April 26, 1955

H. L. BARBER ET AL

2,706,961

MOTOR DRIVEN PADDLE WHEEL ASSEMBLY

Filed July 29, 1952

4 Sheets-Sheet 1

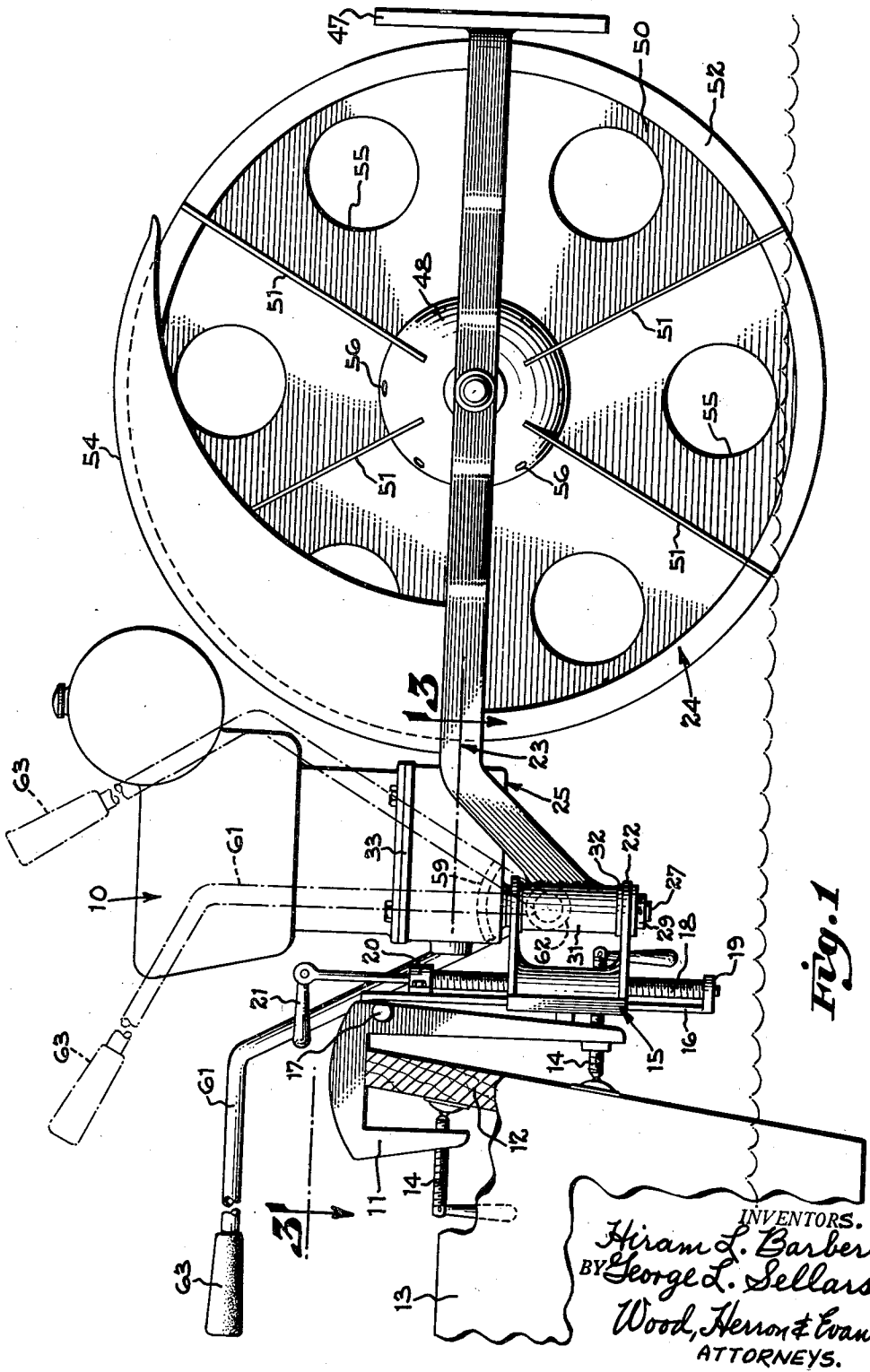


Fig. 1

INVENTORS.
Hiram L. Barber.
BY George L. Sellars.
Wood, Herron & Evans.
ATTORNEYS.

