

Jan. 2, 1940.

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2,185,457

OUTBOARD MOTOR

Filed Oct. 26, 1938

Fig. 1.

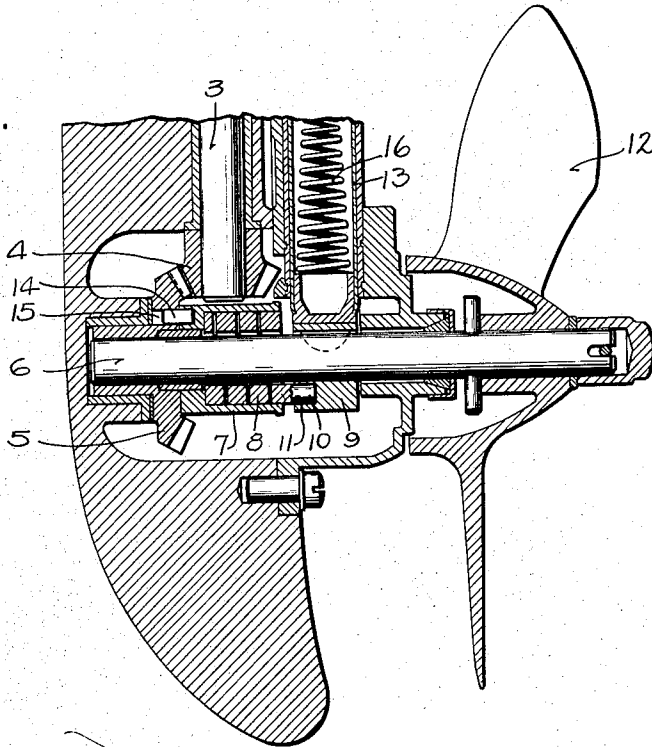
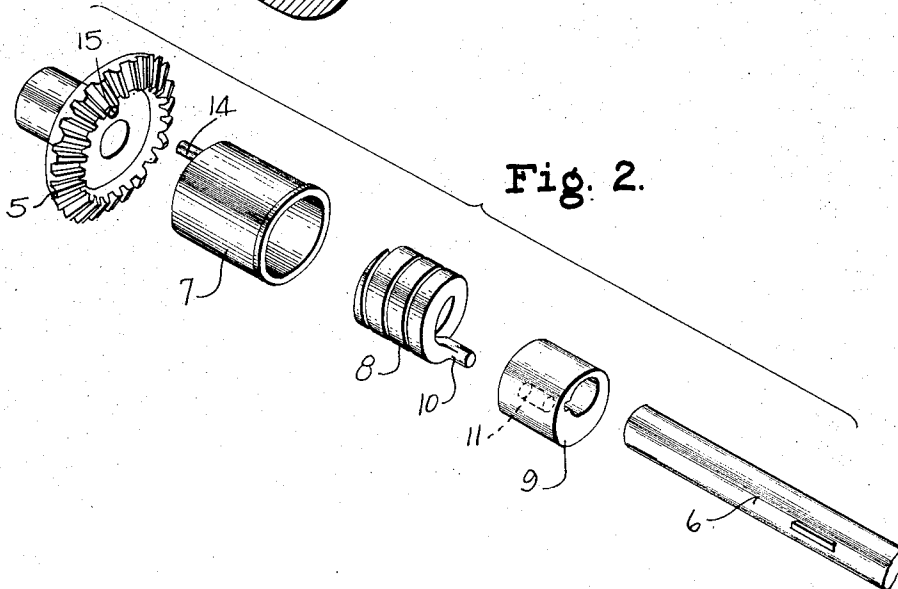


Fig. 2.

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2,185,457

OUTBOARD MOTOR

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Application October 26, 1938, Serial No. 236,978

4 Claims. (Cl. 115—17)

My invention relates to improvements in outboard motors. More particularly, it relates to the type of clutches employed to disengage the driving power from the propeller when the propeller meets with undue resistance as, for example, in encountering a shoal or other submerged obstacle.

Broadly it is my object to provide a simple and inexpensive form of clutch which will disengage and re-engage smoothly, and which is of such a character that when it has once disengaged it will not tend to grab or re-engage until the undue resistance to a propeller operation has wholly disappeared.

More particularly stated, it is a further object of the invention to provide a clutch of this character which can readily be installed in the propeller drive shaft mechanism of an otherwise conventional type of outboard motor and, moreover, to utilize existing or conventional outboard motor structure for the necessary anchorages at the input and output portions of the clutch mechanism.

In the drawing:

Fig. 1 is a sectional view of a fragmentary portion of an outboard motor lower unit which includes the gear casing in which my clutch is preferably installed.

Fig. 2 is a perspective view of the separate parts of my clutch arranged in the order of assembly.

Like parts are identified by the same reference characters throughout the several views.

The drive shaft 3, which is coupled to the motor, transmits power to the propeller shaft 6 by means of a drive shaft pinion 4 which engages with propeller shaft gear 5, rotatably mounted on shaft 6.

