This invention relates, in general, to water craft and, in particular, to new and improved propelling means therefor.

One of the objects of this invention is to provide a new and improved propelling means for a boat which is itself buoyant and which, therefore, has and is free to maintain itself at a predetermined level of buoyancy so that the boat may be employed in shallow waters without fear of being grounded or the possibility of damage heretofore resulting therefrom.

Another object is to provide a boat with a new and improved propelling means which is self-buoyant and which is supported by the boat for substantially vertical, self movement relative thereto so that the boat may be operated with ease and with little or no attention given to said means regardless of the depth of the water in which the boat is being propelled.

Another object is to provide a boat with a new and improved propelling means which is driven about an axis of rotation and which is so supported by the boat that said axis is freely displaced vertically with respect to the boat and the level of the water in which the boat is being propelled, said displacement resulting from the buoyancy and floating nature of said means and the self maintenance of its level of buoyancy.

Other objects and advantages of the invention will become readily apparent from a reference to the following specification taken in conjunction with the accompanying drawings of which there are two (2) sheets and in which:

Figure 1 is a plan view, partly in section, of a boat and showing the invention as being employed therewith;

Figure 2 is an elevational view, partly in section, of the showing in Fig. 1;

Figure 3 is a sectional view taken along the lines 3—3 in Fig. 2;

Figure 4 is a plan view of a modification of Fig. 1;

Figure 5 is a plan view of still another modification;

Figures 6 and 7 are front and end elevational views, respectively, of the showing in Fig. 5, Fig. 6 being shown partly in section; and

Figure 8 is a detail section of the driving mechanism for the showing in Figs. 5, 6 and 7.

In Figures 1, 2 and 3, there is shown the hull of a boat 18 at the stern and on the bottom of which is rigidly secured a pair of laterally spaced base supports 12, and fixedly mounted upon and spanning said supports is a table member 14. An upright standard 16, supported upon bearings 10, is pivotally mounted on the table member 14 by means of a pin 18 for movement about the vertical axis of said pin and relatively to said table member, said standard having formed integrally therewith a pair of laterally spaced, vertically upstanding arms 22. Arms 22 at their upper ends are co-axially bored for freely receiving therein pintles 24 which pivotally support about a horizontal axis and between said arms a gear casing 26 integrally provided on the housing of an internal combustion engine 28, said pintles being press fitted or otherwise fixedly secured to said casing. It will be noted that the vertical axis of the pin 29 and the horizontal axis of the pintles 24 lie in a single vertical plane, the latter axis being normal to a vertical plane through the longitudinal axis of the boat 18. It will be further noted that one of the arms 22, above the pintle 24 supported thereby, is bifurcated, as at 30, to provide a split bearing for said pintle, there being provided in screw-threaded relationship with the bifurcations a tightening member 32 which serves to maintain said pintle 24 in any selected position relative to the horizontal axis of the pintles 24. A steering member 34 is bolted, riveted or otherwise secured to the housing of the engine 28 for moving said engine, the casing 26 and the standard 16 as a unit about the vertical axis of the pin 29.

The engine 28 has a rotatably driven shaft 36 extending into and being supported by the gear casing 26 and on this outer end of said shaft there is fixedly mounted for rotation therewith a bevel gear 38 having one section of a jaw clutch formation 40 at its hub portion. Pilot, as at 41, to the gear-carrying end of said shaft 36 for being supported thereby is the end of a second shaft 42, said shaft 42 being encased within a sleeve formation 44 on the casing 26 and extending with said sleeve outwardly through an opening 46 in the stern of boat 18. Loosely mounted on shaft 42 within casing 26 in spaced relation to the piloted end of said shaft is a second bevel gear 48 having at its hub portion one section of a second jaw clutch formation 50. The portion of said shaft 42 between the gears 38 and 48 is axially splined along its circumference, as at 51, and rotatably carries a two-faced jaw clutch formation 52, the face of clutch formation 52 adjacent the clutch section 40 on gear 38 being operable for engaging said section 40 under certain conditions to drive shaft 42 in one direction, and the face of clutch formation 52 adjacent the clutch section 50 on gear 48 being operable for engaging said section 50 under other conditions to drive shaft 42 in the opposite direction. In the horizontal plane containing the axes of shafts 36 and 42 is disposed the axis of a stub shaft 54, the vertical plane through said axis being normal to the single vertical plane containing said axes and being substantially equally spaced from the gears 38 and 48, shaft 54 carrying an idler gear 56 which is in constant mesh with said gears 38 and 48. The periphery of the two-faced clutch formation 52, between the clutching faces thereof, is annularly grooved, as at 58, to receive a shif-
ing pin 50 mounted on a crank 62 which is pivotally supported by the casing 26 and operated externally thereof by a lever 64. Before passing, it should be pointed out that the piloted connection 41 between the shafts 36 and 42 is for support only and in no way serves as a driving connection therebetween.

