

Feb. 5, 1935.

O. C. LINTHWAITE
MARINE DRIVE MECHANISM

1,990,387

Filed Aug. 15, 1930

3 Sheets-Sheet 1

Fig. 1

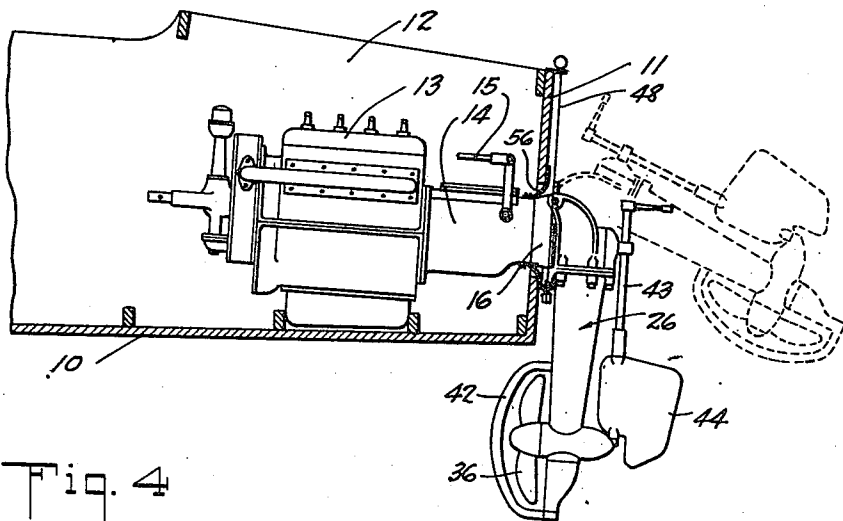


Fig. 4

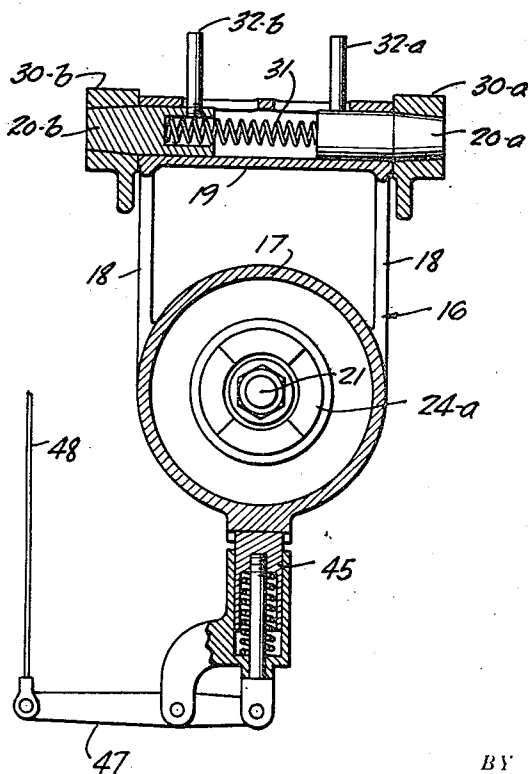
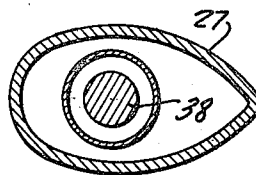


