Dec. 26, 1933. H. L. MATHIAS 1,941,360

OUTBOARD MOTOR TRANSMISSION

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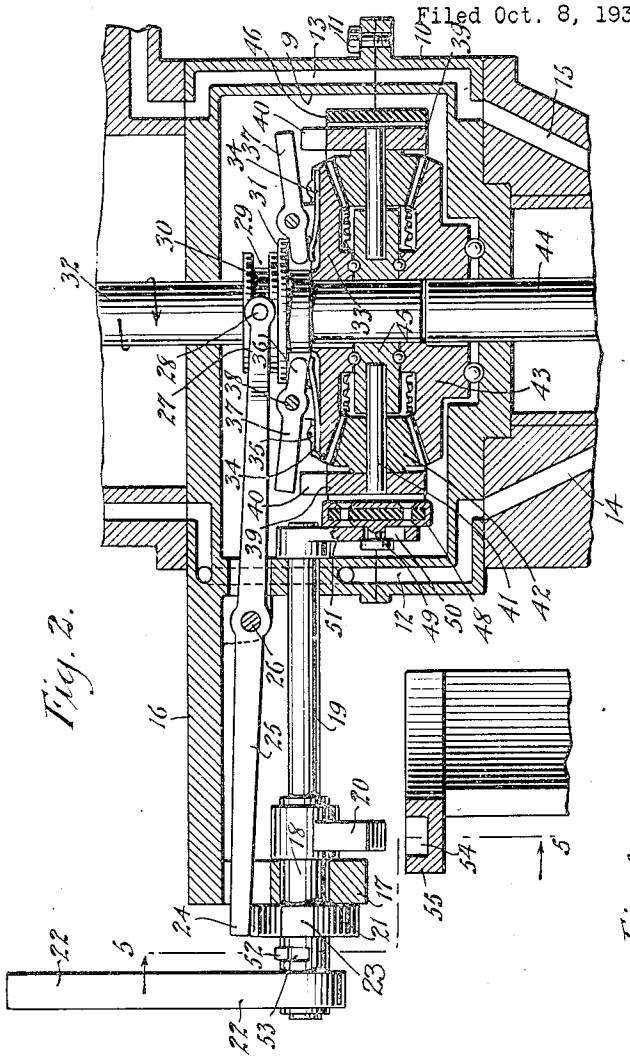


Fig. 2.

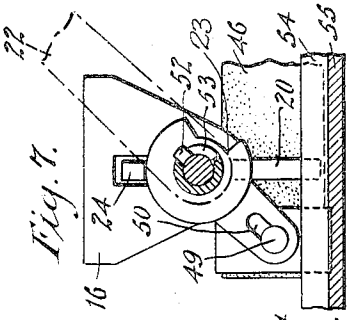


Fig. 7.

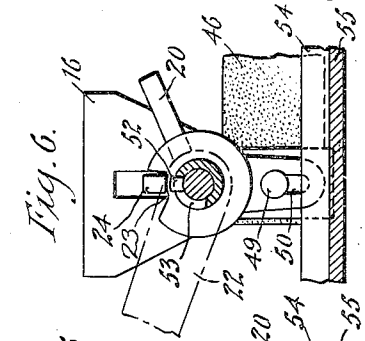


Fig. 6.

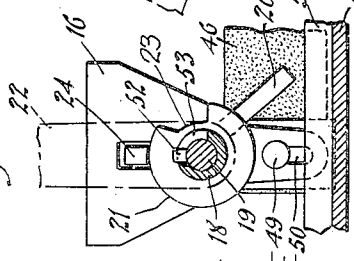


Fig. 5.

