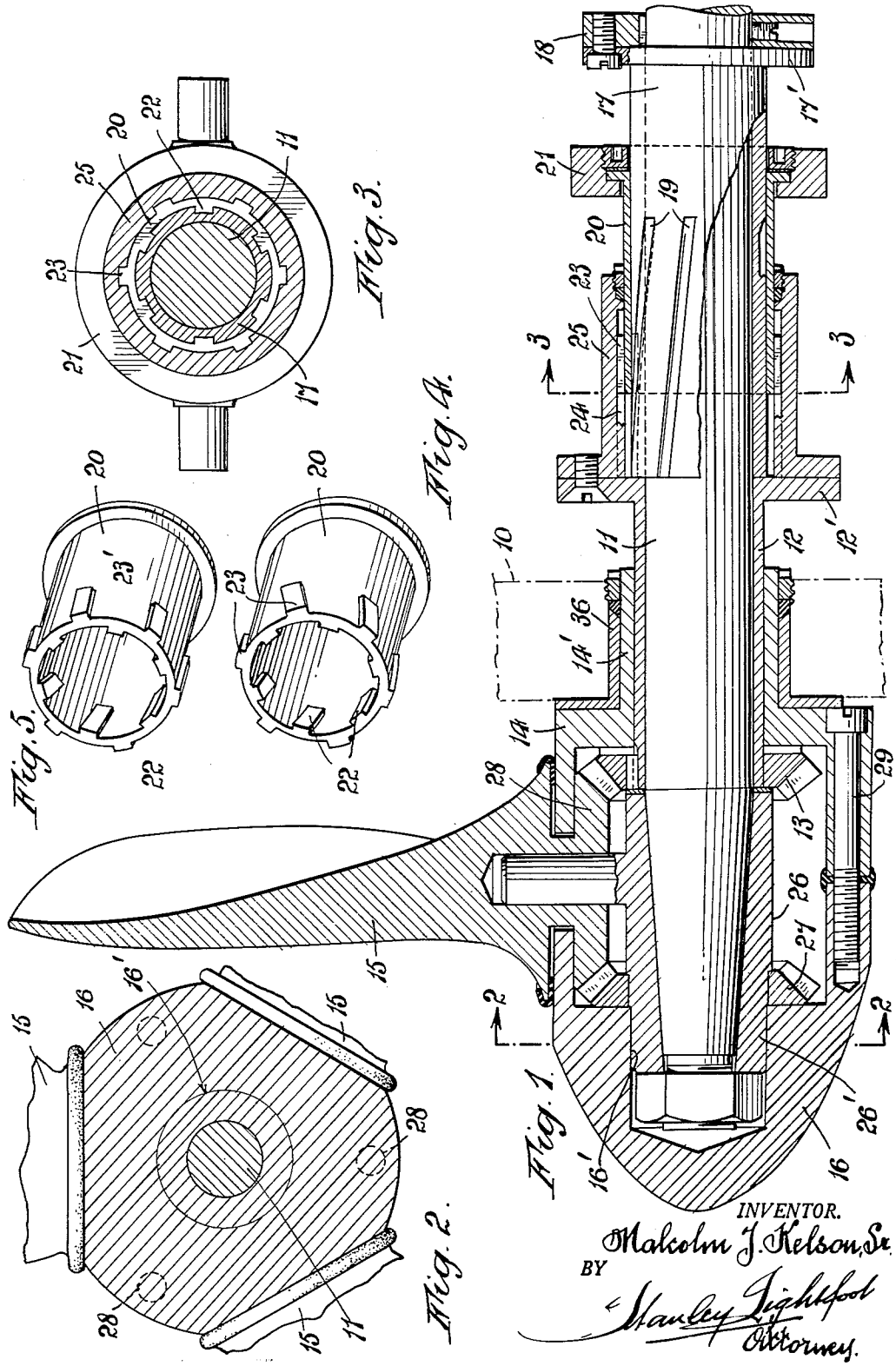
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REVERSIBLE PITCH MARINE PROPELLER

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REVERSIBLE PITCH MARINE PROPELLER

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3 Claims. (Cl. 170—160.48)

This invention relates to reversible pitch marine propellers; and has for its object to provide an assembly arrangement particularly adapted to meet the special conditions of marine operation wherein high rotational speeds may be called for while maintaining a minimum degree of vibration, it being very desirable that, while freedom and simplicity of operation in adjusting the pitch of the propeller blades be secured, adequate, and sturdy support of the blades and of their immediate adjusting means in relation to the propeller shaft should be afforded to a high degree.

