March 31, 1953 C. L. RAYFIELD 2,633,096

MANUALLY OPERATED OUTBOARD MOTOR

Filed July 28, 1948 5 Sheets-Sheet 1

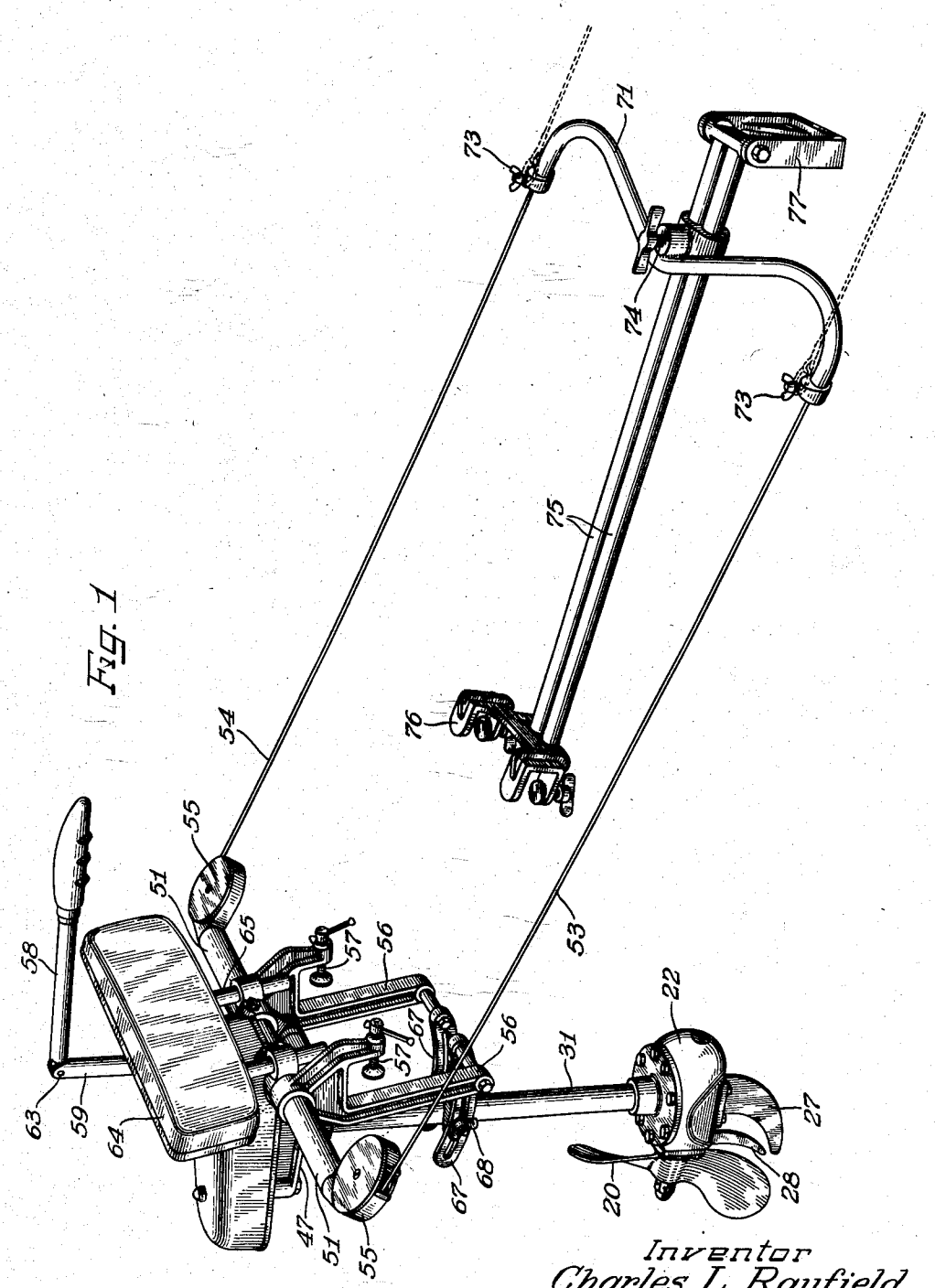


Fig. 1

Inventor
Charles L. Rayfield

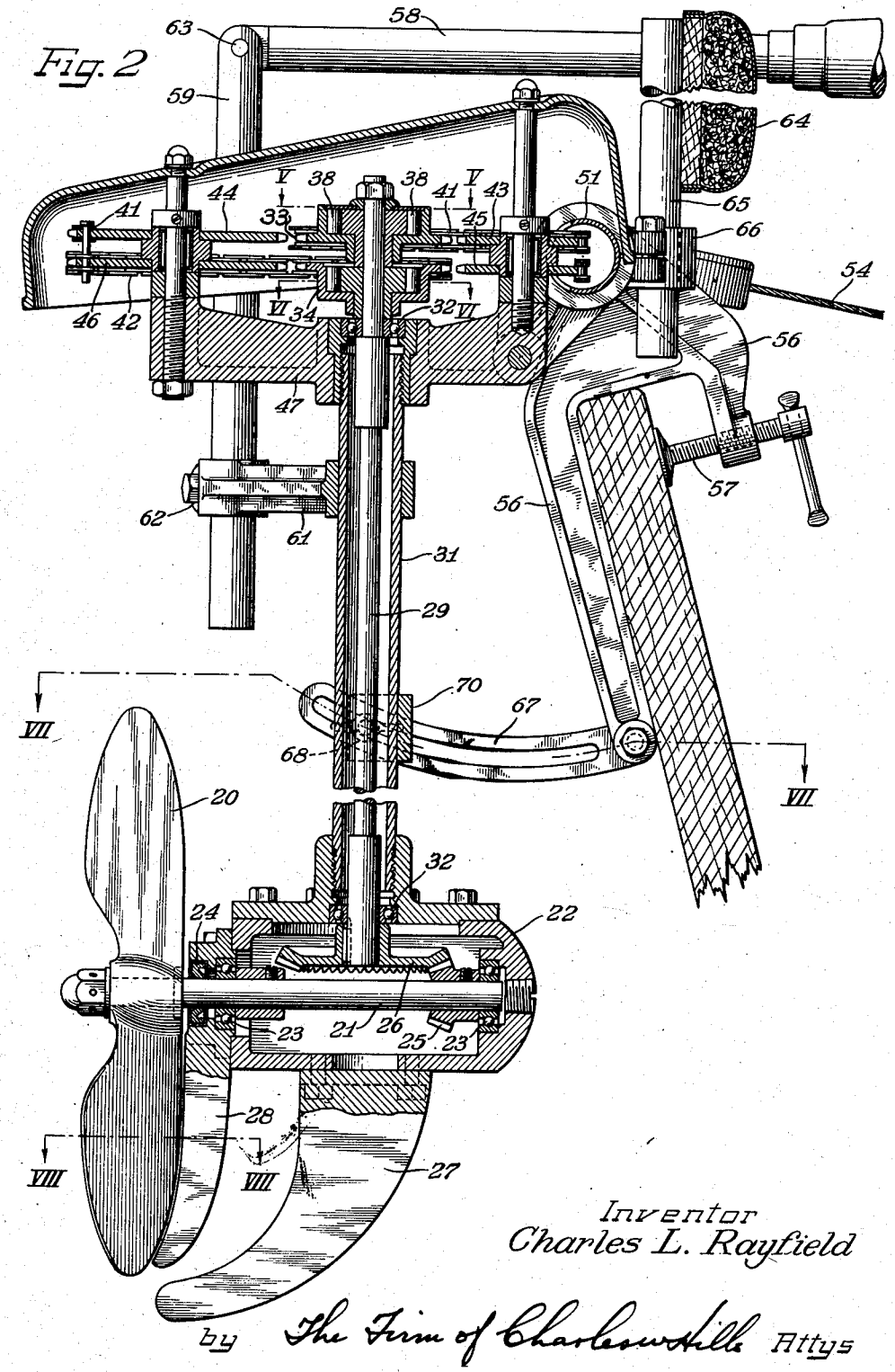
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March 31, 1953 C. L. RAYFIELD 2,633,096

MANUALLY OPERATED OUTBOARD MOTOR

Filed July 28, 1948 5 Sheets-Sheet 2

Fig. 2



Inventor
Charles L. Rayfield

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March 31, 1953 C. L. RAYFIELD 2,633,096