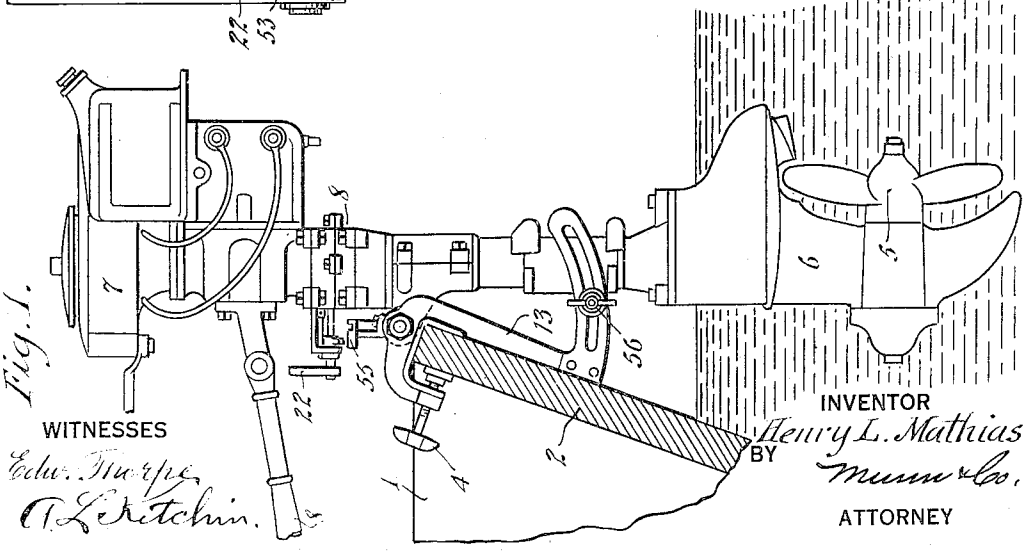


Fig. 1.

WITNESSES

Edw. Thorpe.

A. L. Ketchin.

INVENTOR

Henry L. Mathias

BY Munn & Co.

ATTORNEY

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Fig. 3.

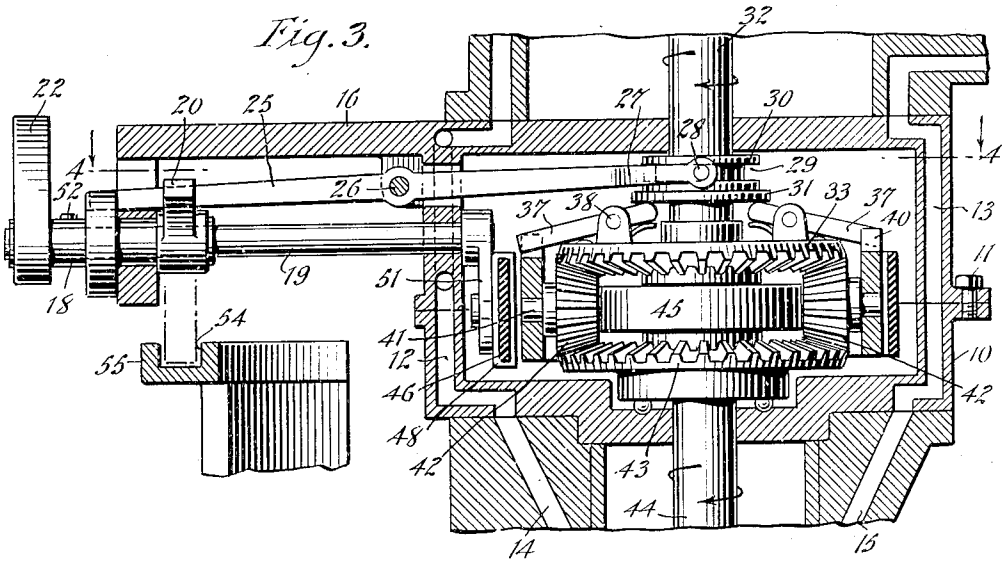


Fig. 4.

