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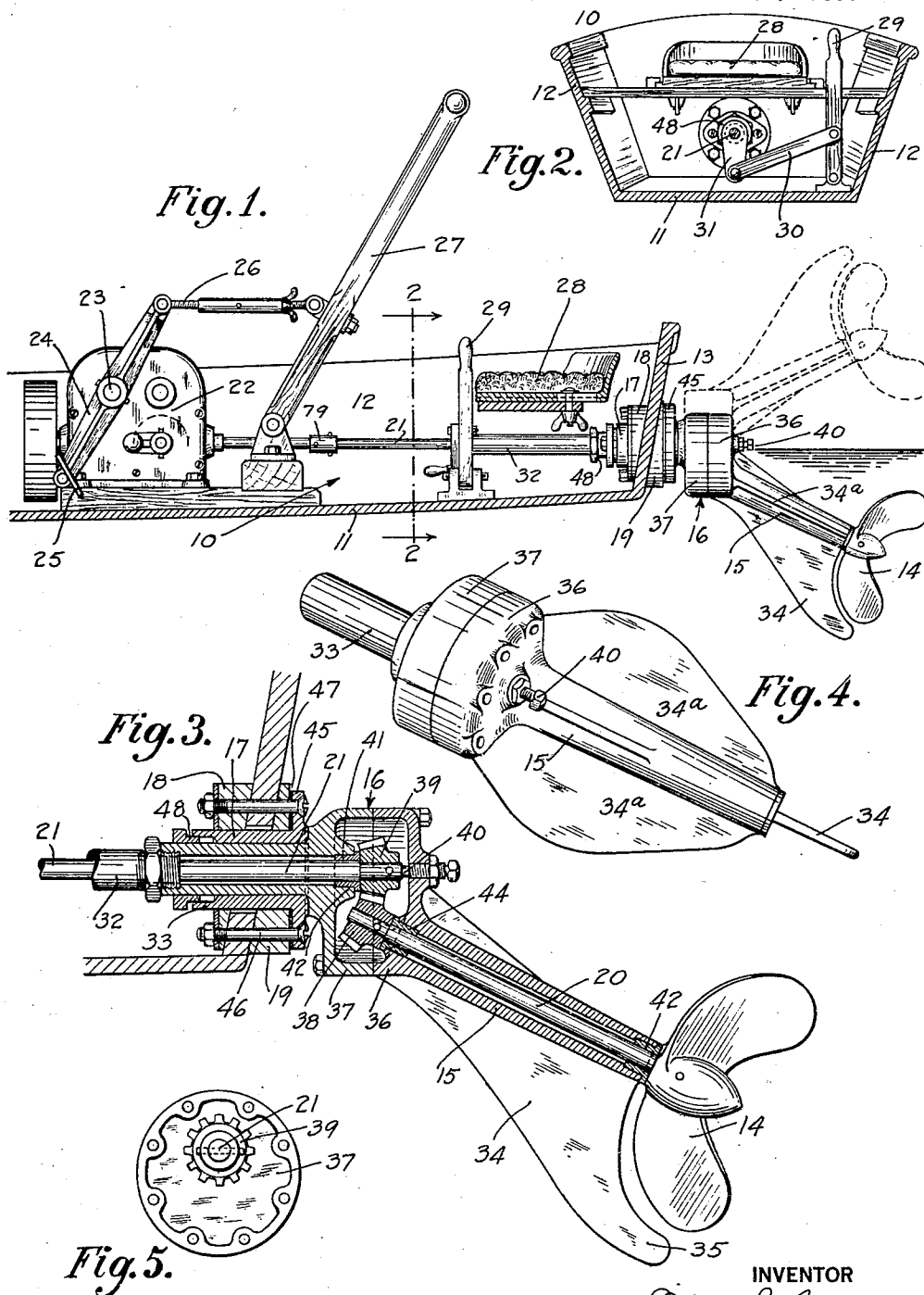
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BOAT PROPELLING MECHANISM