MANUALLY OPERATED OUTBOARD MOTOR

Filed July 28, 1948 5 Sheets-Sheet 3

Fig. 3

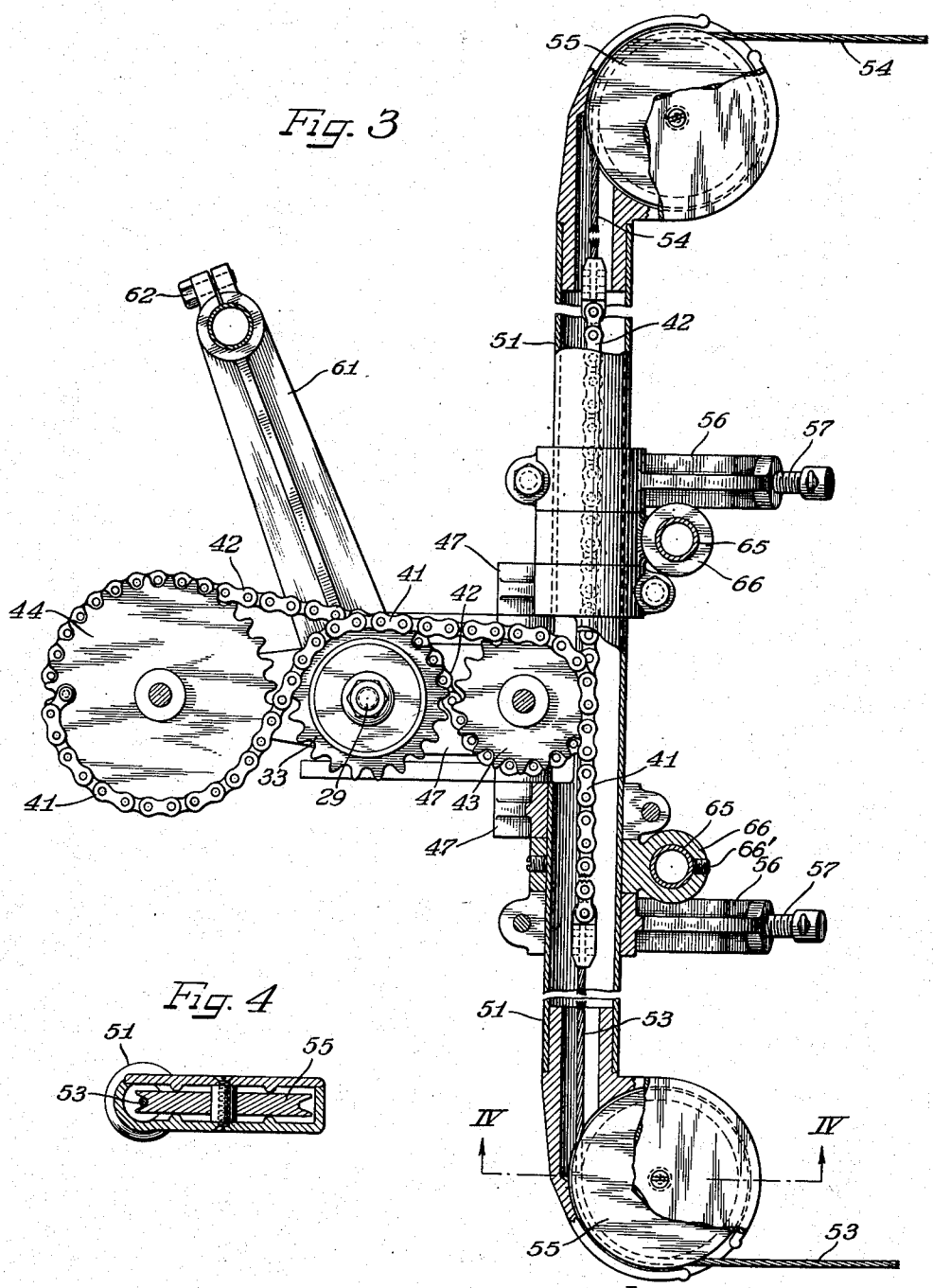


Fig. 4

Inventor
Charles L. Rayfield

by The Firm of Charlesworth Attys

March 31, 1953 C. L. RAYFIELD 2,633,096

MANUALLY OPERATED OUTBOARD MOTOR

Filed July 28, 1948 5 Sheets-Sheet 4

Fig. 5