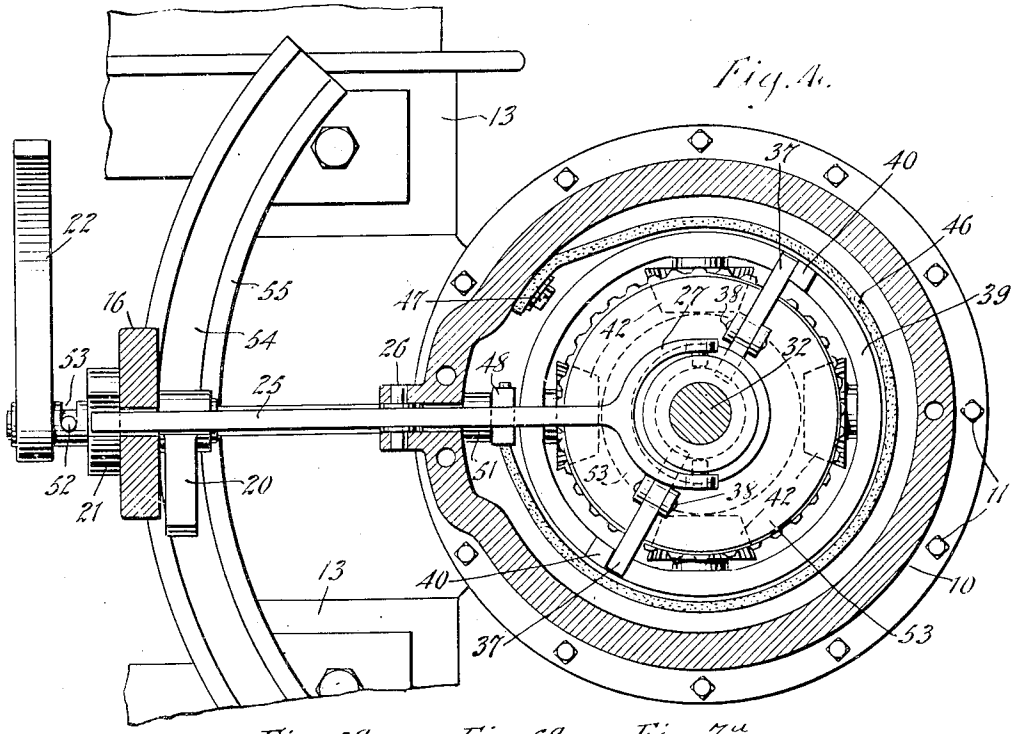


Fig. 5a

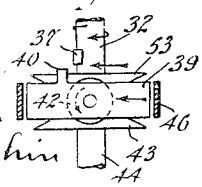


Fig. 6a

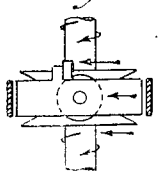
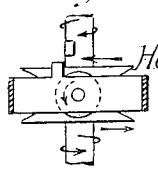


Fig. 7a



WITNESSES

Edw. Thorpe.

T. L. Hutchin

INVENTOR

Henry L. Mathias

BY

Munn & Co.

ATTORNEY

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UNITED STATES PATENT OFFICE

1,941,360

OUTBOARD MOTOR TRANSMISSION

Henry L. Mathias, Amsterdam, N. Y.

Application October 8, 1932. Serial No. 636,916

3 Claims. (Cl. 115—18)

This invention relates to transmissions for outboard motors, the object being to provide an improved construction which may be applied to outboard motors now in use or which may hereafter be manufactured, and when applied act to transmit power from the engine to the propeller.

Another object of the invention is to provide a power transmitting device for outboard motors wherein the same presents a structure which will permit the motor to be started and to run "idle".

A further object of the invention is to provide a transmission for outboard motors wherein means are provided which will transmit the power from the motor to the propeller so as to drive the propeller either forwardly or rearwardly according to the way the parts are set.