Fig. 5



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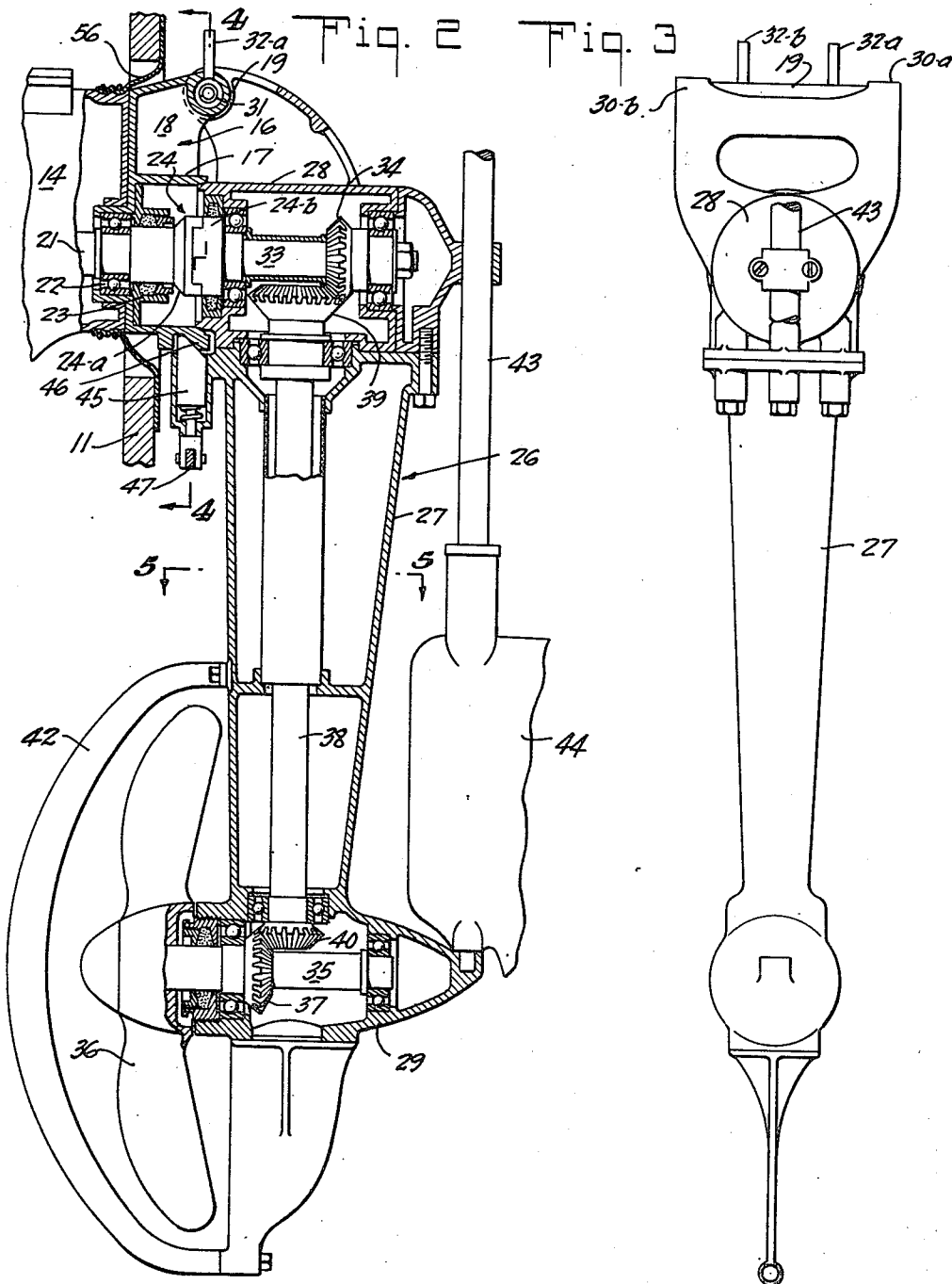
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3 Sheets-Sheet 3