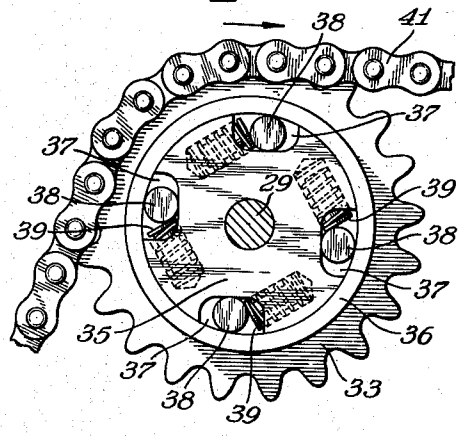


Fig. 6

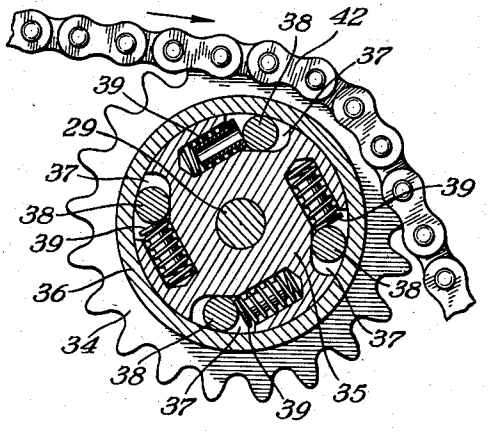


Fig. 7

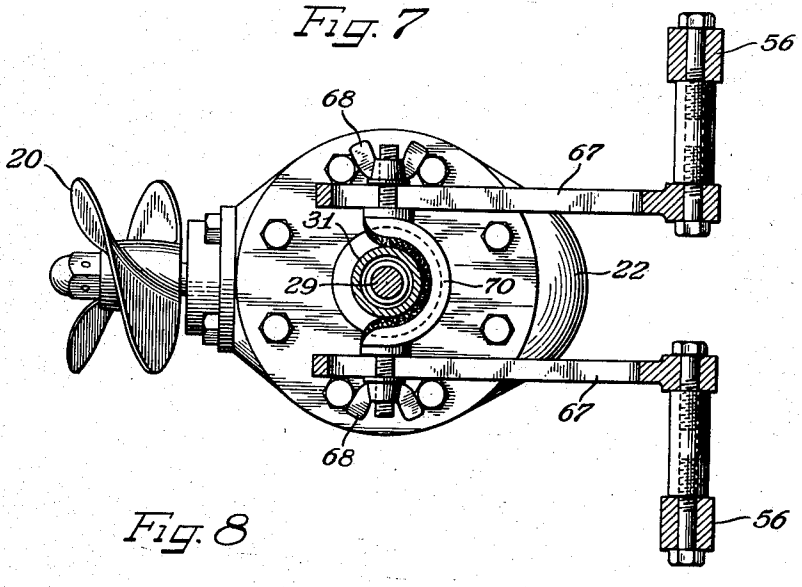
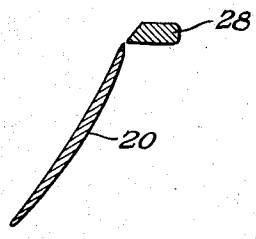


Fig. 8



Inventor
Charles L. Rayfield

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March 31, 1953 C. L. RAYFIELD 2,633,096