Filed March 17, 1926

2 Sheets-Sheet 1



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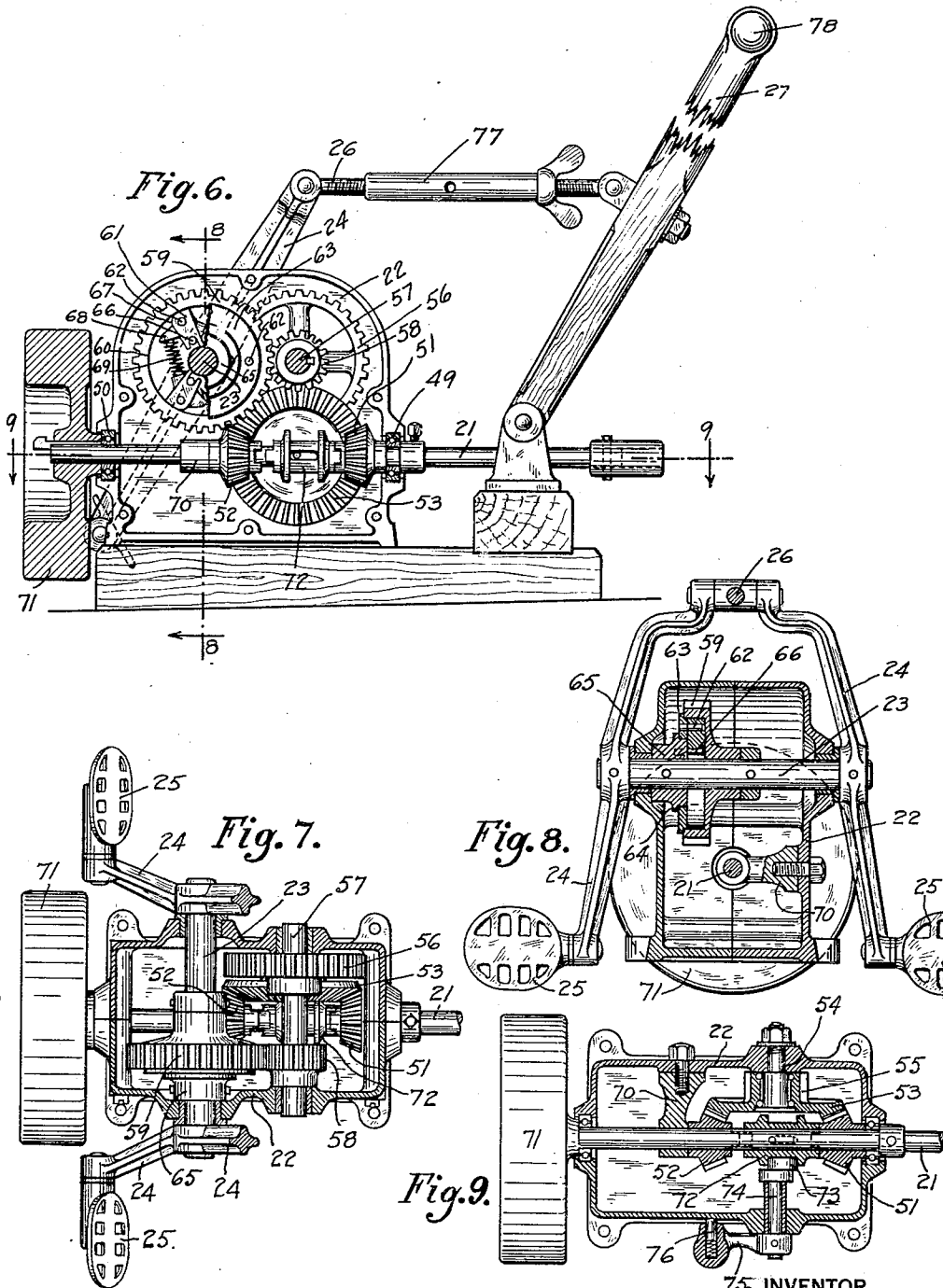
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2 Sheets-Sheet 2



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BOAT-PROPELLING MECHANISM.

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This invention is designed particularly for the purpose of providing a compact, efficient and comparatively simple mechanism for the manual propulsion of small boats, although the arrangement for mounting and angling the propeller is adapted for mechanical propulsion. The means provided for applying power to the propeller shaft and connections are designed to utilize the swinging body and leg movements characteristic of rowing for the application of power to gearing and connections leading to the propeller, so that the pull of the operator's arms and the thrust of the legs incident to the backward swing of the body will be utilized in the working of the power mechanisms.