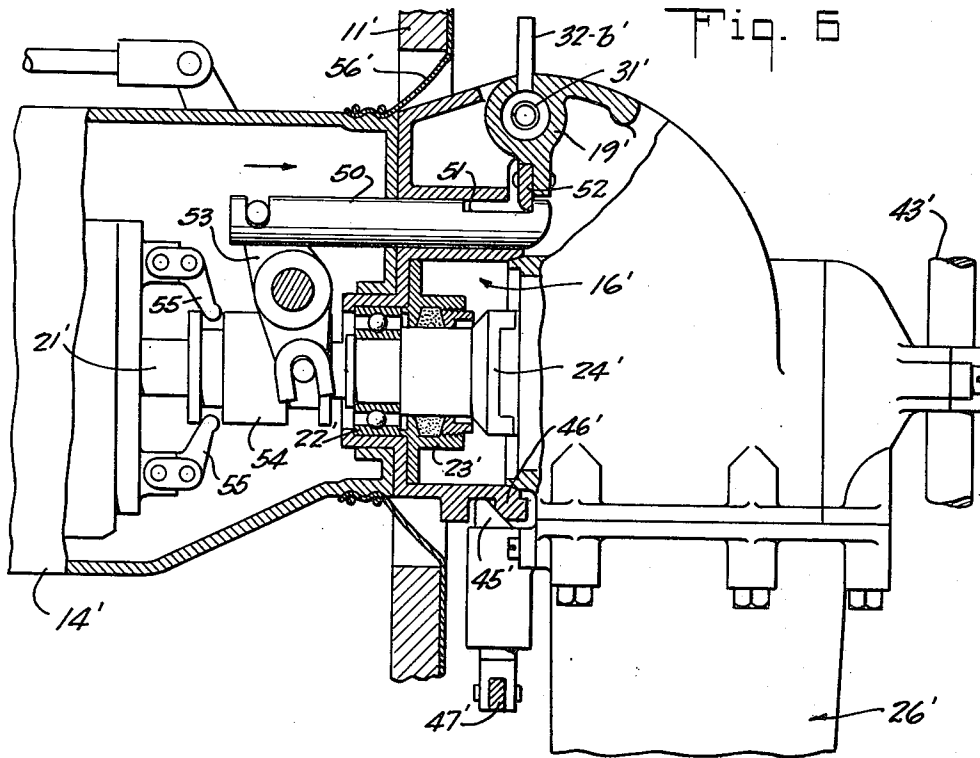
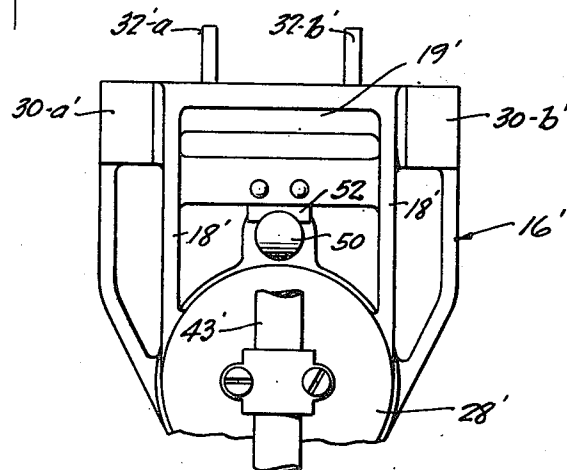


Fig. 7



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MARINE DRIVE MECHANISM

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Application August 15, 1930, Serial No. 475,439

34 Claims. (Cl. 115-41)

This invention relates to a drive mechanism for boats and pertains especially to a unitary structure comprising a propeller and associated driving mechanism which may be disposed outboard; which is demountable and which may be swung to a position to clear the keel level in the water.

Outboard marine motors as commonly constructed are rigidly mounted on the transom of the boat and have a downwardly extending portion carrying the propeller and positioning it below the level of the keel. Consequently, the propeller is subject to striking obstacles which clear the bottom of the boat. This results in damage to the motor as well as to the boat. It is accordingly a primary object of this invention to provide a propeller or drive unit which is yieldably held in operating position with the propeller below the keel and which will allow the propeller to swing upwardly when an obstacle is encountered.

A further object of the invention is to provide an outboard drive mechanism with the features just described for use with a motor mounted inboard. A still further object is the provision of such a device which may be readily mounted on the motor or dismounted therefrom. Other objects among which is the provision of such a device which will be light, strong and durable will be apparent from the subjoined description and drawings.

In the drawings, Fig. 1 is a longitudinal section through a fragment of a boat showing the motor well at the stern and having a motor and drive mechanism arranged in accordance with my invention; Fig. 2 is a longitudinal section on an enlarged scale through the drive mechanism, certain portions being shown in elevation; Fig. 3 is a rear elevation of the device; Figs. 4 and 5 are sections on enlarged scale as seen on the correspondingly numbered lines of Fig. 2; Fig. 6 is a partial section through the upper portion of a drive mechanism having means to control the motor transmission; and Fig. 7 is a rear elevation of the unit shown in Fig. 6.