Concentric with shaft 6 is a sleeve 7 provided with a pin 14 anchored in the socket 15 of the driven gear 5 to receive motion through said gear from the drive shaft. The helical spring 8 is of such dimensions as to be confined under pressure within the sleeve 7 and hence to receive, through frictional engagement with the inner periphery of the sleeve, the driving torque necessary for the operation of the propeller. The coils of spring 8 are preferably made up of square stock so that the exterior surface of the spring will be substantially cylindrical. The end of the spring confined within the sleeve 7 is free. The aft end of the spring is provided with a rearward projection 10 engaged in the bore 11 which extends axially of the pump cam 9 within the load thereof. The pump cam is, as usual, keyed

to shaft 6 for the purpose of reciprocating the displacement pump plunger 13 against the compression of spring 16.

The motion communicated to the propeller shaft from drive shaft 3 through the clutch mechanism above described, is of such a direction as to tend to rotate the propeller shaft clockwise as viewed from the rear. In other words, as will be apparent from Fig. 2, the clockwise rotation of sleeve 7 will have a tendency, proportionate to the torque transmitted, to wind up the spring 8, thereby reducing its overall diameter. The normal tension of spring 8 is such as to be adequate to resist this tendency for the spring to be wound up. Consequently, under normal loads to which the propeller 12 is subject, the spring 8 will engage the sleeve 7 with sufficient friction to transmit adequate torque for propeller operation. However, when the propeller is subject to excessive load the added torque to which the clutch is subjected will immediately cause sleeve 7 to slip on the surface of spring 8 and, to the extent that driving torque is still transmitted through the spring, the spring will be so wound as to reduce its diameter and the slippage will occur with less resistance.

Consequently, so long as the propeller is subject to excessive load, the resistance offered by the slip clutch will remain relatively low, but the instant such excessive load is released the spring will expand, by its own resilience, to re-establish driving connection through the clutch to the propeller.

One great advantage of locating a clutch of this character in the propeller gear casing, lies in the fact that this casing is ordinarily maintained full of grease or other lubricant. Consequently the re-engagement of the clutch will invariably be very smooth and the presence of the lubricant will preclude the possibility of injury to the clutch during the period for which it slips.

I claim:

1. In an outboard motor mechanism, the combination with a drive shaft, a driven shaft, a propeller connected to receive motion from the driven shaft; of a shaft bearing adjacent said propeller and a cam rotor secured to said shaft adjacent the bearing, a one-way clutch with parts encircling the drive shaft and operatively connecting said shaft and the cam rotor, whereby to provide uni-directional drive means from the drive shaft to the driven shaft with a minimum of torsional stress and resultant vibration in the driven shaft during operation of the device.

2. In combination with a vertical driving shaft 55

having secured to its lower terminus a pinion gear, a horizontal driven shaft having rotatably mounted thereon, a gear engageable with the drive shaft pinion gear, a pump positioned parallel to and in close proximity to the drive shaft, a cam rotor secured to the driven shaft in position for operative association with said pump, a slip clutch disposed within space defined by the intersection of projected areas of the gears and operatively connected between the rotatably mounted gear and the cam, whereby to provide means for uni-directional power transmission between the shafts and simultaneous operation of the pump.

3. In an outboard motor, the combination with a lower unit housing providing a gear casing, of a drive shaft entering said casing, a propeller shaft extending from said casing, a driven pinion fixed on the drive shaft, a gear including a hub portion rotatably mounted on and concentric with the propeller shaft and positioned by bearing means supported by said casing, said hub portion being provided with a socket, a clutch encircling the propeller shaft within space defined by the intersection of projected areas of the gears and including a sleeve substantially concentric with the propeller shaft and having interlocking means engaged with said hub socket, a cam rotor fixed on said propeller shaft adjacent said sleeve, a helical spring having an end

secured within said sleeve and the other end secured to said cam rotor, and bearing means adjacent said rotor and supported by said gear casing.

4. In combination in an outboard motor lower unit, a casing, an upright drive shaft provided with a bearing in the casing and carrying a pinion rotatable in a horizontal plane, a centrally apertured propeller shaft gear meshing with the pinion and having an extended portion journaled in the casing, a propeller shaft having one end portion projecting through the gear aperture and rotatably journaled within the journal sleeve, a second sleeve encircling the propeller shaft and secured to the gear and having a bearing on the shaft concentrically spacing said sleeve from the shaft, a helical spring normally confined within said second sleeve in pressure engagement therewith, and means on the shaft immediately adjacent the pinion for anchoring the end of the spring to the propeller shaft, said spring adapted to be wound up by relative rotation of the propeller shaft in one direction respecting the second sleeve to provide a slip clutch between the shaft and the gear, the second sleeve and helical spring being disposed within the projected area of the pinion and immediately adjacent the end of the drive shaft.

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