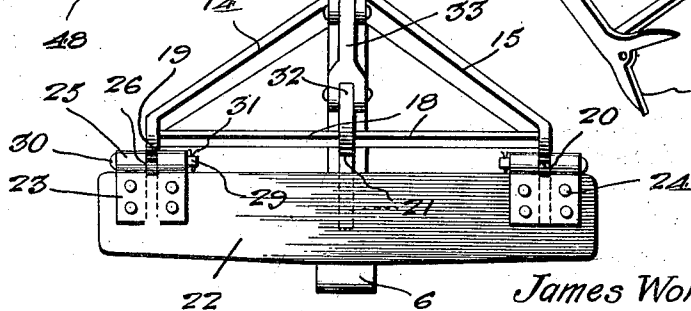


Fig. 3.



Inventor

James Worcester

Delhurst & Co.
Attorney

UNITED STATES PATENT OFFICE.

JAMES WORCESTER, OF WALTHAM, MASSACHUSETTS.

PROPELLING MECHANISM FOR SHIPS.

Application filed March 27, 1922. Serial No. 547,062.

To all whom it may concern:

Be it known that I, JAMES WORCESTER, a citizen of the United States, residing at Waltham, county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Propelling Mechanism for Ships, of which the following is a specification.

This invention relates to propelling mechanisms for ships and more particularly to certain improvements in propelling mechanisms of the oscillating type described in my prior Patent No. 1,390,283, granted May 31, 1921.

The primary purpose of the present invention is to effect certain important improvements in the mechanism for oscillating the propeller frame and blade, which will more particularly adapt the invention for application to boats or ships intended to travel at a comparatively high rate of speed.

Another important purpose of the present invention is to provide novel means for varying the stroke or angle of oscillation of the propeller or propeller frame.

A still further purpose of the invention is to effect certain important improvements in the construction of the propeller frame and in the method of attaching the propeller blade thereto.

Further purposes and advantages of the invention, as well as the details of construction, combination and arrangement of parts, will be apparent from the following description considered in connection with the accompanying drawings, wherein,

Fig. 1 is a view partly in section and partly in side elevation showing the stern member of the vessel equipped with my invention,

Fig. 2 is an end view partly in section of the construction shown in Fig. 1; and

Fig. 3 is a perspective view of the propeller frame and blade.

Fig. 4 is a detailed view partly in section of a shifting device forming part of the invention.

Referring more particularly to the drawings, numeral 5 designates the keelson or overhanging stern of a vessel, while 6 designates the skeg shoe thereof. This shoe 6 has the outer end thereof turned back, as at 7, and apertured to provide a step bearing for a short spindle 9 formed integral with

the lower end of a casing 10. An elongated bearing sleeve 11, formed integral with the upper end of the casing 10, extends upwardly into the vessel through the overhanging stern 5, being passed through a suitable out-board bearing 12, especially constructed to prevent the entrance of water into the vessel around the said sleeve.

As in my prior patent, previously referred to, this casing 10 with its spindle 9 and sleeve 11 mounted as shown, constitutes a rotatable support for an oscillating propeller frame designated generally by the numeral 13. In the present instance, this frame 13 comprises a pair of outer rearwardly converging arms 14 and 15 having the inner ends thereof engaging opposite sides of the casing 10 and pivotally attached thereto by means of a bolt 16 passing through the casing. This bolt 16 also serves to support the inner end of an intermediate arm 17, which passes into the casing 10 between the side walls thereof. Adjacent its outer end, the arm 17 is integrally connected with the arms 14 and 15 through the medium of suitable braces 18.

Each of the arms 14, 15 and 17 has the outer end thereof forked as indicated, respectively, by the numerals 19, 20 and 21, and it should be noted here that the branches of the fork 21 are spaced further apart than the branches of the forks 19 and 20. The purpose of this particular construction will be hereinafter explained.