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4 Sheets-Sheet 2

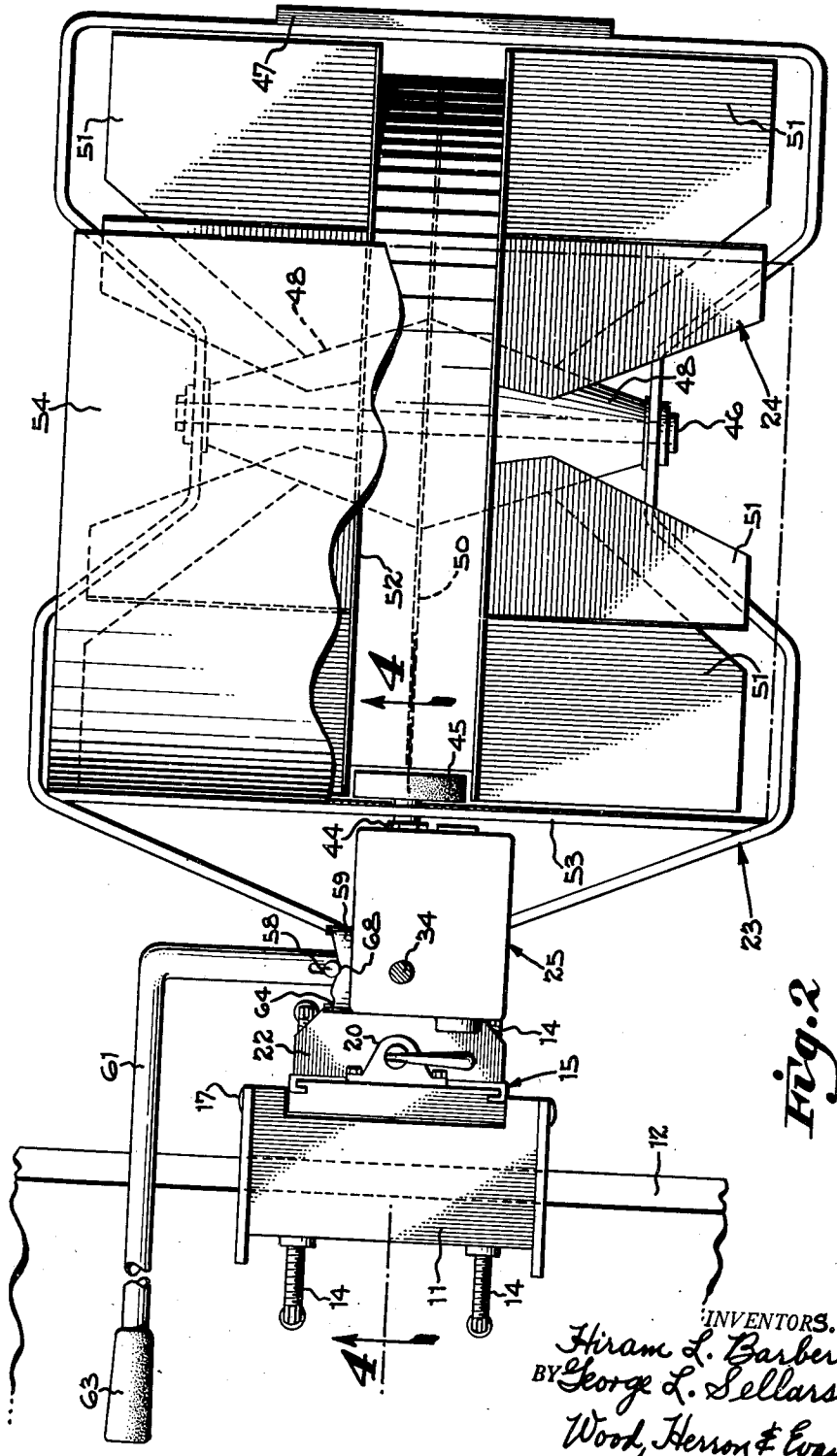


Fig. 2

INVENTORS.
Hiram L. Barber.
BY George L. Sellars.
Wood, Herron & Evans.
ATTORNEYS.