Referring with more particularity to Fig. 1 of the drawings, the rear portion of the hull of a boat is indicated by 10, while the transom is indicated by 11 and the motor well by 12. A motor 13 of any preferred type is suitably mounted in the motor well and may include a transmission 14 having a manually operable clutch and reversing mechanism controlled by a rod 15. A bracket frame 16 is secured to the rear of the transmission and projects through a suitable opening in the transom 11. This bracket has

a lower cylindrical portion 17 and upstanding side members 18 terminating in a tubular portion 19 which carries slidable trunnion pins 20a and 20b. Drive shaft 21 projects from the rear of the transmission and extends coaxially through the cylindrical portion 17 of bracket 16 to near its outer end. It is supported in a suitable bearing 22 and provided with a grease retainer 23, both carried in bracket 16. The end of shaft 21 carries one member 24a of a jaw-clutch 24.

Supported on trunnions 20a and 20b is the drive unit generally indicated by 26. This comprises a column housing with a normally substantially vertical intermediate portion 27 preferably of ovate cross section, with a cylindrical portion 28 secured to its upper end normally coaxial with the cylindrical portion 17 of bracket 16, and a cylindrical portion 29 formed at its lower end. Brackets are formed on each side of cylindrical portion 28 terminating in eyes or bearings 30a and 30b adapted to receive trunnions 20a and 20b (Fig. 4). These trunnions are slidable within tubular portion 19 and are urged apart by a compression spring 31, each being provided with a projection marked 32a and 32b. These may be grasped in the hand and the trunnions retracted against the compression spring out of engagement with eyes 30a and 30b permitting the drive unit 26 to be removed.

Supported on anti-friction bearings within cylindrical portion 28 and provided with a suitable grease retainer is a driven shaft 33 carrying one member 24b of jaw clutch 24 at its forward end and a bevel pinion 34 at its rear end. Shafts 21 and 33 comprise a divided shaft having a coupling clutch 24. Within the lower cylindrical portion 29 is a propeller shaft 35, also supported on anti-friction bearings and provided with a grease retainer. This shaft carries the propeller 36 at its outer end and a bevel gear 27. A vertical transmission shaft 38 is supported on anti-friction bearings in the vertical portion 27 of the housing and has a bevel gear 39 at its upper end meshing with pinion 34 and a bevel pinion 40 at its lower end meshing with gear 37. A guard or "skag", 42 is secured to the housing and spans the propeller. Mounted in bearings on the rear of the housing is a shaft 43 carrying the rudder 44. A spring projected latch 45 is provided at the front of the housing and coacts with a lug 46 on bracket 16 to form a one-way yieldable lock for a purpose to be later described. A lever 47 and wire 48 extending to a convenient place for manipulation provide a means of operating the latch.

With all parts in their normal positions as shown in solid lines in Fig. 1, and Fig. 2, the rotary motion of drive shaft 21 is transmitted through the coupling clutch 24 and the shafting 5 and gearing previously described to the screw 36, latch 45 serving to hold the parts as shown by the engagement of its inclined face, with the correspondingly inclined face on lug 46. When guard 42 encounters an obstruction, the drive 10 unit 26 will be swung backwardly and upwardly to a sufficient height to ride over it, latch 45 being depressed against spring 47 by the action of the inclined faces so that it will pass under lug 46. When the obstruction has been passed, the unit 15 drops back to nearly its original position; the forward side of latch 45 engages the back of lug 46 holding the unit from its initial position sufficiently to prevent the members 24a and 24b of the jaw-clutch from engaging. This is necessary, for the motor will race immediately the clutch is disengaged, and if permitted to reengage before slowing down the motor, damage to the parts would certainly result. The motor is throttled down and the latch 45 then retracted by means of cable 48, allowing the unit to return 20 to its initial position. The unit may be detached by retracting trunnions 20a and 20b as previously mentioned.

In Figs. 6 and 7 is illustrated a similar drive 30 having an added feature, corresponding parts having the same reference numerals as before with the addition of '. Brackets 16' has been modified by having bearings 30'a and 30'b formed on it instead of on projections from the cylindrical part 28', these projections now carrying the tubular 35 part 19'. The hinge arrangement is otherwise unchanged. Bracket 16' has a boss within which is slidably mounted a clutch operating rod 50, the outer end of which has a long notch 51 engaged by a blade 52 suitably secured to a projec- 40 tion on 19'. The inside end of rod 50 has a notch engaged by a pin in the clutch operating lever 53. This lever is adapted to reciprocate a sleeve 54 on shaft 21' and by means of levers 55 to disengage the clutch when it is swung in the direction indicated by the arrow. The specific details of the clutch mechanism are not pertinent.