MANUALLY OPERATED OUTBOARD MOTOR

Filed July 28, 1948 5 Sheets-Sheet 5

Fig. 9

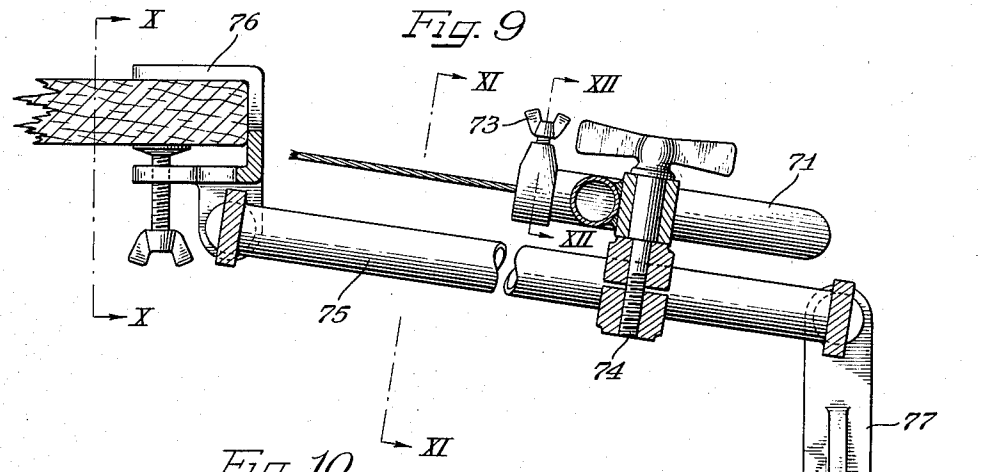


Fig. 10

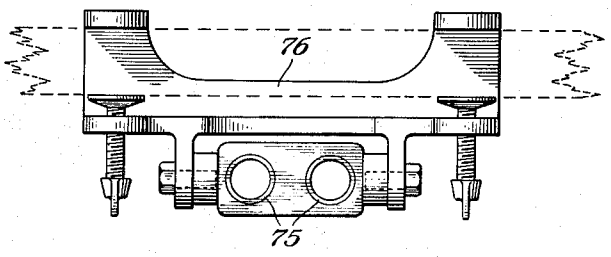


Fig. 11

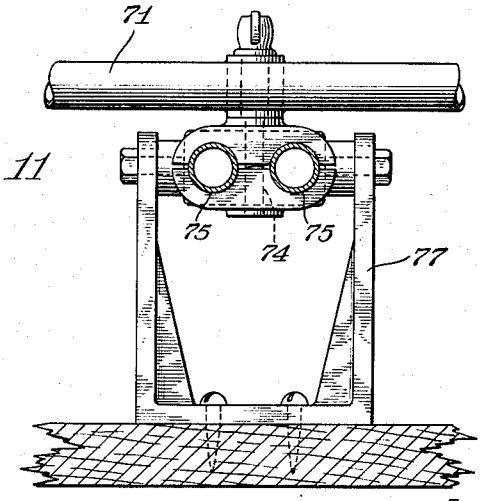
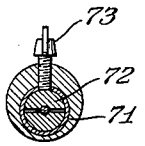


Fig. 12



Inventor
Charles L. Rayfield

by The Firm of Charlesworth & Hills Attys

Patented Mar. 31, 1953

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UNITED STATES PATENT OFFICE

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MANUALLY OPERATED OUTBOARD MOTOR

Charles L. Rayfield, Chicago, Ill., assignor to C. L. Rayfield Company, Chicago, Ill., a corporation of Illinois

Application July 28, 1948, Serial No. 41,103

5 Claims. (Cl. 115—24)

1

This invention relates to a demountable device for propelling row boats, canoes, and similar small water craft. More specifically, the invention relates to a foot treadle operated outboard propelling mechanism for use in boats.

Many states have laws prohibiting the use of outboard motors in trolling. In such states if an ordinary rowboat is used in trolling it is necessary for someone to handle the oars while the fisherman trolls. Accordingly, there has been a need for a manually operated boat-propelling device which would leave the operator's hands free. This invention provides such a device.

It is an object of the invention to provide an easily controlled means whereby an operator may manually propel a boat.

It is a further object of the invention to provide a demountable outboard propelling device for a boat which an operator may energize by means of a foot treadle while facing forward in the boat.

It is another object of the invention to provide a demountable outboard propelling device for a boat in which propelling cables may be easily adjusted as to length.

It is another object of the invention to provide an outboard propelling device for a boat in which a screw type propeller is kept clean of plant material.

It is still another object of the invention to provide an outboard propelling device for a boat, which device includes an operator's back rest as an integral part thereof.

Other and further objects of the invention will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which disclose preferred embodiments of the invention.

On the drawings:

Figure 1 is a perspective view of the outboard propelling device, showing its position during operation;

Figure 2 is a side elevation partially in cross-section, showing the device exclusive of the treadle as it appears when fastened to the transom of a boat;

Figure 3 is a top view partially in cross-section of the device of Figure 2 with the chain-driven gears exposed to view;

Figure 4 is a vertical cross-sectional view taken along the line IV—IV of Figure 3;

Figure 5 is a horizontal cross-sectional view taken along the line V—V of Figure 2;

Figure 6 is a horizontal cross-sectional view of the lower sprocket taken along the line VI—VI of Figure 2;

2

Figure 7 is a horizontal cross-sectional view taken along the line VII—VII of Figure 2;

Figure 8 is a horizontal cross-sectional view of one of the propeller blades and the weed-cleaning knife taken along the line VIII—VIII of Figure 2;

Figure 9 is a partial cross-sectional view of the treadle mechanism;

Figure 10 is a view of the treadle clamp taken along the line X—X of Figure 9;

Figure 11 is a cross-sectional view of the treadle mechanism taken along the line XI—XI of Figure 9; and

Figure 12 is a cross-sectional view of the split bushing and wing nut used in tightening the flexible cables of the treadle taken along the line XII—XII of Figure 9.