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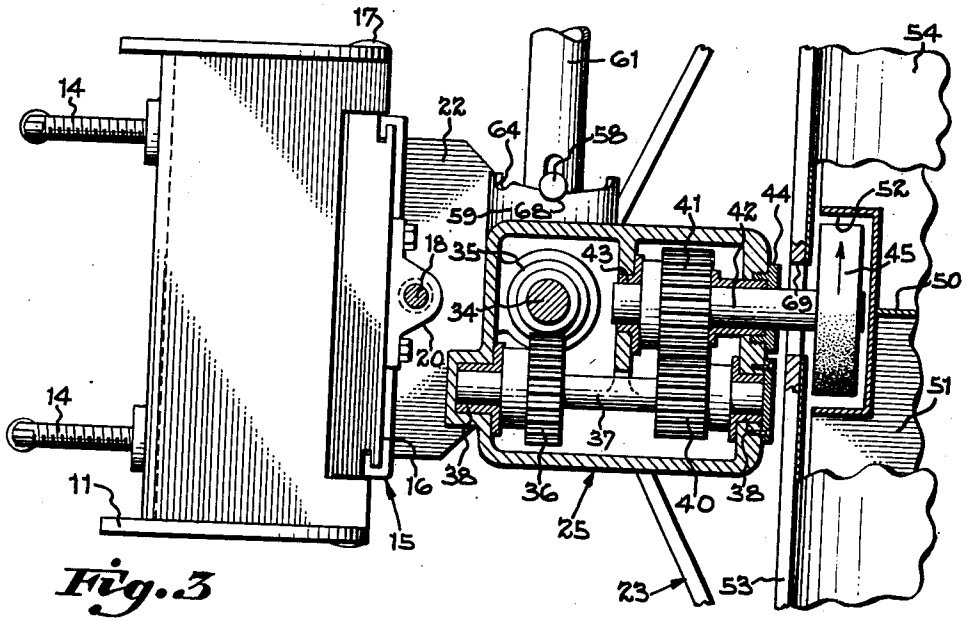


Fig. 3

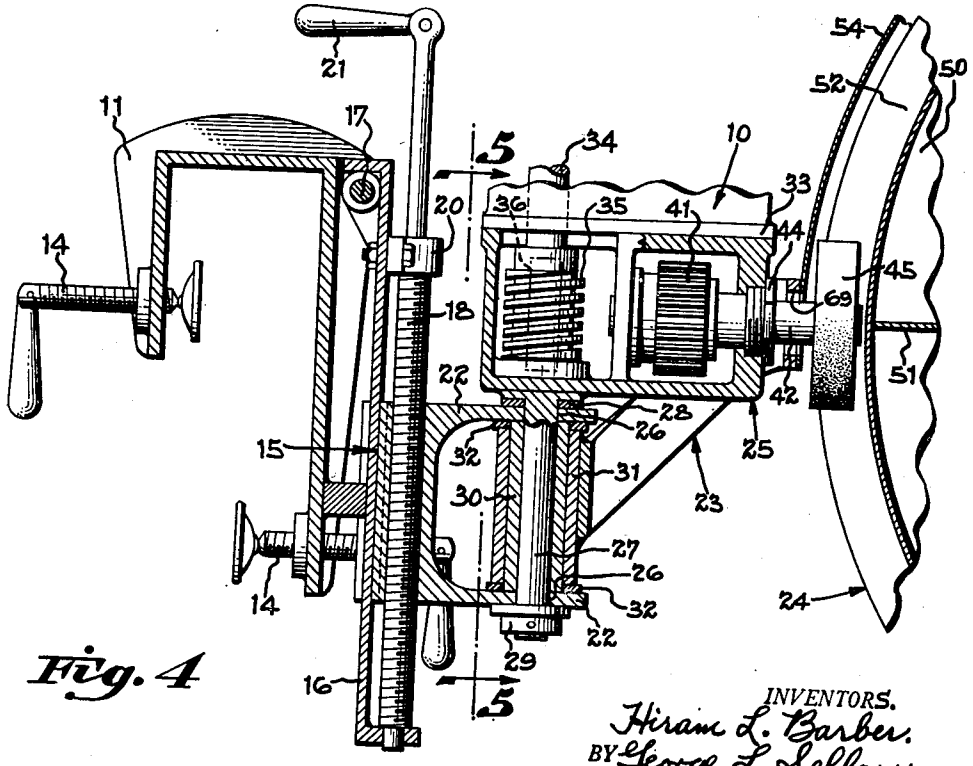


Fig. 4

INVENTORS.
Hiram L. Barber.
BY George L. Sellars.
Wood, Herron & Evans.
ATTORNEYS.