In the position the two-faced clutch member 52 is shown in Fig. 1, the engine 28 drives the shaft 36 in one direction, and this rotation is transmitted in reversed direction to the shaft 42 through the agency of (in the order named) the bevel gear 38, the idler gear 55, the bevel gear 40, the positive connection 50 and the adjacent clutch face on member 52, and the positive connection between the member 52 and the shaft 42 (by the splined engagement therebetween). If such rotation of shaft 42 is desired to be reversed, that is, if it is desired to drive shaft 42 in the same direction as shaft 36, the lever 64 is thrown into its opposite extreme position, thereby bringing the clutch section 40 on gear 53 and the adjacent clutch face on member 53 into positive engagement with each other, whereas the shaft 42 is driven in the same direction of rotation as shaft 36 through the agency of (in the order named) the positive connection between the clutch section 40 and the adjacent clutch face on member 52 and the positive connection between the member 52 and the shaft 42 (by the splined engagement therebetween), the bevel gear idly driving the idler gear 55 and the latter idly driving the bevel gear 40. Intermediate the two extreme positions of the lever 64 is a neutral position wherein the two-faced clutch member 52 will be out of engagement with both clutch sections 40 and 58, and it is this position wherein idling of the shaft 42 is obtained.

Sleeve formation 44, which forms the housing for the shaft 42 and which is either integral with or otherwise made rigid with the gear casing 28, has formed thereon, just rearwardly of the stern of boat 10, a bifurcated support 55 the ends of the arms of which are parallel with the axis of said shaft and spaced equally therefrom on either side thereof to provide axially aligned bearing portions in which the two ends of a shaft 68 are journaled, the axis of shaft 68 being normal to the axis of shaft 42 and in the same horizontal plane contains the axes of shafts 36 and 42. Sleeve formation 44 extends in parallelism for a distance between the arms of the bifurcated support 55 and terminates in a gear casing 70 which is either made integral with or otherwise fixedly secured to said sleeve end, and the shaft 42 which is encased within said sleeve formation terminates in said casing and has fixed on the end thereof for rotation therewith a bevel gear 72.

In constant mesh with gear 72, and fixed on said 68 for rotation therewith, is another bevel gear 74.

Shaft 68 is axially splined at its periphery on either side of the gear casing 70 to receive a pair of internally splined, simultaneously air tight, hollow drums 16 which drums are provided externally with annularly spaced, axially directed fins 78, the fins being sufficient in number to motivate the boat 10 efficiently upon the driving of shaft 68 by the shaft 42 and having radial lengths just sufficient to move the water effectively so that the buoyant drums may be employed in shallow waters. The common diameter of the drums is such that, when said drums are assembled and placed in use, the axes of shafts 36 and 42 will be substantially horizontal.