As shown on the drawings:

Figures 1 to 8, inclusive, show various aspects of that part of the device which fastens onto the stern of the boat and the operation of this portion of the device will be discussed first. It will be observed that this part of the device resembles a conventional engine propelled outboard motor and many of the parts function in a manner similar to comparable parts on an outboard motor. Thus, a propeller **20** (Figures 1, 2 and 7) is mounted on a shaft **21** (Figure 2) which extends into a gear box **22** in which it is supported by bearings **23**. A Garlock type seal **24** in the gear housing **22** helps to keep out water. A beveled pinion gear **25** on the shaft **21** meshes with a bevel gear **26** and acts to turn the axis of rotation through approximately a 90° angle. The gears **25** and **26** are also in a step-up ratio in order to increase the forward thrust of the propeller. A vane **27** is attached to the bottom of the gear housing **22** and serves the two-fold purpose of protecting the propeller **20** from fracture and acting as a rudder in steering. In back of the vane **27** is a knife-like member **28** which is curved to fit the contour of the propeller **20** and which has a sharp edge disposed immediately opposite the leading edge of the propeller. In the view of the propeller and knife blade shown in Figure 8 it can be seen that the knife blade would shear off any weeds and grasses clinging to the propeller **20**, thereby keeping the mechanism in good running order.

The gear **26** is mounted on a vertical shaft **29** which rotates inside a vertical supporting member **31**. The shaft **29** is supported by bearing members **32**. Mounted above the top bearing member of the shaft **29** are two sprockets **33** and **34** (Figure 2).

The operation of the sprockets **33** and **34** will be

described more fully with reference to Figures 5 and 6. The sprockets 33 and 34 consist of an inner circular disk 35 which is rigidly attached to the shaft 29 and an outer rim 36 which is concentric with the circular disk 35. A slight clearance is left between the members 35 and 36 and they can rotate independently of each other. Both the sprockets 33 and 34 are rigidly attached to their respective rims 36. Grooves 37, provided in the disk 35, are not symmetrical, but are shallower on one end than on the other, a shallow end of one groove following behind the deep end of another groove around the perimeter of the disk 35. A roller member 38 is located in each of the grooves 37, the roller members 38 being provided with the diameter slightly greater than the depth of the grooves 37 at the shallow end thereof. Each of the grooves 37 has a spring imbedded in the disk 35 and impinging on the roller member 38 from the deep end of the groove.

In operation, when the sprockets 33 and 34 are rotated clockwise, the interior surface of the rims 36 runs the rollers 38 toward the shallow end of the grooves 37. When the rollers 38 reach the end of the grooves 37 they are in tight engagement with the rim 36 and consequently the clockwise rotation of the sprockets 33 and 34 will effect rotation of the disks 35 and the shaft 29. When the sprockets 33 and 34 are rotated counter-clockwise, the roller members 38 are rolled toward the deep end of the grooves 37 where the diameter of the rollers 38 is less than the depth of the grooves 37. The clearance between the disk 35 and the rim 36 enables these two members to rotate independently of each other. Thus, the shaft 29 may be rotated in only one direction by the sprockets 33 and 34.

The sprockets 33 and 34 are rotated respectively by means of chains 41 and 42. The chain 41 runs around a forward idler member 43 and a rear idler member 44 to which it is anchored. The chain 42 runs around a front idler member 45 and a rear idler member 46 to which it is anchored in a manner similar to the chain 41. Both the front idler units 43 and 45 may be a single unit as they always rotate in the same direction and this is also true of the idler members 44 and 46.

The shafts on which the front and rear idler members turn are imbedded in a supporting frame 47 of the apparatus. The vertical supporting member 31 is pivotally attached to the frame 47. The gear box 22 is rigidly attached to the vertical supporting member 31 and the three parts—the gear box 22, the vertical supporting member 31, and the frame 47—constitute the stationary skeleton of the apparatus.

The front part of the frame 47 pivots around a horizontal tube 51. The center of the horizontal tube 51 has an aperture into which the idler members 43 and 45 extend. The chains 41 and 42 run around the idler members 43 and 45 respectively from opposite directions and enter the tube 51 from opposite directions. It will be noted that the chains 41 and 42 are so disposed upon their respective idler members that the front and rear idler members will always rotate in opposite directions. It will also be observed that the sprocket 33 rotates in unison with the front idler member while the sprocket 34 rotates in an opposite direction from its front idler member. Thus, the sprockets 33 and 34 always rotate in opposite directions.