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4 Sheets-Sheet 4

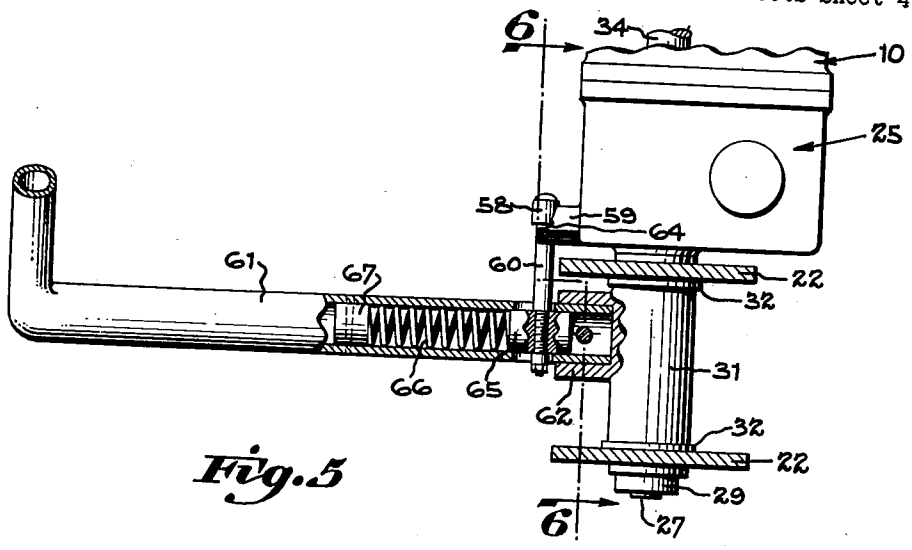


Fig. 5

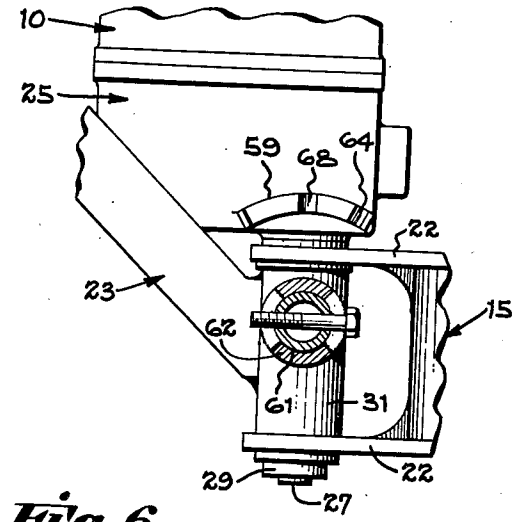


Fig. 6

INVENTORS.
Hiram L. Barber.
BY George L. Sellars.
Wood, Herron & Evans.
ATTORNEYS.

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MOTOR DRIVEN PADDLE WHEEL ASSEMBLY

Hiram L. Barber, Newtown, and George L. Sellars, Milford, Ohio

Application July 29, 1952, Serial No. 301,528

4 Claims. (Cl. 115—50)

This invention relates to improvements in motor driven paddle wheel assemblies of the type which are arranged to be clamped onto the transom of a small boat in the manner of the popular screw propelled outboard motor.

The assembly of this invention is designed primarily for use by fishermen, and toward this end it has been an objective of the invention to provide a propulsion unit for small boats which creates a minimum of underwater noise, which may be run at trolling speeds without placing undue strain upon the motor, and which is highly maneuverable.