In the accompanying drawings—

Figure 1 is a fragmentary sectional view of part of a boat with an outboard motor of conventional type applied thereto, the motor having an embodiment of the invention associated therewith;

Figure 2 is an enlarged vertical sectional view through the transmission structure shown in Figure 1 and part of the associated structure;

Figure 3 is a view similar to Figure 2 but showing the moving parts mostly in elevation and in a different position to that illustrated in Figure 2;

Figure 4 is a sectional view through Figure 3 approximately on the line 4—4;

Figure 5 is a sectional view through Figure 2 on the line 5—5;

Figure 5a is a diagram showing a power transmitting means in the position assumed when the control is in the position shown in Figure 5;

Figure 6 is a view similar to Figure 5 but showing the parts moved to the position known as forward;

Figure 6a is a diagram showing the power transmitting parts in the position they occupy when the control is as shown in Figure 6;

Figure 7 is a view similar to Figure 5 but showing the parts moved to the position known as rearward;

Figure 7a is a diagram showing the power transmitting parts in the position they assume when the control is in the position shown in Figure 7.

Referring to the accompanying drawings by numerals, 1 indicates a boat of any kind having a rear member or board 2 designed to receive the clamping bracket 3 held in place by the usual clamping screw 4. These parts are all old and well known as well as the propeller 5, the casing 6 and the engine 7 with its shifting or steering arm 8. All of the parts above recited are old and well known and the particular outboard motor structure illustrated in Figure 1 being of the type on the market known as the Johnson outboard motor.

Arranged between the upper part of the casing 6 and the lower part of the engine 7 is a transmission casing 8 which with the associated parts embody the invention. The casing 8 as shown in Figure 2 is divided into a top section 9 and a bottom section 10 secured together by suitable screws or bolts 11. This casing is preferably cast although it may be formed in some other manner and when formed is provided with an inlet passageway 12 and an outlet passageway 13 whereby water may pass upwardly to the passageway 14 through passageway 12 and thence into the proper places in the cooling system of the motor 7. From the motor 7 the water passes downwardly through passageway 13 and finally out through passageway 15.

It will be understood that in the Johnson motor as well as in the other motors of this type, a small pump is provided which circulates water through the cooling system of the motor and the passageways 12 and 13 are provided so as not to interrupt the usual cooling systems now in common use.

Within the casing 8 most of the transmission mechanism is provided, but exteriorly thereof are found certain important parts. As shown in Figure 6, casing 8 is provided with an extension 16 having a depending rear bearing 17 for supporting the sleeve 18 through which the shaft 19 extends. An arm 20 is keyed or otherwise rigidly secured to sleeve 18 and rotates with this sleeve, said sleeve also having a cam 21 rigidly secured thereto so that whenever the control arm 22, which is rigidly secured to sleeve 18, is swung the cam 21 and arm 20 will also be swung accordingly.

As shown in Figure 5, cam 21 is provided with a notch 23 adapted to receive the end 24 of lever 25 which is pivotally mounted at 26. When the end 24 is resting on the outer surface of the cam, the lever 25 will be held in the position shown in Figure 2. When the control arm 22 is swung over to the left as shown in dotted lines in Figure 6, notch 23 will come opposite end 24 and end 24 will automatically move downwardly into notch 23 and permit the bifurcated end 27 of lever 25 to move upwardly. This lever is provided

with pins 28 extending into the groove 29 of the collar 30, said collar having an extending flange 31. The power shaft 32 extending from motor 7 extends through the upper part of casing 8 and downwardly to near the bottom of the casing whereby the collar 30 may freely slide thereon within the casing. A beveled gear wheel 33 is keyed or otherwise rigidly secured to shaft 32 so as to continually rotate therewith. This gear wheel has springs 34 secured thereto by suitable screws 35, said springs acting on the ends 36 of the clutch arms 37, said clutch arms being pivotally mounted at 38 on suitable ears secured to or formed integral with the gear wheel 33. When the cam 21 is in the position shown in Figures 2 and 5, collar 30 with its flange 31 will hold the outer ends of arms 37 upwardly. However, as soon as the parts are moved to the position shown in Figure 6, springs 34 will immediately function to swing the ends 36 upwardly and the outer ends of arms 37 downwardly so that they will rest on ring 39. This ring is provided with two stops or abutments 40, although a greater or less number could be used without departing from the spirit of the invention. As the arms 37 are mounted on the gear wheel 33 these arms will rotate with the gear wheel while rotating with the motor 7. By reason of this arrangement, the ring 39 will rotate whenever arms 37 have been lowered.