The invention also relates to the means provided for steering the boat by angling the propeller to the desired degree, the same means, in an extreme position of adjustment, serving to completely elevate the propeller from the water which may be desirable when passing through weeds or under other conditions which preclude the use of propeller mechanism.

Further objects and details will appear from the description of the invention in connection with the accompanying drawings wherein—

Figure 1 is a longitudinal sectional view of the stern of a boat showing the propeller mechanism of the present invention in elevation;

Fig. 2 is a cross sectional view taken on line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a view showing the propeller in elevation with the associated housing in section;

Fig. 4 is a perspective view looking downwardly upon the propeller housing;

Fig. 5 is a detail of the housing with the rear section thereof removed;

Fig. 6 is a side elevation of the gear assembly with one side of the gear housing removed;

Fig. 7 is a view looking downwardly on the gear assembly with the gear housing sectioned on a horizontal plane;

Fig. 8 is a sectional view taken on line 8—8 of Fig. 6, looking in the direction of the arrows; and

Fig. 9 is a sectional plan view taken on line 9—9 of Fig. 6.

The general arrangement of the propelling mechanisms is best illustrated in Fig. 1

wherein 10 represents the rear portion of a boat having a bottom 11, side 12 and a square stern 13. The propeller 14 is carried by an angularly disposed tubular housing 15 which terminates in a drum shaped gear housing 16 mounted within a bearing sleeve 17 entered through and rigidly secured to inner and outer stern blocks 18 and 19.

The propeller shafting comprises a rear driven shaft 20 and a forward driving shaft 21, which latter is rotated by gearing mounting within the gear box 22. The shaft 21 is constantly driven by the partial rotations of a rock shaft 23, extending transversely through the gear box and having pinned to its ends a pair of swinging levers 24 which in conjunction with one another constitute a yoke shaped member which straddles the housing. Each of the swinging levers at its lower end carries a foot pedal 25, and the two swinging arms at their upper ends in conjunction provide a mounting for an adjustable link 26 which is pivoted to a hand lever 27 in suitable relation to a seat 28 located near the stern of the boat.

The propeller and associated housing may be angled from side to side in steering by the action of a steering lever 29, which through the medium of a link 30, serves to impart swinging movements to a crank 31 on the forward end of a sleeve 32, which constitutes a forward extension of a sleeve 33 which is journaled within the bearing sleeve 17.

The above constitutes the principal groups of elements involved in the propelling and steering mechanism of the present invention, and the same will now be described more in detail. The tubular housing 15 has formed thereon a depending fin 34 which normally occupies a depending vertical position, as in Fig. 3, the rear end being extended to furnish a heel 35 which underlies the propeller and serves to protect the same against weeds, rocks, or other obstacles. The depending rudder fin 34 is supplemented by lateral fins 34^a, which, when the parts are swiveled from the center toward either side as in steering, will swing out of the horizontal plane sufficiently to develop a lateral component of resistance to the water and thus supplement the steering function of the depending fin and will also serve to divert weeds or other obstacles away from the propeller.

The gear housing 16 comprises a rear section 36 and a front section 37 which furnish

a complete enclosure for a pair of bevel gears 38 and 39, the former of which is carried by the driven propeller shaft 20 and the latter of which is carried by the driving propeller shaft 21. An adjustable thrust bearing 40 contacts the rear end of the driving shaft 21, and co-acts with a bushing 41 on the forward side of the gear 39, which bushing contacts a boss 42 formed on the inner wall of the housing section 37. Bushings 43 and 44 furnish bearings for opposite ends of the driven propeller shaft 20.

The sleeve 33 through which the rear end of the driving propeller shaft 21 extends is integral with the section 37 of the gear housing and extends forwardly therefrom above the center thereof, and this arrangement enables the housing as a whole to be swung or swiveled around an axis coincident with the axis of the driving propeller shaft which will serve to swing the propeller itself, together with its tubular housing and rudder pin, from side to side, in an arcuate path of movement, so that by thus angling the propeller the boat may be steered, and by moving the propeller and associated housing from its normal position through an arc of 180°, as shown in Fig. 1, the propeller, together with the rudder fin and housing may be completely lifted from the water as occasion may require.