Motor driven paddle wheel constructions of the outboard type have been suggested in the past. In general, a paddle wheel drive has the advantage that it requires little draught, in fact, even less than the boat itself, so that it is possible to use the propulsion unit in any waters which are of sufficient depth to float the boat. A paddle wheel drive also has the advantage that it is not likely to become fouled by bass weeds or other water vegetation so often found in good fishing waters. However, despite these advantages, outboard paddle wheel units have been used but little by fishermen. One reason may be that the units heretofore provided have been unwieldly to operate, which made it exceedingly difficult to maneuver the boat in close quarters. With this in mind the present inventors have provided a novel mount for their paddle wheel assembly which makes it possible to turn the boat on a short radius. In addition, the inventors have provided a novel driving connection between the motor and the paddle wheel which makes it possible to shift from forward to reverse drive without slowing down the motor nor shifting gears as such. The improvements which distinguish the present invention over past constructions are centered about this driving connection and relate to it, to the construction of the paddle wheel, to the relationship of the drive means to the paddle wheel assembly, and to a novel control handle construction which not only controls the turning of the boat but also controls the shifting of the driving connection from forward drive through neutral and into reverse.

These features and others will be more fully explained in the following detailed description of the drawings, in which:

Figure 1 is a side elevational view of a motor driven paddle wheel assembly embodying the principles of our invention.

Figure 2 is a top plan view of the assembly shown in Figure 1 in which certain of the parts are broken away to illustrate the details of the driving connection between the motor and the paddle wheel.

Figure 3 is a cross sectional view taken on the line 3—3 of Figure 1 illustrating in greater detail the drive connection.

Figure 4 is a cross sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a fragmentary cross sectional view taken on the line 5—5 in Figure 4.

Figure 6 is a cross sectional view taken on the line 6—6 in Figure 5.

The motor for driving the unit is indicated generally at **10**. The details of the motor are not shown inasmuch as the particular type used is not important to the successful operation of the assembly. It is suggested, however, that an air-cooled, two cylinder motor of opposed design, and of approximately 1 to 2 H. P. be employed. Such motors are readily available commercially, are inexpensive and have sufficient power to drive the assembly within the speed range desired for fishermen. An air-cooled

motor is preferred because underwater noises are kept at a minimum and such motors, being of rather simple design, are less apt to give trouble than those which are water-cooled.

A mounting clamp for the assembly is indicated at **11**, this clamp being shown secured onto the transom **12** of a boat **13** which is illustrated fragmentarily only in Figure 1. The clamp shown has two sets of screws **14**, one set being disposed inside and the other outside of the boat. The inside pair is above the other pair to accommodate the clamp to transoms which may be set at different angles. The clamp shown may be replaced by the ordinary C type clamp, commonly used for screw propelled outboard motors, in which an apertured sector plate is provided for adjusting the relation of the motor to the transom.

With a paddle wheel drive it is desirable to provide vertical adjustment for the paddle wheel relative to the transom board. To accomplish this, a mounting bracket such as the one shown generally at **15** may be slidably engaged upon a hanger plate **16** which is, in turn, pivotally secured near its upper end upon a cross bar **17** affixed to the clamp. In the instance shown, an adjustment screw **18** is mounted upon hanger plate **16**, the screw being generally vertically disposed with its lower end journalled in a boss **19** and its upper end journalled in a block **20**. A pivoted handle such as the one shown at **21** may be employed for operating screw **18**. As will be seen from Figure 4, mounting bracket **15** is threaded internally to accommodate screw **18**, so that upon turning screw **18**, mounting bracket **15** may be slid up or down upon hanger plate **16** to elevate or lower the paddle wheel assembly relative to clamp **11**. Other than providing means for securing the mounting bracket **15** to a boat in such a manner that it can be raised or lowered the specific construction of the above described parts is not critical as far as the improvements of the present invention are concerned.

Bracket **15** includes a pair of vertically spaced arms **22** which extend rearwardly from it. These arms constitute the mounting means for a frame, indicated generally at **23**, for a paddle wheel **24** and also for a transmission housing **25** which is part of the motor assembly. In general, the mount at bracket **15** is designed so that the paddle wheel may be turned about the vertical axis of the mount in order to steer the boat, and also so that the motor assembly may be shifted from position to position around the same vertical axis relative to the paddle wheel, in order to shift the driving connection between motor and paddle wheel. This relationship will be explained in detail at a later point, after the details of the mount, motor assembly and paddle wheel have been described.