The invention, therefore, contemplates the provision of an arrangement of gearing and propeller blades relatively positioned and mounted on the propeller shaft by means of a spider rigidly secured on said shaft and a housing member, also rigidly secured to said spider and operating to support the propeller fins in a manner whereby the said fins may be subjected to relatively great and sudden stresses, such as are met with in reversing during high speed operation.

My improved propeller in actual practice lends itself to ready, easy, and successive reversals in heavy weed beds, as a means of effecting its disengagement therefrom, without any tendency of the propeller blades to lock against such reversing motions or to suffer damage thereto, or to damage the propeller shaft or its bearings.

Still further objects or advantages additional or subsidiary to the aforesaid objects, or resulting from the construction or operation of the invention as it may be carried into effect, will become apparent as the said invention is hereinafter further disclosed.

In carrying the said invention into effect, I may adopt the novel construction and arrangement of parts hereinafter described, by way of example, having reference to the accompanying drawing, wherein:

Figure 1 is a longitudinal sectional elevation of my improved marine propeller assembly;

Figure 2 is a transverse sectional view taken on a plane indicated by the line 2—2 in Figure 1;

Figure 3 is a transverse detail sectional view taken on a plane indicated by the line 3—3 in Figure 1;

Figure 4 is a perspective view of the pitch-adjusting sleeve; and

Figure 5 is similar to Figure 4 illustrating a slightly modified form of the pitch-adjusting sleeve.

Similar characters of the reference indicate similar parts of the several figures of the drawing.

10 indicates the stern board of a boat and 11 the propeller shaft extending rearwardly therethrough, this shaft being surounded by a sleeve 12 capable of having limited relative rotation imparted thereto, said sleeve 12 having a flange 12' formed on or secured to its forward end and a bevel gear 13 secured to the rear end thereof. This sleeve is, in turn, also surrounded by the tubular shank 14' of a hollow body or shell 14 about which shell the propeller blades 15 are radially mounted.

The rear portion of the said shell or body is indicated by the numeral 16, and the nature of its mounting in

relation to the shaft and to the support of the propeller blades, all of which is an important feature of my improved propeller assembly, will be more particularly described hereinafter.

The shank 14' of the shell member 14 is journalled in any suitable form of bearing 36 mounted in the stern board 10.

A further sleeve 17 is shown as being mounted forwardly of the sleeve 12 on the said propeller shaft and secured to the said propeller shaft as by means of a flange 17' suitably secured to a collar 18, this collar being keyed or otherwise fixed on the said propeller shaft, in its final assembly for use, so that the said sleeve 17 and the shaft 11 will rotate as a single element. The sleeve 17 is shown as having its outer surface grooved, as at 19, with the grooves inclined to a slight right-hand lead, as will be clearly seen from the drawing.

Longitudinally slidable on the said sleeve 17 is a pitch-adjusting sleeve 20 provided with an operating collar 21 through the medium of which its longitudinal adjustment may be effected by any well-known means (not shown). This pitch-adjusting sleeve 20 is shown as having internal right-hand splines 22 corresponding to and meshing with the grooves 19 of the sleeve 17; and this sleeve 20 is also provided with oppositely inclined, or left-hand, splines 23 on its outer surface to engage in correspondingly inclined grooves 24 formed in the inner wall of the tubular extension 25 which is bolted to the flange 12' of the sleeve 12.

Thus, it will be apparent that reciprocation of the sleeve 20 will, by reason of the co-action between the splines and the grooves referred to, result in a rotation of the gear 13 relative to the propeller shaft throughout a determined number of degrees.

Secured on the tapered rear end of the propeller shaft 11 is a spider 26, the hub of which is elongated to provide a rearward extension 26' machined to accurately fit within the bore 16' of the shell or body member 16, which member is formed to match with the body member 14 to form an enclosure for the spider 26, the idler gear 27, the pitch-adjusting gear 13 and the gears 28 which are formed or secured on the inner ends of the propeller blades 15 as clearly shown in Figure 1 of the drawing. The two parts 14 and 16 of the shell or body of the propeller are secured together by bolts 29.

As shown, the idler gear 27, as mounted on the hub extension 26' in shouldered abutment with the inner face of the shell member 16 thus adding to the rigid support of the said shell member 16.

The propeller blades 15 are rotatable about the axes of the spider arms in one or other direction, to reverse or alter their effective pitch, by the rotation in one or other direction of the gear 13, relative to the shaft 11, as a result of the slidable adjustment of the sleeve 20 as already described.