In design, the aggregate weight of the entire structure which is movable as a unit about the horizontal axis of the pintles 24 is so proportioned and distributed as to cause that portion disposed rearwardly of the vertical plane through the axes of said pintles and pin 26 to be slightly heavier than that portion disposed ahead of said plane, so that the drums 76 are free to seek their level of buoyancy and so that said drums may, if desired, be raised entirely from the water by comparatively slight downward pressure upon the rigid steering member 34. In other words, the axis of pintles 24 passes horizontally through a point lying slightly ahead of the center of gravity of the entire pivoted structure. And, the axis of pin 26, about which the structure is also pivoted for lateral swinging or steering movement, passes vertically through the same point lying ahead of said center of gravity.

Therefore, the entire driving structure for the boat 10, in Figs. 1, 2 and 3, is movable as a unit about two axes of movement, said axes being normal to each other and passing through the same point, and said point lying slightly ahead of the center of gravity of said structure. One of these axes is the axis about which the boat is steered, and the other is the axis about which the driving structure is freely movable for seeking its own level of buoyancy and for permitting the drums thereof to be readily and effortlessly moved into and out of the water. The floating nature of the drums enables the driving structure to be employed in shallow waters. The structure is easily manipulated and readily reversed or idled.

Whereas the driving structure for the boat 10 in Figs. 1, 2 and 3 is confined within the lateral expance of the boat, a side drive arrangement is shown in Fig. 4 and is embodied in a boat 110 similar in general to boat 10. The engine 128, similar in general to engine 28, is supported in any suitable manner in the boat 110 and is in suitable driving engagement with the gear train (not shown) confined within the gear casing 126, similar to casing 26, for selectively driving in one or the opposite directions, by means of proper manipulation of the lever 164, and in general to lever 64, a shaft 168 which is similar in general to the drum-carrying shaft 68 but which is supported in bearings provided on the sides of the boat, the axis of shaft 168 being horizontal and normal to the vertical plane through the longitudinal axis of said boat. Each end of shaft 168 laterally outwardly of that side of the boat the adjacent pivotally carries one end of a supporting arm 80 and fixedly carries a sprocket wheel or pulley 81.

The opposite end of each arm 80 carries a rotatable stub shaft 82 upon which is fixedly mounted for rotation therewith a second sprocket wheel or pulley 83 and a hollow, air tight drum 176 similar to either of the drums 76. A chain or belt 84 is connected between each pair of wheels or pulleys 81-83 for driving each of the shafts 82 upon which the drums are mounted. Drums thereon fins 170 similar to fins 78. Boat 110 is steered by a rudder (not shown), or it may be steered by any well known clutching arrangement within the casing 126 whereby the two drums 176 may be made to rotate simultaneously in opposite directions. It will be noted that the drums 176 are as free to seek their own buoyancy level as are the drums 76.
The driving apparatus shown in Figs. 5 through 8 has the novel features of that shown in Figs. 1 through 3 together with other features, such as the ready and easy attachment on and detachment from the boat 210, similar to boats 10 and 116. The driving apparatus is removably secured to the stern of the boat 210 by means of a pair of laterally spaced clamping members 85 equipped in the usual manner with set screws 85 for gripping the boat’s hull. Members 85 are integrally joined together on the side of the hull opposite the side engaged by the screws 86, the upper end of the clamping unit being transversely bored to receive a pin 87, and the lower end of said unit extending rearwardly in a bifurcated formation the arms of which are arcuately slotted, as at 88, about the axis of said pin. Pivotally carried by the pin 87 for movement about the horizontal axis thereof is one end of a bracket 89, and carried between the arms of the bifurcated lower rear end of the clamping unit 85 is a sleeve member 90 which is formed on its periphery with a pair of diametrically opposite pins 91, said pins being cooperative with the slots 88 and being threaded at their ends to receive wing nuts 92 for holding said sleeve member in any selected position along said slots. Sleeve 90 and the free end of bracket 89, the latter being bored coaxially with the former, are operable for freely receiving the drive shaft housing 93 which is an integral part of the housing for the engine 228, engine 228 being similar in general to engines 28 and 126, and in this housing 93 is carried the engine drive shaft 94 which is properly connected for rotation within the boat housing to said engine. It is hereafter readily seen, then, that the engine 228, its drive shaft 94 and housing 93 therefor are movable as a unit about the horizontal axis of the pin 87 and about the common axis of the sleeve 90 and bored portion of the bracket 89.