Arms **22** are bored as at **26** to provide a pair of holes, which are in vertical alignment with one another, in order to provide journals for a stub shaft **27**. The upper end of stub shaft **27** is secured to the under side of the transmission housing **25**. Above the upper arm **22** a washer **28** may be employed to decrease the friction between the transmission and the upper arm. The lower end of the stub shaft **27** extends through the journal in lower arm **22** and a washer and collar unit **29** pinned to it to lock the shaft in place. An inner bushing **30** fits on stub shaft **27** between the two arms **22**. Around bushing **30** a second bushing or collar **31** is disposed. At the ends of the second bushing antifriction washers such as the ones shown at **32** may be employed. The outer collar **31** and the stub shaft **27** thus are free to turn relative to one another within bracket **15** (see Figure 4). The second or outer bushing **31** carries frame **23**, the frame preferably being welded to it. It will be seen, therefore, that the motor and the paddle wheel assembly may be turned about the vertical axis of bracket **15** either together or individually so that relative movement between the two is provided.

Stub shaft **27** may either be formed as a part of the transmission housing or secured to it by welding, bolts, or other well-known means. The upper end of transmission housing **25** is flanged as at **33** and the motor bolted thereon. In the particular embodiment shown, a drive shaft **34** of the motor depends into transmission housing **25** and has a worm gear **35** keyed at its lower

end. Worm gear 35 is in driving connection with a gear 36 mounted upon a shaft 37 which is journalled inside transmission housing 25 in a generally horizontal position between bearings 38—38, gear 36 being in the forward part of transmission housing 25. In the rear part of the housing a second and smaller gear is keyed to shaft 37. This gear is indicated at 40 and is, in turn, intermeshed with a larger gear 41 which is mounted upon a shaft 42. Shaft 42 is journalled at its forward end in a bearing 43 seated within an inner wall of the transmission housing, whereas the opposite end of shaft 42 extends through the rear wall of the transmission housing, being journalled in a water tight bearing 44. At the outer end or rear of shaft 42 a rubber treaded driving wheel 45 is keyed. It should be noted that shaft 42 lies upon a radial line of the motor drive shaft 34.

The paddle wheel rotates about a shaft 46 which is journalled at its opposite ends in the frame 23. The frame itself may be made from strap iron or steel which is bent so as to generally follow the contours of the paddle wheel, the outline as seen from above being shown in Figure 2, and its outline as seen from the side being shown in Figure 1. The forward portion of the frame is generally V-shaped, with the sides converging upon bracket 15, so that the paddle wheel may be swung from side to side for steering purposes. The present paddle wheel is of such size that it is necessary to bend the forward end of the frame downwardly in order to weld it to bushing 31. At the rear of the frame a plate 47 may be affixed, the plate serving as a stand upon which the assembly may be rested when not in use.

The core of the paddle wheel comprises a pair of conical hub members 48—48. These hub members are welded at the opposite sides of a circular web 50. The two conical hub members are aligned with one another with their axes and the axis of the web coinciding. The paddle blades of the wheel are indicated at 51. Each member is welded at its inner edges to the hub and the web. In addition, the outer periphery of web 50 is welded to the inner surface of a circular channel member 52 which extends around the paddle wheel, being centered thereon. The circular channel member 52, which we term a "drive channel," is also welded to each of the paddle blade members 51 which serves to strengthen the paddle wheel assembly considerably.

It is preferred that all the parts of the paddle wheel assembly, namely the blades, hubs, web and channel, be fabricated from a corrosion resistant sheet metal such as stainless steel. This is particularly important where the assembly is to be used in salt water.

A cross bar 53 adjoins the opposite sides of the frame 23 just forwardly of the path of rotation of the paddle blades and to this is affixed one end of an arcuate splash guard 54. If desired, the opposite side edges of guard 54 may be carried rearwardly, as shown in Figure 1, to keep water from splashing into the boat or upon the motor when the paddle wheel is turned with respect to the boat.

As shown in the drawings, the entire paddle wheel assembly is of welded construction. It will be obvious, however, that the same configuration can be fabricated in a riveted construction in which the joined edges are flanged. In addition, the paddle blades themselves may be corrugated or otherwise strengthened if desired. In the instance shown the circular web of the wheel is cut out as at 55 between each of the blades in order to decrease the weight of the assembly. Drain holes such as those shown at 56 may be provided between blades at the inner ends of the hub members to permit water which might collect inside of the hubs to escape. The paddle wheel assembly rotates freely upon shaft 46 and, therefore, the bearing constructions at the ends of the shaft may be of very simple design, any standard anti-friction bearing being sufficient. The paddle wheel need take only a shallow "bite" of the water in order to propel the boat. Thus, there is little likelihood of ever damaging the paddle wheel blades by running into an underwater obstruction.