This modified arrangement operates in the same manner as the other with the added function that when the unit is swung out, blade 51 50 pulls rod 50 and disengages the manually operable clutch. Due to the length of notch 52, the rod will not be returned to its initial position when the unit is returned, the clutch remaining disengaged until returned to engagement by the operator. In both species of the invention shown 55 herein, a bellows like diaphragm 56 and 56' is attached to the margins of the opening therein and to the transmission casing to prevent entrance of water.

What I claim is:—

1. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, a column housing hinged thereto and depending therefrom, a divided shaft for operation 65 by a motor having a clutch at the juncture of said frame and housing, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided shaft and said propeller shaft, and spring locking means for yieldably securing said housing to said frame with the divided shaft sections clutched.

2. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, 75 a column housing hinged thereto and depending

therefrom, a divided shaft for operation by a motor having a clutch at the juncture of said frame and housing, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided shaft and said propeller shaft, a one-way locking means enabling said housing to be swung away from the transom of said boat to declutch said divided shaft and preventing return of said housing to clutch engaging position, and means to operate said lock and enable return of said housing to clutch engaging position.

3. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, a column housing, trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of the boat, said trunnions and bearings being axially movable in relation to one another whereby to enable detachment of said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings, a divided shaft for operation by a motor having 25 a clutch at the juncture of said frame and housing to declutch said divided shaft on swinging of said housing away from said frame, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided 30 shaft and said propeller shaft, and yieldable locking means for securing said housing to said frame with the divided shaft sections clutched.

4. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, a column housing trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of the boat, said trunnions and bearings being axially movable in relation to one another whereby to enable detachment of said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings, a divided shaft for operation by a motor having a clutch at the juncture of said frame and housing to declutch said divided shaft on swinging of such housing away from said frame, a propeller shaft at the lower end of said housing, transmission 50 means in said housing gearing said divided shaft and said propeller shaft, a one-way locking means enabling said housing to be swung away from the transom of said boat and preventing return of said housing to clutch engaging position, and means to operate said lock and enable return of said housing to clutch engaging position.

5. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, a column housing hinged thereto and depending therefrom, a divided shaft for operation by a motor having a clutch at the juncture of said frame and housing, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided shaft and said propeller shaft, and yieldable locking means for securing said housing to said frame with the divided shaft sections clutched, a manually operable clutch mechanism for connecting said drive shaft to the engine shaft, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on rearward swinging of said housing.

6. A marine drive mechanism comprising a sup- 75

port frame for mounting upon a boat at the stern, a column housing hinged thereto and depending therefrom, a divided shaft for operation by a motor having a clutch at the juncture of said frame and housing, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided shaft and said propeller shaft, and a one-way locking means enabling said housing to be swung away from the transom of said boat to declutch said divided shaft and preventing return of said housing to clutch engaging position, means to operate said lock and enable return of said housing to clutch engaging position, a manually operable clutch mechanism for connecting said drive shaft to the engine shaft, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on rearward swinging of said housing.

7. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, a column housing, trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of the boat, said trunnions and bearings being axially movable in relation to one another whereby to enable detachment of said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings, a divided shaft for operation by a motor having a clutch at the juncture of said frame and housing to declutch said divided shaft on swinging of said housing away from said frame, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided shaft and said propeller shaft, yieldable locking means for securing said housing to said frame with the divided shaft sections clutched, a manually operable clutch mechanism for connecting said drive shaft to the engine shaft, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on rearward swinging of said housing.

8. A marine drive mechanism comprising a support frame for mounting upon a boat at the stern, a column housing trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of the boat, said trunnions and bearings being axially movable in relation to one another whereby to enable detachment of said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings, a divided shaft for operation by a motor having a clutch at the juncture of said frame and housing to declutch said divided shaft on swinging of such housing away from said frame, a propeller shaft at the lower end of said housing, transmission means in said housing gearing said divided shaft and said propeller shaft, a one-way locking means enabling said housing to be swung away from the transom of said boat and preventing return of said housing to clutch engaging position, means to operate said lock and enable return of said housing to clutch engaging position, a manually operable clutch mechanism for connecting said drive shaft to the engine shaft, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch

mechanism to declutching position on rearward swinging of said housing.

9. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit hingedly supported on said frame and depending therefrom, said drive unit being mounted to swing away from the transom of the boat and including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft; and spring means to yieldingly lock said column housing to said supporting frame.

10. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit hingedly supported on said frame and depending therefrom, said drive unit being mounted to swing away from the transom of the boat and including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft; a one-way yieldable lock enabling said housing to be swung away from the transom of the boat and preventing return of said housing to clutch engaging position, and means to operate said lock and enable return of said housing to clutch engaging position.

11. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit hingedly supported on said frame and depending therefrom, said drive unit being mounted to swing away from the transom of the boat and including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft; means to yieldingly lock said column housing to said supporting frame; a manually operable clutch mechanism for connecting said drive shaft to the shaft of an engine, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on swinging rearward of said housing.

12. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft, hinge trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of

the boat, said trunnions and bearings being axially movable in relation to one another whereby to enable detachment of said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings; and means to yieldingly lock said column housing to said supporting frame.

13. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit hingedly supported on said frame and depending therefrom, said drive unit being mounted to swing away from the transom of the boat and including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft; a one-way yieldable lock enabling said housing to be swung away from the transom of the boat and preventing return of said housing to clutch engaging position, means to operate said lock and enable return of said housing to clutch engaging position; a manually operable clutch mechanism for connecting said drive shaft to the engine shaft, a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on swinging rearward of said housing.

14. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit hingedly supported on said frame and depending therefrom, said drive unit being mounted to swing away from the transom of the boat and including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft; a one way yieldable lock enabling said housing to be swung away from the transom of the boat and preventing return of said housing to clutch engaging position, means to operate said lock and enable return of said housing to clutch engaging position; a manually operable clutch mechanism for connecting said drive shaft to the shaft of an engine, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on swinging rearward of said housing.

15. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive clutch member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft, hinge trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of the boat,

said trunnions and bearings being axially movable in relation to one another whereby to detach said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings; a one-way yieldable lock enabling said housing to be swung away from the transom of the boat and preventing return of said housing to clutch engaging position, and means to operate said lock and enable return of said housing to clutch engaging position.

16. A marine drive mechanism comprising a supporting frame for mounting upon a boat at the stern including a drive shaft and a coupling drive clutch member; a drive unit including a column housing, a driven shaft for alignment with said drive shaft, a driven clutch member on said driven shaft for engagement with said drive member, a transmission shaft extending through said column housing, a propeller shaft at the lower end of said housing, gearing connecting said driven shaft, transmission shaft and propeller shaft, hinge trunnions and bearings between said frame and housing hingedly supporting said housing on said frame whereby the latter may be swung away from the transom of the boat, said trunnions and bearings being axially movable in relation to one another whereby to detach said housing from said frame, means tending to hold said trunnions and bearings in engagement, manually operable means to disengage said trunnions and bearings; a one-way yieldable lock enabling said housing to be swung away from the transom of the boat and preventing return of said housing to clutch engaging position, means to operate said lock and enable return of said housing to clutch engaging position; a manually operable clutch mechanism for connecting said drive shaft to the shaft of an engine, and a slidable clutch operating rod connected to said clutch mechanism and said housing to move said clutch mechanism to declutching position on swinging rearward of said housing.

17. A boat propulsion system comprising an inboard motor, a drive shaft and a casing therefore extending from the motor to the hull, and an outboard transmission unit detachably mounted to the outer end of the casing.

18. A boat propulsion system comprising a fixed inboard motor, a drive shaft and a casing extending therefrom through the hull, and an outboard transmission unit hinged to tilt upwardly at the outer end of the casing and detachably connected for removal therefrom.

19. A boat propulsion system comprising an inboard motor, a drive shaft and casing extending therefrom through the hull, an outboard transmission unit hinged at the outer end of the casing to tilt rearwardly upward, and a detachable connection at the hinge for bodily removing the unit.