The lower end of the engine drive shaft 94 has mounted thereon for rotation therewith a bevel gear 95, and carried in a rigid right angle bend 96 of the drive shaft housing 93 is a shaft 97 on which is mounted for rotation therewith another bevel gear 98. Gear 98 is in permanent mesh with gear 95. The opposite end of shaft 97 has mounted thereon for rotation therewith a second bevel gear 99, and in permanent mesh with gear 98 is another bevel gear 100 which is fixedly mounted on an air tight hollow drum 276 similar to drums 16 and 176 and having fins 278 similar to fins 13 and 178. Welded or otherwise secured to the hub portion of drum 276 about the gears 99 and 100 for encompasing said mesh is an enlarged portion of a housing 101, said housing being elongated and sleeved over the bend 96 of the drive shaft housing 93 for rotation with respect to said bend. This elongated or sleeve portion of housing 101 has formed on its periphery a pulley or gear formation 102 which has an endless belt or chain 103 in driving engagement therewith, belt or chain 103 being driven by a pulley or gear 104 mounted on one end of a shaft 105 which is supported for rotation within a boss 106 formed on the engine housing. The opposite end of shaft 105 has fixed thereon a wheel 107 upon the manual turning of which wheel the drum 276 may be moved in either direction 180° about the longitudinal axis of the shaft 97 relatively to the bend 96 for selectively propelling the boat 210 forwardly or backwardly.

A steering member 108 is fixedly mounted on the engine housing and may be moved laterally to move the drum 276 about the axis of the shaft 94 for steering the boat 210 and may be moved upwardly and downwardly to move the drum about the axis of the pin 87 for moving the drum into and out of engagement with the water. The wing nuts 92 permit the operator to select and maintain the desired elevation of the drum 276 with respect to the water, but this is optional because the buoyancy of the drum is for the most part the best judge of this selection.

Although the invention has been described in detail it is to be understood that such description is for the purpose of illustration only and is not to be taken as definitive of the limits of the inventive idea. The right is reserved to make such changes in the details of construction and arrangement of parts as will come within the purview of the attached claims.

What I claim is:

1. In a boat having an engine, a buoyant cylindrical drum having an axis of rotation, a support pivotally mounted on the boat operable for supporting said drum for vertical movement relatively to the boat, a driving structure interconnecting the engine and said drum and operable for rotating said drum about said axis, said drum being proportioned in dimensions so that the buoyant force of the water displaced by said drum supports the drum with said axis above the water a distance substantially equal to the radius of said drum, and a series of driving fins on said drum.

2. In a boat, an engine, a rearwardly extending drive shaft operatively connected to said engine, a transverse driving axle operatively connected to said drive shaft, a cylindrical propeller secured to said driving axle and rotatable thereby, means for supporting said cylindrical propeller for rotation about a vertical axis and about a horizontal transverse axis.

3. In a boat, an engine, a rearwardly extending drive shaft operatively connected to said engine, a transverse driving axle operatively connected to said drive shaft, a cylindrical propeller secured to said driving axle and rotatable thereby, said drive shaft and said driving axle being substantially horizontal when in operation, and means for supporting said cylindrical propeller for rotation about a vertical axis.

4. In a boat, an engine, a buoyant cylindrical propeller, driving means interconnecting said engine and said cylindrical propeller, and support means, said support means being rotatable about a vertical axis intermediate said engine and said propeller, said engine, said propeller and said driving means being supported by said support means for rotation about a transverse horizontal axis.

5. In a boat, an engine, a buoyant cylindrical drum, said drum having an axis of rotation, driving fins on said buoyant cylindrical drum, driving means connecting said engine and said drum for rotation of said drum, means for permitting movement of said drum about a vertical axis intermediate said engine and said drum to steer the boat, and means for permitting substantially vertical movement of said drum to position said drum with said axis of rotation above the water a distance substantially equal to the radius of said drum.

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