Referring now to Figure 3, drive channel 52 is sufficiently wide to accommodate drive wheel 45 with from an eighth to a half inch clearance at each side of the wheel when it is centered and disposed within the channel as shown. As has been indicated above, the motor assembly is shiftable relative to the paddle wheel assembly; thus when the motor assembly is shifted slightly in

a counterclockwise direction as viewed in Figure 3, and with the drive wheel turning in a clockwise direction as viewed from the rear, the tread of the drive wheel is brought into rolling contact with the side of the drive channel at the right side of the boat. This causes the paddle wheel assembly to be driven in the forward direction. Shifting the motor assembly relative to the drive channel in the opposite direction, while maintaining the same direction of rotation of the drive wheel 45, causes the wheel to engage the left side wall of drive channel 52, and consequently, the paddle wheel is driven in the reverse direction.

Reversal is thus effected by the relative movement indicated above without reversing the direction of the drive of wheel 45. This expedient simplifies the construction considerably over drives in which such reversal is made by a change of gears.

The relative shifting is brought about by moving the transmission housing, that is, the whole motor assembly, relative to the paddle wheel frame, and consequently, the drive channel 52. This is done by means of a spring urged cam roller 58 and a cam sector 59. The net effect of these two elements is to shift the transmission housing in a horizontal plane about the vertical axis of stub shaft 27 relative to the bushing 31 to which the paddle wheel frame is affixed. The details of construction of the two cam elements and the manner in which they operate are shown in Figures 5 and 6. Cam roller 58 is journalled at the upper end of a pin 60. This pin is mounted in a hollow control handle 61 which has its inner end pinned into a journal 62 welded at the right side of bushing 31. The opposite end of the control handle is bent upwardly at an angle and then forwardly (see Figure 1) to bring a grip 63 at its forward end into a position in which it can be grasped easily by the operator. It will be seen that by moving grip 63 in a horizontal plane the whole paddle wheel assembly including the motor and the paddle wheel swing about the axis of stub shaft 27 for steering the boat. The turning action, when the control handle is so swung, is somewhat like that of the ordinary screw propelled outboard motor. However, when the handle is brought into the position shown in solid lines in Figure 1, the cam roller 58 is moved forward of the pivotal axis of the transmission housing. The cam sector 59, as viewed from the top in Figure 3, is arcuate with both ends being farther removed from the transmission housing than the center. When the handle is swung down, cam roller 58 is caused to track along the forward part of the cam sector and finally drop into a niche 64. In this position, the cam roller is ahead of the axis in rotation of the transmission housing so that the drive wheel is forced to the right into rolling engagement with the right side of the drive channel to drive the paddle wheel in the forward direction. Preferably, pin 60 which carries cam roller 58 is spring urged toward the transmission housing. This may be accomplished, as shown in Figure 5, by extending the pin through a pair of slots at opposite sides of the tubular handle 61, with the portion of the pin inside the handle being threaded through a slidable plug 65 disposed within the handle. A coil spring 66 may be employed, the spring being under tension between the slidable plug 65 and a stationary plug 67 which is pinned inside handle 61.

The lowest portion of the cam sector 59 may also be niched as at 68. This niche corresponds to a neutral position, or centered position, which is directly opposite to the vertical axis of stub shaft 27. By swinging handle 61 up beyond the neutral position, cam roller 58 is caused to track upon the rear portion of the arcuate cam sector 59 where it is behind the pivot of the transmission housing. This movement causes the motor assembly to swing clockwise as viewed in Figure 3 to bring drive wheel 45 into rolling engagement with the left side of the drive channel. As described above this causes the paddle wheel to rotate in the reverse direction.