Numeral 22 designates a relatively thin flat propeller blade having suitable hinge straps 23 and 24 secured thereto for the purpose of hinging the blade to the propeller frame 13. Each of these straps is preferably constructed from a single sheet of metal of suitable dimensions bent upon itself to provide a tubular portion 25 and opposing plate-like portions 26, the latter being riveted to opposite sides of the blade with the tubular portion 25 projecting beyond the rear edge of the blade in parallel relation therewith. These tubular portions 25 are slotted as at 26 to accommodate therein the apertured crotch portions 27 and 28 of the forks 19 and 20, suitable pins 29 being then passed through the bearings 25 and through the apertures in the said crotch portions to establish pivotal connection between the blade and the arms 14 and 15. These pins

29 are each preferably equipped with a head 30 at one end and with a cotter pin 31 at the opposite end to facilitate removal thereof when it is desired to detach the blade from the frame.

The branches of the fork 20 serves as intermediate supports for the blade 22 and are spaced further apart than the branches of the forks 19 and 20 in order to permit of a limited flexing or bowing of the blade by pressure of the water thereagainst, as it has been found that such flexion of the blade adds materially to the propelling efficiency thereof. Furthermore, it will be understood that, when an extremely long blade is used, I may provide a plurality of intermediate forks 20 to give the necessary support to the blade intermediate its points of attachment to the frame.

It should be noted here that the plate-like portions 26 of the hinge-straps 23 and 24 overlies a considerable area of the blade and are so located as to receive the impact with the branches of the forks 19 and 20 during oscillation of the blade, whereas, in my former patent, this impact was borne directly by the blade itself. A still further advantage of this particular method of mounting the blade resides in the fact that the hinge-straps 23 and 24 or, to be exact, the plate portions 26 are adapted, in the oscillation of the blade, to lie against and engage the full length of the branches of the forks 19 and 20, instead of engaging only the tips of the forks as in my prior patent and in other previous constructions known to me.

At the intersection of the arm 17 and the braces 18, the propeller frame is provided with a lug 32 to which is attached one end of a connecting rod 33 having its opposite end connected to the lower extremity of a vertically disposed shaft 34 mounted for sliding or reciprocal movement in the sleeve 11. The upper end of this shaft 34 projects upwardly through an opening in a horizontal extension 35 formed integral with a cross head 36 and is threaded to receive thereon suitable fastening nuts 37 which engage the upper surface of said extension to cause the shaft 34 to move vertically therewith. Immediately below said extension 35, the shaft 34 is provided with a suitable abutment in the form of a collar 38 which engages the lower surface of the extension. It will thus be apparent that the nuts 37 and collar 38, while connecting the shaft to the cross head to reciprocate therewith also permit the said shaft to have an independent rotary motion as is necessary in swinging the propeller frame to steering and reversing positions.

The aforementioned cross head 36 is slotted, as at 39, and is also provided with vertically disposed tubular bearing sleeves

40. These sleeves 40 are mounted to slide vertically on a pair of upright guides 41 which are secured, at their upper ends, in suitable bearings carried by a frame 42, rising from the bed plate 43, and have their lower ends disposed in suitable bosses 44, preferably cast integral with said bed plate.

A main bearing, designated by the numeral 45, is mounted centrally on the bed plate 43 and serves to support therein an elongated hub 46 carried by a rotary face plate or disk 47. Received within this hub and keyed or otherwise secured thereto is a shaft 48, which is coupled, by means of a universal joint 49, with the engine shaft 50. Adjacent the universal joint 49, the shaft 48 passes through a suitable bearing 51 carried by an upright standard 52 preferably formed integral with the bedplate 43. It will thus be seen that rotation of the engine shaft 50 will, through the medium of the shaft 48, impart corresponding movement to the hub 46 and face plate or disk 47.

The face plate 47 is equipped with a suitable guide 53 in which is mounted for sliding movement a block 54 having a crank pin 55 formed integral therewith. This pin 55 extends into the slot 39 of the cross head and is provided with a revoluble sleeve 56 for engaging the walls of the slot. The pin is retained in the slot by confinement of the upper and lower edges of the slot between a flange 57 formed on one end of the sleeve 56 and a washer 58 abutting the opposite end of the sleeve and held thereto by a nut 59 threaded on the pin 55.