A number of pins 41 are carried by the ring 39, there being four pins shown although a greater or less number might be used. Each of the pins 41 carries a beveled gear 42, said gears continually meshing with the gear wheel 33 and also continually meshing with the gear wheel 43, which latter gear wheel is keyed or otherwise rigidly secured to the shaft 44 extending downwardly to operate the propeller 5. A ring 45 is rotatably mounted on the lower part of shaft 32 and receives the inner ends of the respective pins 41, as well as suitable ball bearings for the respective gear wheels 33 and 43.

When the parts of the structure as just described and the shaft 32 are rotating in the position shown in Figure 2, the engine 7 is idling and no part of the power is transmitted to the propeller 5. As the shaft rotates in idling position it will rotate gear wheel 33 and incidentally rotate gear wheel 42, but this gear wheel will merely roll over the gear wheel 43, thus not transmitting power to shaft 44. However, when it is desired to transmit power to shaft 44, the control arm 22 is moved to the dotted position shown in Figure 6 and immediately arms 37 will move downwardly and strike the respective abutments 40 so as to rotate ring 39 at the same speed as gear wheel 33. This will prevent independent rotation of gear wheel 42 and, consequently, these gear wheels will move gear wheel 43 and thereby transmit power to shaft 44.

When it is desired to reverse the direction of movement of the propeller 5, the arm 22 is first moved to the dotted position shown in Figure 5 which is the idling position, and then over to the dotted position shown in Figure 7. This last movement causes the brake band 46 to tighten against the ring 39 and stop the rotation thereof. Ring 39 may be stopped completely or may be merely checked in its movement. Where rotation of ring 39 is stopped completely the speed of the shaft 32 will be transmitted to shaft 44 but in a reverse direction as the various gear wheels are held against moving in a circle but are permitted to rotate freely on their respective pins 41. If a powerful reversing action is desired, the brake band 49 is pulled tightly against ring 39, but if it is only desired to check somewhat the forward movement of the boat 1 so as to slow the same down, band 46 is caused to check somewhat the rotation of ring 39.

It will be understood that the cam 21 holds lever 25 in such a position that the arms 37 will not be functioning when the brake band 46 is functioning. As shown in Figures 2, 3 and 4, one end of the brake band 46 is secured by a screw 47 rigidly to the housing 8 and the other end is secured rigidly by suitable rivets to a clamping sleeve 48, which sleeve has a pin 49 extending through a slot 50 in the arm 51, which arm is rigidly secured to shaft 19. Shaft 19 is provided with a pin 52 as shown in Figures 5 to 7 inclusive, said pin extending through an arc-shaped slot 53 formed in sleeve 18. The slot 53 permits a quarter of a circle movement to sleeve 18 before it moves shaft 19. In Figures 5 and 7 it is seen that when the parts are moved from idling to the forward position, sleeve 18 has moved for a quarter of a revolution but has not rotated shaft 19. However, when the parts are moved from the idling position as shown in Figure 5 to a rearward position as shown in Figure 7, sleeve 18 will press against the pins 52 and move the same so as to rotate shaft 19 a sufficient distance to cause the arm 51 and associated parts to compel the band 46 to grip ring 39. As heretofore mentioned, arm 20 is rigidly secured to sleeve 18, and as this sleeve is rocked or partly rotated arm 20 will be moved accordingly, but until the parts are moved into reverse or rearward position, arm 20 will not function. When the parts are moved to the reverse position arm 20 will move until the end thereof is fitting into groove 54 of the arc-shaped member 55, which member is bolted or otherwise rigidly secured to bracket 3.