The driven propeller shaft being set at an angle to the driving propeller shaft normally holds the propeller at a substantial distance below the surface of the water, which not only enables the propeller to obtain an adequate grip on the water, but also provide for an adequate steering action by slightly angling the propeller from side to side, so that this steering effect, in adequate degree, will be secured without appreciably lifting the propeller above the plane normally occupied by the propeller in its middle position. The steering effect will be due both to the angling of the steering fin and to the decentering of the propeller thrust as the propeller is swung away from its straight ahead position.

The bearing sleeve 17 is provided at its rear end with an outwardly extending flange 35 which receives through bolts 46 entered through the inner and outer stern blocks 18 and 19, a backing 47 being interposed between the flange and the outer stern block to prevent leakage of water. To further guard against leakage a gland 48 is entered into the forward end of the bearing sleeve 17 which serves to seal the inner sleeve 33, and at the same time, permit the swinging movements thereof required in steering.

The forward end of the driving propeller shaft 21 is entered through the gear housing 22 and is carried by ball bearings 49 and 50. The shaft carries a pair of spaced inwardly facing bevel gears 51 and 52 which are freely mounted upon the shaft and both constant-

ly in mesh with a bevel faced gear 53 journaled upon a stub shaft 54. The hub of the bevel faced gear 53 is provided with gear teeth 55 in mesh with a steering gear 56 keyed to a transmission shaft 57 carrying a pinion 58 which in turn meshes with a driving gear 59 freely mounted on the rock shaft 23.

The freely mounted driving gear 59 is recessed on its interior to afford an inner circular wall 60 which constitutes a gripping surface for the action of a plurality of shoes 61 (three in number as shown), each of which shoes is pivoted on a pin 62 inwardly extending from the periphery of a ring 63 which is freely mounted within an offset 64 on the inner face of a hub 65 which is pinned to the rock shaft 23. The inner end of each shoe is bifurcated and engaged by a pin 66 inwardly extending from the hub 65, and each shoe at its gripping outer end is rounded away on one of its corners as at 67, and immediately adjacent the round corner the shoe is provided with a heel 68, the opposed heels of adjacent shoes being spread apart by the thrust of an interposed spring 69.

The arrangement is such that when the upper ends of the swinging arms are drawn rearwardly to impart a rotative movement to the rock shaft 23, the pins 66, which are in fixed relation to the rock shaft, will draw against the inner ends of the shoes and tend to impart a swinging movement thereto such that the angularly cut corner of each shoe will bite against the inner wall 60 of the driving gear 59 and clutch therewith during the active stroke of the rock shaft while on the return stroke. The tendency will be to swing the biting portion of each shoe away from contact with the wall of the surrounding gear, which release will be assisted by the thrust of the interposed springs 69 with the result that the parts will act in the manner of a clutching ratchet for the purpose of transforming a rocking motion into a continuous motion in one direction. This conversion of rocking motion of the rock shaft into rotary motion is accomplished by a driving force which is applied to the gear 59 adjacent its periphery at all times, thus working through a maximum leverage in the transmission of the hand power which is utilized.

The shaft 21 is additionally supported by an intermediate strut 70 inwardly extending from the side of the gear housing, and the forward end of the shaft carries a fly wheel 71. Between the pivot gears 51 and 52 is a slidably grooved clutch collar 72 which engages with the shaft 21 and is adapted to be thrown into clutching relation with either of the pivot gears, and such clutching is effected by the action of a crank 73 mounted on the inner end of a rock shaft 74 carrying a handle 75 at its outer end which may be swung in either direction to bring the collar into desired clutching relationship. A spring

pressed pin 76, bearing against the outer wall of the gear housing, serves to hold the handle in adjusted position. The link 26 is formed in threaded sections united by a turn buckle connection 77; and the upper end of the hand lever 27 is provided with a cross handle 78 to afford a grip for both hands of the operator.

In use, the operator will occupy the seat 28 facing forward and will grasp the cross handle 78 with both hands and place his feet upon the foot pedals which swing in opposition to the handle bars. Thus, when the operator draws back, as in rowing, he will naturally thrust his feet forward, so that the normally opposed movements of the hands and feet will both be utilized in imparting power to the rock shaft 23 which will be transformed into rotating movement through the clutch connections described, and such rotation will be imparted to the propeller.