From the foregoing, it will be apparent that the shaft 48 constitutes a fixed center about which the pin 55 is movable during rotation of the face plate 47 and, in order to vary the stroke or angle of oscillation of the propeller frame 13, I provide means for adjusting the position of the pin 55 with respect to the said fixed center or shaft 48. To this end, one extremity of the block 54 is connected, by a link 60, to one arm of a bell crank lever 61. This lever 61 is pivoted, as at 62, to operate in a slot 63 in the face plate 47 and has the remaining arm thereof connected, by a link 64, to one end of a rod 65 which is mounted to slide in a slot 66 formed in the hub 46. The remaining end of the rod 65 is secured to the hub 67 of a pulley 68 which is keyed or otherwise fixed to the shaft 48 to rotate therewith. The hub 46 is preferably provided with a flange sleeve 66' fixed to the rod therewith. The purpose of this sleeve is to provide a smooth surface after contact with the main bearing 45 and to prevent the oil in lubricating said main bearing from entering the slot 66 and interfering with the operation of rod 65.

Received between the flanges 69 of the

pulley 68 is the forked end 70 of a vertically disposed shifting member 71. A shaft, 72, passing loosely through an intermediate portion of the member 71 has one end thereof 5 journaled for sliding and rotary movement in the standard 52 and the opposite end thereof threaded through an opening in a short standard 73 rising from the top or cap portion of the bearing 45. The last 10 mentioned end of the shaft 72 is preferably provided with a very fine thread, so as to more securely hold the shaft against independent actuation by reason of the shocks and jars transmitted thereto in the actuation 15 of the propeller. The intermediate portion of the shaft 72 is formed to provide an integral elongated pinion 74 against one end of which the shifting member 71 is held by means of a nut 75. The pinion 74 meshes 20 with the pinion 76 fixed to a shaft 77 journaled at one end in the standard 73 and at the opposite end in the standard 52. This shaft 77 is provided with a hand crank 78. It will thus be seen that rotation of the 25 shaft 72 by operation of the crank 78 will, through the medium of the threaded connection of the shaft with the standard 73 cause the shaft to move in its axial direction, thus effecting a sliding movement of the 30 pulley 68 and the rod 65. This movement of the rod 65 is transmitted through the bell crank lever 61 and its connections, to the block 54, thus moving the said block toward or away from the fixed center or shaft 48 35 dependent upon the direction of movement of the shaft 72. This adjustment of the pin 55 with respect to a fixed center will vary the diameter of the circle described by the pin and thus regulates, through the medium 40 of the cross head 36 and shaft 34, the stroke or angle of oscillation of the frame 13.

From the foregoing, it is apparent that the propulsion of the vessel is effected by the oscillation of the frame 13 and the blade 45 22 through the medium of the elements 34, 55, 47, 48 and 49, while steering or reversing of the vessel is effected by rotating the casing 10 to swing the frame 13 horizontally in the arc of a circle. This rotation of the 50 frame 10 may be conveniently effected by providing the sleeve 11 with a worm wheel 79 adapted to be actuated by a suitable worm (not shown). It may also be desirable to provide some means for readily 55 ascertaining the exact position of the propeller and to this end I suggest the provision of a pointer 80 fixed to a vertically disposed rotatable shaft 81 equipped with a chain wheel 82, connected by a chain 83, 60 with a second chain wheel 84 fixed to the sleeve 11. This pointer 80 is so fixed to the shaft 81 as to always point in the same direction as the intermediate arm 17 of the propeller frame and thus serves to accurately 65 indicate the position of the latter.

Having thus fully described my invention, I wish it to be understood that I am not to be limited to the exact construction, combination and arrangement of parts herein disclosed, as it is obvious that various modifications could be resorted to within the 70 scope of the appended claims.

What I claim as my invention, is:

1. In combination, an oscillatable propeller frame, an operating member connected 75 therewith and movable in a circular path, and means for adjusting said member with respect to a fixed center to vary the stroke or angle of oscillation of the frame.

2. In combination, a swinging propeller 80 frame, a swinging propeller blade carried thereby, a member connected with said frame to impart swinging movement thereto, said member being movable around a fixed center and means for adjusting the position of 85 the member with respect to said center to vary the stroke or angle of oscillation of the frame.