20. A boat propulsion system comprising an inboard motor, a casing extending therefrom through the hull, an outboard transmission unit mounted to the outer end of the casing and means forming a yielding water tight connection between the casing and the hull.

21. A boat propulsion system comprising a fixed inboard motor having a casing extending therefrom through the hull, a drive shaft in the casing, an outboard transmission unit pivoted on the casing to tilt rearwardly upward, and a clutch connection between the shaft and the unit which is broken by upwardly tilting of the unit.

22. A boat propulsion system comprising an inboard motor, a casing extending therefrom

through the hull and an outboard transmission unit pivoted on the casing to swing rearwardly upward, a driving connection between the motor and the unit including a movable clutch, and means operated by the unit as it swings to move the clutch in accordance therewith.

23. In a boat propulsion system comprising an inboard motor having a casing extending through the hull, an outboard transmission unit pivoted on the casing to tilt rearwardly upward, a driving connection between the motor and unit including a movable clutch, and a latch to prevent return of the unit to clutch engaging position when it has swung rearwardly upward.

24. A boat propulsion system comprising an inboard motor having a casing extending through the hull, an outboard transmission unit pivoted on the casing to tilt upwardly, a driving connection including a separable clutch between the motor and the transmission unit, and means to prevent re-engagement of the clutch when the unit swings outwardly.

25. A boat propulsion system comprising an inboard motor, a drive shaft casing extending therefrom through the hull, an outboard unit hinged on the end of the casing to tilt rearwardly upward and a latch connecting the unit and the casing whereby the unit may tilt upwardly upon impact with an obstruction and to prevent re-engagement of the latch upon the return of the unit.

26. A boat propulsion system comprising an inboard motor, a drive shaft casing extending therefrom through the hull, an outboard unit hinged to the end of the casing to tilt upwardly, a latch connecting the unit and casing whereby the unit may tilt upwardly upon impact and to prevent the return of the unit to latch engaging position, and means to actuate the latch to unit engaging position.

27. A marine drive mechanism comprising a support, an outboard drive unit hinged on the support, a means in the hinged connection for mounting the unit detachably in the support.

28. A marine drive mechanism comprising a support, and an outboard driving unit, and means for pivotally and detachably mounting the unit in the support.

29. A marine drive mechanism comprising a support having spaced bearings, a propeller driving unit having spring pressed trunnions for detachably and pivotally mounting the unit in the

bearings, and means to disengage the trunnions against said spring pressure.

30. A marine drive mechanism comprising an inboard motor, a drive shaft casing extending therefrom through the hull, and an outboard transmission unit pivotally and detachably hinged thereon, a latch to connect the unit and casing releasably whereby the unit may tilt upwardly upon impact and normally positioned to prevent re-engagement thereafter, a driving connection between the motor and unit including a movable clutch, means actuated by the upward movement of the unit to move the clutch to declutching position, manual clutch operating mechanism, and manual latch operating mechanism for restoring the driving connection between the motor and unit.

31. Boat propulsion system comprising a fixed inboard motor, a fixed drive shaft extending from the motor to the hull, a detachable outboard transmission unit carrying the propeller, a pivotal suspension for said unit and a releasable connection between the drive shaft and the transmission gear in said unit.

32. Boat propulsion system comprising a fixed inboard motor, a fixed drive shaft extending to the hull and a detachable outboard transmission unit consisting of a housing with a pivotal suspension from the hull, a short extension shaft in the upper part of said housing having a releasable connection with the drive shaft, downwardly extending transmission gear within the housing and a propeller shaft in the lower part of said housing.

33. Boat propulsion system consisting, in combination with a fixed inboard motor and drive shaft extending to the hull, of a detachable outboard transmission unit comprising transmission gear having a releasable connection with the drive shaft, a housing for said gear, pivotal suspension means at the upper part of said housing and a locking device adapted to hold the lower part of said housing to the hull.

34. Boat propulsion system consisting, in combination with a fixed inboard motor and drive shaft, of an outboard unit comprising transmission gear having a releasable connection with the drive shaft, a housing for said gear, a pivotal suspension for said housing, locking means normally holding the unit to the hull and trip mechanism operative to release said locking means automatically.

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