Inside the horizontal tube member 51, the chains 41 and 42 are connected respectively to flexible cables 53 and 54. The flexible cables 53 and 54 run around pulleys 55 located at the end of the horizontal tube 51. These pulleys 55 rotate around a vertical axis and serve to turn the flexible cables 53 and 54 through about a 90° angle in a substantially horizontal plane.

The tube member 51 serves as a pivot axis for a clamp member 56. The clamp member 56 has two tightening screws 57 which serve to attach the device to the transom of a boat, or to an outboard bracket.

A tiller handle 58 is pivotally attached to a vertical member 59, which is adjustably mounted through a post 61—the tiller handle 58, the vertical member 59 and the post 61 constituting the tiller assembly. The post 61 is rigidly attached to the vertical supporting member 31. The vertical supporting member 31 is in pivotal contact with the frame 47 and can rotate around the vertical axis. The height of the tiller handle 58 may be adjusted by moving the vertical member 59 up or down through the arm 61. When the proper height has been achieved, the adjustment screw 62 on the arm 61 is tightened and thereafter the direction of thrust of the propeller 20 may be changed by manipulating the tiller handle 58. The tiller handle 58 pivots through a 180° angle around a pin 63 on the vertical member 59. In order to reverse the direction of thrust of the propeller 20, it is only necessary to swing the tiller handle 58 through a 180° angle and then to rotate the vertical member 31 through a 180° angle so that the propeller 20 is thrusting toward the bow of the craft rather than away from the bow of the craft. The tiller handle 58 is then on the right side of the operator rather than the left side.

Since the operator faces forward, it is convenient to have a back rest in conjunction with the apparatus. This has been provided by a cushion 64, which is attached to two posts 65, which extend through post supports 66, attached to the frame member 47. As may be seen by reference to Figure 3, the post supports 66 have set screws 66' so that the height of the cushion 64 may be adjusted.

In order to maintain the device in a vertical position irrespective of the angle of the boat transom or outboard bracket, the clamp 56 has been provided with the arms 67 (Figures 2 and 7) extending rearward from the base thereof. The vertical member 31 has a collar 70 with two bolts extending outward from the sides thereof through arcuate slots in the arms 67. A wing nut 68 on these bolts serves to tighten the collar 70 at any desired point along the arcuate slots of the arms 67. In this manner the angle the vertical member 31 makes with the boat transom or outboard bracket may be adjusted within the limits of the slots of the arms 67.

Referring particularly to Figures 1 and 9 to 12, it may be seen that the flexible cables 53 and 54 lead forward to a pivoted treadle bar 71. The flexible cables 53 and 54 lead into the treadle bar 71 through split bushings 72 (Figure 12). These split bushings 72 may be tightened by means of wing bolts 73. In this manner slack in the flexible cables may be taken up.

The treadle bar 71 pivots around the wing bolt 74, which may be tightened any place along a rigid support 75. The rigid support 75 has a twin clamp 76 which is fastened to a boat seat in order to maintain the treadle bar 71 in position. Figure 10 shows specifically the manner in which the twin clamp 76 fastens on to a boat seat. A pivoted rest 77 is connected to the rigid member 75 at the end opposite from the twin clamp 76.

The pivoted rest 77 serves to hold the treadle bar 71 a sufficient distance above the bilges or floor boards that the operator's feet will have no difficulty in maintaining clearance. The rest 77 may be fastened to the floorboard, as shown in Figure 11, where the installation is desired to be permanent.

The dotted lines leading forward from the wing bolts 73 of Figure 1 show how an additional treadle bar arrangement may be placed farther forward in the boat in order to provide tandem operation.

In operating the apparatus illustrated in Figure 1, the clamp 56 is made fast to the boat transom or outboard bracket and the adjustable nuts 57 tightened. The wing nuts 68 are then loosened and the vertical support member 31 is adjusted to the proper angle. The clamp 76 is then made fast to the operator's seat as shown in Figure 10. The treadle bar 71 is adjusted by means of the pivotal wing bolt 74 to the proper position along the rigid member 75 to suit the operator. The flexible cables 53 and 54 are then drawn taut through the split bushings 72 and the wing bolts 73 are tightened. Slack in the flexible cables 53 and 54 may be finally adjusted by loosening the wing bolt 74, pushing the treadle bar 71 forward, and tightening the wing bolt 74 again.