3. In combination, a swinging propeller 90 frame, a swinging propeller blade carried thereby, a member connected to said frame to impart oscillating movement thereto, means for revolving said member about a 95 fixed center, and means for adjusting the position of the member with respect to said center.

4. In combination, a propeller, an operating member connected to the propeller to impart oscillating movement thereto, said 100 member being movable around a fixed center to effect oscillation of the propeller and adjustable to a dead-center position to effect stoppage of the propeller.

5. In combination, a propeller, an operating member connected therewith, means for 105 moving said member around a fixed center to effect oscillation of the propeller, and means for moving said member to a dead-center position to effect stoppage of the 110 propeller.

6. In combination an oscillatable propeller, a crank pin connected therewith and 115 revoluble about a fixed center, and means for adjusting the position of the crank pin with respect to said center to vary the stroke or angle of oscillation of the propeller.

7. In combination, an oscillatable propeller, a member revoluble about a fixed 120 center, means connecting the propeller and member, operable by movement of the latter, to effect oscillation of the propeller, means for revolving said member and means for 125 adjusting the position of the member with respect to the fixed center to vary the stroke or angle of oscillation of the propeller.

8. In combination, an oscillatable propeller, a member revoluble in a circular 130 path about a fixed center and adjustable with respect to said center to vary the di-

ameter of the circle described thereby and means operable by movement of said member to effect oscillation of the propeller.

9. In combination, an oscillatable propeller, a crank pin revoluble about a fixed center and adjustable with respect to said center to vary the diameter of the circle described thereby, and a reciprocal connection extending between said propeller and pin.

10. In combination, an oscillatable propeller, a member revoluble in a circular path about a fixed center and adjustable with respect to said center to vary the diameter of the circle described, and a reciprocal shaft connected at one end to said member and at the opposite end to said propeller.

11. In combination, a propeller mounted for oscillating movement, a member revoluble about a fixed center connected to the propeller to oscillate the same, a finely threaded screw, a traveler having threaded engagement with said screw, and adjustable thereon, and means connecting the traveler to the said member to adjust the position of the latter with respect to the fixed center dependent upon the adjustment of the traveler.

12. The combination of a rotary face plate, a crank pin adjustable thereon, and means for shifting the position of said pin comprising a finely threaded screw, a traveler having threaded engagement with said screw and adjustable thereon, and means connecting the traveler to the crank pin.

13. The combination of a rotary face plate, a crank pin adjustable thereon, a finely threaded screw, a traveler having threaded engagement with said screw and adjustable thereon, gear teeth formed on said traveler, a driving gear meshing with said teeth, and means connecting the traveler to the crank pin to vary the position of the latter dependent upon adjustment of the traveler.

14. The combination of a face plate, a ro-

tary shaft connected thereto, a crank pin adjustable on the face plate, a sleeve slidable on said shaft, means connecting the sleeve to the crank pin to vary the position of the latter according to the movement of the sleeve, and means for moving said sleeve.

15. An arrangement according to claim 14 wherein the means connecting the sleeve to the crank pin comprises a pivotally mounted bell crank, means connecting one arm of the bell crank to the said crank pin, and means connecting the other arm of the bell crank to the said sleeve.

16. An arrangement according to claim 14 in which the means connecting the sleeve to the bell crank comprises a pivotally mounted lever, a rod rigidly connected to said sleeve, a link connecting said rod to one arm of the bell crank, and means connecting the other arm of the bell crank to the said crank pin.

17. An arrangement according to claim 14 wherein the means connecting the sleeve to the crank pin comprises a pivotally mounted bell crank, a link connecting one arm of the bell crank to the said crank pin, and means connecting the other arm of the bell crank to the said sleeve.

18. An arrangement according to claim 14 wherein the means for moving said sleeve comprises a finely threaded screw, a traveler having threaded engagement with said screw, and adjustable thereon, and means connecting the traveler to the said sleeve.

19. An arrangement according to claim 14 in which the means for moving the sleeve comprises a finely threaded screw, a traveler having threaded engagement with said screw and adjustable thereon, gear teeth formed on the traveler, a drive gear meshing with said teeth, and means connecting the traveler to the said sleeve.

In testimony whereof I hereunto affix my signature.

JAMES WORCESTER.