When the propeller 5 is reversed the same will tend to swing the casing 6 and associated parts away from the stop or pin 56, but to prevent this one end of arm 20 is moved into the groove 54 at the time the parts are moved to produce a reverse rotation to the transmitting mechanism. Consequently, when the parts attempt to swing away from the boat 1, arm 20 bearing against one of the walls of the groove 54 will prevent such swinging movement, but by reason of the arc-shaped formation of the groove 54 the steering arm 8 of the motor may be swung back and forth to secure the desired steering action.

When the parts are as shown in Figures 1 and 2 the engine may be standing still or may be idling. When the arm 20 is swung from the position shown in Figures 2 and 5 to the dotted position shown in Figure 6, lever 25 will swing downwardly so as to permit arm 37 to also swing to a position for engaging the abutments 40, thus causing ring 39 to rotate with gear wheel 33. In a certain sense this ties the ring, gear wheel 33, gear wheel 42 and gear wheel 43 together so that they will all rotate in unison thus causing shaft 44 to rotate at the same speed as shaft 32.

When it is desired to disengage the power from the propeller but leave the engine running, it is only necessary to move lever 22 to the position shown in Figure 5 and this will result in arm 37 being raised to the position shown in Figure 2. When in this position the engine may idle.

If it should be desired to reverse the direction of the propeller 5 to check the speed of the boat

or to cause the boat to move in a reverse direction, arm 22 is swung over to the dotted position shown in Figure 7, whereupon brake band 46 will function to stop the rotation of ring 39 and, consequently, cause the gear wheel 42 to independently rotate and thereby permit a reverse movement of gear wheel 43 and shaft 44.

I claim:—

1. A transmission for outboard motors including a driving shaft, a driven shaft, a gear wheel secured to each of said shafts, a plurality of pinions continually meshing with said gear wheels, a ring carrying said pinions, said ring having an abutment, a pivotally mounted clutch lever carried by the gear wheel secured to the driving shaft, a spring tending to move the clutch lever into the path of movement of said abutment whereby the ring and gear wheel will rotate together, a sleeve acting on said clutch lever, a pivotally mounted second lever acting on said sleeve to cause the same to function, a rotating cam for normally holding said second lever in position for holding the clutch lever in a non-functioning position, said cam having a notch, and manually actuated means for moving said cam so that when the outer end of said second lever moves into said notch it will thereby release said sleeve, thus permitting said spring to move the clutch lever into the path of movement of said abutment.

2. A transmission for outboard motors including connecting gearing adapted to transmit power in either of two directions, said gearing including a driving shaft, a driven shaft, means including a rotatable pinion for regulating the direction of movement of said driven shaft, a brake for holding said pinion in a given position without interfering with its independent rotation, means including a rotatable shaft for causing said brake to function, a sleeve surrounding said rotatable shaft adjacent one end, manually actuated means connected with said sleeve for rocking the sleeve on said rotatable shaft, an arm rigidly secured to said sleeve, and a holding structure formed with an arc-shaped groove adapted to receive the end of said arm so that the arm and parts connected therewith may be moved in an arc without being permitted to tilt from a given plane.

3. A transmission for outboard motors including a driving and a driven shaft, power transmitting gears for transmitting power from the driving to the driven shaft, means for causing said gears to rotate to drive the driven shaft in a reverse direction, a brake band for causing said means to function, a rock shaft for moving said brake band to functioning position, a sleeve rotatably mounted on said rock shaft, a control lever secured to said sleeve for rotating the same, an arm rigidly secured to said sleeve, and a holding member having an arc-shaped groove positioned to receive said arm when the parts have been moved to a position for causing a reverse rotation of said driven shaft, whereby the outboard motor may be swung back and forth in one plane but is held from tilting.

HENRY L. MATHIAS.