The sidewalls of the shell or body members 14 and 16 are suitably formed, as by being flattened, to extend between each of the gears 28 and its propeller blade 15, as shown in Figure 1 to secure the said blades and their gears in position; and the shell or body member 16 also serves to back up the idler gear 27 and to maintain it in proper matching position with the said gears 28 to minimize looseness which might otherwise result in undue vibration in operation.

The solid support and maintenance of relationship between the moving parts is greatly aided by the long extended bearing of the hub of the spider on the end of the propeller shaft 11 and the firm fitting and coaxial support of the shell or body member 16 on the said rearwardly extended hub 26' of the spider 26. This provides an extremely rigid assembly of all the members associated directly with the propeller blades and mini-

mizes coupling forces such as have proved quite destructive in reverse propellers, as heretofore constructed, so that my improved propeller may be reversed suddenly and with great frequency, even at quite high speeds, in water containing weeds and similar obstructions without damage to the propeller and the shaft or its bearings.

The particular camming means for securing relative rotation of the sleeve **12** about the propeller shaft **11** is not a particular feature of the present invention. For instance, in Figure 5, the pitch-adjusting sleeve **20** is shown as having the outer splines **23'** parallel with the axis of the sleeve instead of inclined thereto, in which case the tubular extension **25** of the sleeve **12** would be correspondingly splined; an arrangement which would simply call for longer travel of the operating collar **21** to cause a determined degree of pitch adjustment of the propeller blades.

This invention may be developed within the scope of the following claims without departing from the essential features of the said invention, and it is desired that the specification and drawing be read as being merely illustrative of a practical embodiment of the same and not in strictly limiting sense.

What I claim is:

1. In an adjustable pitch marine propeller mechanism, a propeller shaft, a relatively rotatable sleeve on said shaft, a spider having outwardly extending arms fixedly mounted on said shaft, a propeller blade rotatably mounted on each arm of the said spider, a pitch-determining bevel gear carried by the inner end of each of the said blades and spaced from said sleeve, a pair of spaced opposed coaxial bevel gears connecting said pitch-determining gears together with one of said gears mounted on said rotatable sleeve and the other gear freely mounted as an idler on said shaft, and a two-part enclosing shell, for said gears and the inner ends of said blades, consisting of an outer part and an inner part with the outer part of said shell being rigidly mounted on the outer end of said propeller shaft, and the inner part being rotatably mounted on said rotatable sleeve, both of said shell parts being rigidly secured together; each of said shell parts having a portion extending between the inner end of each of said blades and the gear carried by said blade inner end.

2. In an adjustable pitch marine propeller mechanism, a propeller shaft, a relatively rotatable sleeve on said shaft, a spider formed with a rearwardly extending hub and having outwardly extending arms fixedly mounted on said shaft, a propeller blade rotatably mounted on each arm of the said spider, a pitch-determining bevel gear carried by the inner end of each of the said blades and spaced from said sleeve, a pair of spaced opposed coaxial bevel gears connecting said pitch-determining gears together with one of said gears mounted on said rotatable sleeve and the other gear freely mounted as an idler on the rearward extension of said spider hub, and a two-part enclosing shell, for said gears and the inner ends of said blades, consisting of an outer part and an inner part with the outer part of said shell being rigidly mounted on the outer end of said propeller shaft, and the inner part being rotatably mounted on said rotatable sleeve, both of said shell parts being rigidly secured together; each of said shell parts having a portion extending between the inner end of each of said blades and the gear carried by said blade inner end.

3. In an adjustable pitch marine propeller mechanism, a propeller shaft, a relatively rotatable sleeve on said shaft, a spider formed with a rearwardly extending hub and having outwardly extending arms fixedly mounted on said shaft, a propeller blade rotatably mounted on each arm of the said spider, a pitch-determining bevel gear carried by the inner end of each of the said blades and spaced from said sleeve, a pair of spaced opposed coaxial bevel gears connecting said pitch-determining gears together with one of said gears mounted on said rotatable sleeve and the other gear freely mounted as an idler on the rearward extension of said spider hub, and a two-part enclosing shell, for said gears and the inner ends of said blades, consisting of an outer part and an inner part with the outer part of said shell being rigidly mounted on the said rearward extension of said spider hub, and the inner part being rotatably mounted on said rotatable sleeve, a portion of said inner part being journalled in a support bearing mounted in a supporting member, both of said shell parts being rigidly secured together; each of said shell parts having a portion extending between the inner end of each of said blades and the gear carried by said blade inner end.

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