In steering, the handle 29 can be moved transversely to swivel the propeller mounting thereby throwing the propeller and steering fin off center to the desired degree, and such steering can easily be effected by the left hand while a grasp of the right hand is retained upon the propelling lever. It is desirable to provide a coupling 79 in the shaft 21 to facilitate the installation of the mechanisms, and also to afford some slight range of adjustment in the length of the shaft. The arrangement is one which so locates the propeller as to give it a desirable upper thrust in all normal positions of steering adjustment.

The invention is one which is strong and rugged in construction and which may be easily fitted to boats of the character for which said type of propelling mechanism is primarily designed, and at the same time, the mechanism is one which will prove highly efficient in operation and which will afford a healthful form of exercise and bring into play all of the body muscles ordinarily exercised in rowing. Although, the invention has been described with considerable particularity as to detail, it is not the intention to limit the invention to the exact mechanism shown which may obviously be modified in various particulars without departing from the spirit of the invention.

I claim:

1. In combination with a boat, a propelling mechanism therefor, including a driving shaft having a fixed mounting within the boat and extended to a point exteriorly thereof, a driven shaft having a propeller thereon in angular relation to the driving shaft, gear connections between the two shafts, a swivelly mounted housing enclosing the driven shaft and the said gear connection, and means extended from the housing to a point within the boat for controlling swivelling move-

ments of the former, substantially as described.

2. In propelling mechanism for boats, the combination with a propeller, a driven shaft on which the propeller is mounted, a driving shaft having a fixed relation to the longitudinal axis of the boat, the driving shaft being in angular relation to the driven propeller shaft, intermeshing gears on the respective shafts, a housing for the two shafts, a swivel mounting for the housing to permit the driven shaft and propeller thereon to be swung laterally in steering, and means for actuating the driving shaft, substantially as described.

3. In propelling mechanism for boats, the combination with a propeller, a driven shaft on which the propeller is mounted, a driving shaft having a fixed relation to the longitudinal axis of the boat, the driving shaft being in angular relation to the driven propeller shaft, intermeshing gears on the respective shafts, a housing for the two shafts, a swivel mounting for the housing to permit the driven shaft and propeller thereon to be swung laterally in steering, means for actuating the driving shaft, and a steering fin carried by the mounting, substantially as described.

4. In propelling mechanism for boats, the combination with a propeller, a driven shaft on which the propeller is mounted, a driving shaft having a fixed relation to the longitudinal axis of the boat, the driving shaft being in angular relation to the driven propeller shaft, intermeshing gears on the respective shafts, a housing for the two shafts, a swivel mounting for the housing to permit the driven shaft and propeller thereon to be swung laterally in steering, means for actuating the driving shaft, and a steering fin carried by the mounting having its heel extended below the propeller, substantially as described.

5. In propelling mechanism for boats, the combination with a propeller, a driven shaft on which the propeller is mounted, a driving shaft having a fixed relation to the longitudinal axis of the boat, the driving shaft being in angular relation to the driven propeller shaft, intermeshing gears on the respective shafts, a housing for the two shafts, a swivel mounting for the housing to permit the driven shaft and propeller thereon to be swung laterally in steering, means for actuating the driving shaft, a steering fin normally depending below the rear portion of the swivelly mounted housing, and a pair of lateral fins secured to the housing in transverse relation to the depending fin, substantially as described.

6. In boat propelling mechanism, the combination with a power source which includes a driving shaft having a fixed relation to the longitudinal axis of the boat, of a propeller having fixedly mounted blades, a mounting for the propeller extending in angular relation to the axis of the driving shaft, means

for swinging the mounting laterally in steering, and operating connections extending from the driving shaft through the mounting adapted to rotate the propeller in one direction, substantially as described.

- 5 7. In boat propelling mechanism, the combination with a power source which includes a driving shaft having a fixed relation to the longitudinal axis of the boat, of a propeller having fixedly mounted blades, a mounting for the propeller extending in angular relation to the longitudinal axis of the boat, means for swinging the mounting laterally in steering, operating connections extending from the driving shaft through the mounting adapted to rotate the propeller, and a steer-

ing fin carried by the mounting, substantially as described.

8. In boat propelling mechanism, the combination with a power source which includes a driving shaft having a fixed relation to the longitudinal axis of the boat, of a propeller having a shaft in angular relation to the driving shaft, means for swinging the propeller shaft laterally in steering, operating connections extending from the driving shaft through the propeller shaft whereby to rotate the propeller, and a steering fin carried by the mounting, and having its heel extending below the propeller, substantially as described.

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