It will be observed from Figures 3 and 6 that the rear portion of the cam track on sector 59 is not niched so that in order to propel the boat backward, it is necessary to hold the control handle in its uppermost position. It will also be noted that the action of spring 66 will cause the roller to move drive wheel 45 into neutral position whenever the handle is released. In forward drive, of course, the niche 64 holds cam roller 58 at the forward end of the cam track. This arrangement is provided so that whenever the boat is being driven

rearwardly, the drive must be maintained by a conscious effort upon the part of the operator. Thus, the operator will tend to be observant of what is in the back of the boat, because, if the paddle wheel assembly were backed into an obstruction, the blades might be damaged. In addition, since the neutral niche **68** and forward niche **64**, being the only two places in which the handle will remain stationary, there is little likelihood of the operator starting the motor in reverse drive and immediately backing into an obstruction.

The drive wheel material at the tread, at least, preferably is of a resilient material such as rubber. It is found that a surprising amount of friction is developed between the side walls of the channel and the drive wheel so that there is little or no slippage between the two surfaces even when the motor is speeded up suddenly. The clearance at the two sides of the drive wheel in the drive channel should be a minimum so that little relative movement between the transmission and the paddle wheel assembly is required. Under these circumstances, little maneuvering of the control handle from neutral is required to shift from forward to reverse, and vice versa; this facilitates the movement of the boat. The cross bar **53** should be slotted horizontally as at **69** to accommodate shaft **42**, as shown in Figure 3.

The motor outfit of this invention is ideally suited for use by fishermen. The transmission shown gears down the drive considerably, but added to this is the differential ratio existing between the diameter of the drive wheel and the diameter of the circular drive channel. The motor may, therefore, be run at a speed which places no strain upon it while the paddle wheel is being turned over slowly, for example, when trolling. On the other hand, when the motor is running near top speed, it is found that the boat is propelled sufficiently fast to make it practical to travel comparatively long distances with the outfit.

Having described our invention, we claim:

1. In a motor driven outboard paddle wheel assembly, a mounting bracket, a paddle wheel frame, a motor unit, said motor unit and frame individually pivotally journalled at said mounting bracket, a drive wheel carried and driven by said motor unit, a channel disposed about the periphery of said paddle wheel, said drive wheel disposed within said channel, and control handle means for effecting relative shifting movement between said motor unit and said frame for selectively engaging the thread of said drive wheel with one side of said channel or the other.

2. An outboard paddle wheel assembly comprising a clamp member for mounting the assembly on the transom of a small boat, a mounting bracket carried by said

clamp member, means for adjusting said mounting bracket vertically with respect to said clamp member, a frame, a paddle wheel rotatably mounted in said frame, said motor unit and frame individually pivotally journalled upon a common, vertical axis at said mounting bracket, a control handle arranged to turn said frame for steering purposes upon being swung substantially horizontally, drive means for connecting said motor unit to said paddle wheel, said means being engageable upon movement of the motor unit relative to said frame, and means effective upon the swinging of said handle in a substantially vertical plane for effecting such relative movement.

3. In a motor driven outboard paddle wheel assembly, a mounting bracket, a paddle wheel frame having a paddle wheel rotatably mounted therein, said frame pivotally journalled to said mounting bracket for horizontal swinging movement, a handle attached to said frame at the mounting bracket for swinging the paddle wheel frame for steering purposes, a motor unit, drive means adapted to connect said motor unit to said paddle wheel, said drive means being engageable upon movement of the motor unit relative to said frame, and means effective upon the swinging of said handle in a substantially vertical plane for effecting such relative movement.

4. An outboard paddle wheel assembly comprising a clamp member for mounting the assembly on the transom of a small boat, a bracket carried by said clamp member, a frame, a paddle wheel rotatably mounted in said frame, said frame pivotally journalled to said mounting bracket for horizontal swinging movement about a vertical axis, a motor unit pivotally mounted for swinging movement about the same vertical axis, drive means for connecting said motor unit to said paddle wheel, said drive means being engageable upon movement of the motor unit about said vertical axis relative to said frame, a handle attached to said frame for horizontal swinging movement therewith, and means connecting said handle to said motor unit effective upon the swinging of said handle in a substantially vertical plane for moving the motor unit about said vertical axis relative to said frame.

References Cited in the file of this patent

UNITED STATES PATENTS

239,438	Buchanan	Mar. 29, 1881
827,619	Cox	July 31, 1906
2,587,343	Lind	Feb. 26, 1952

FOREIGN PATENTS

20,383	Great Britain	of 1902
309,789	Italy	July 17, 1933
986,890	France	Apr. 4, 1951