As soon as the boat is in water beyond the depth of the vane 27 the operator sits at the stern of the boat, facing forward and resting his back on the cushion 64, the tiller bar 58 under his left arm. By pushing the treadle bar 71 alternately with his left and right foot he alternately pulls the chains 41 and 42. When he pulls the chain 41 by actuating the treadle 71 on the right side, the sprocket 33 is rotated in a clockwise direction. This rolls the balls 38 in the slots 37 into engagement with the inner surface of the rim 36 which is rigidly attached to sprocket 33, and the circular disk 35 on the shaft 29 rotates in a clockwise direction along with the sprocket 33. This rotates the shaft 29, which in turn communicates the rotation to the propeller 20 through the gears 26 and 25 and the shaft 21. On pivoting the treadle bar 71 in the opposite direction, the sprocket 34 goes through the cycle previously described for the sprocket 33. The sprocket 33 is now rotating in a counter-clockwise direction and the roller members associated therewith go out of engagement. Thus, the circular disk members 35 always rotate in a clockwise direction while the sprocket members 33 and 34 alternately rotate in a clockwise and counter-clockwise direction.

It will, of course, be understood that the various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon, otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a demountable outboard propelling device for a boat, a power transmission mechanism comprising a screw type propeller mounted on a substantially horizontal shaft, a substantially vertical shaft geared to said horizontal shaft, sprocket means mounted on the upper portion of said vertical shaft and comprising a pair of sprockets each of which comprises inner and outer concentric members in slidable contact with one another, said inner concentric member of each being rigidly attached to said vertical shaft and having a plurality of longitudinal slots around the periphery thereof, said slots having less depth at one end thereof than the other and being spaced so that the shallow end of one slot follows the deep end of an adjoining slot around the periphery of said inner concentric member, a roller member for each of said slots, said roller member having a diameter slightly greater than the depth of a slot at the shallow end thereof, a spring in each of said slots for impelling the roller member therein toward the shallow end of such slot, and means for alternately rotating said sprockets simultaneously in opposite directions, said rotating means comprising two separate chains each mating with one of said sprockets, a treadle having a pair of pedals and cables connecting each of said pedals to a corresponding chain to drive the respective sprockets simultaneously but in opposite directions.

2. A demountable outboard device for propelling a boat comprising, in combination, a screw type propeller mounted on a horizontal shaft, a generally vertical shaft drivingly connected to said horizontal shaft, a frame for securing to the boat, a housing for said vertical shaft, said housing being pivotally attached to said frame, two rotary drive elements mounted on said vertical shaft, a clutch mechanism between each of said elements and said shaft for alternately engaging one element with the shaft for simultaneous rotation while disengaging the other element, and drive means having portions engaging said elements for alternately rotating the same simultaneously in opposite directions, whereby said shaft is rotated substantially continuously in one direction, said drive means including a foot treadle power mechanism having portions engaging said elements.

3. A demountable outboard device for propelling a boat comprising, in combination, a frame, means for pivotally attaching said frame to a boat, the pivoting axis being in a horizontal plane, a vertical shaft housing pivotally mounted and extending downwardly from said frame, the pivoting axis for said shaft housing being in a vertical plane, a rotatable vertical shaft mounted inside said vertical housing, said vertical shaft being geared to a horizontal shaft at the base of said vertical housing, a screw-type propeller mounted on said horizontal shaft, rotary drive mechanism mounted on the top portion of said vertical rotatable shaft, said mechanism comprising two rotary drive elements mounted on said vertical shaft each of which includes inner and outer concentric members in slidable contact with one another, each of said inner concentric members being rigidly attached to said vertical shaft and having a plurality of longitudinal slots along the periphery thereof, said slots having less depth at one end thereof than the other and being spaced so that the shallow end of one slot follows the deep end of the adjoining slot around the periphery of said inner concentric member, a roller member for each of said slots, said roller member having a diameter slightly greater than the depths of one of said slots at the shallow end thereof, a spring in each of said slots for impelling said roller member toward the shallow end of each slot, and drive means with portions engaging said elements for alternately rotating the same simultaneously in opposite directions.

4. A demountable outboard device for propelling a boat comprising, in combination, a frame, means for pivotally attaching said frame to a boat, the pivoting axis being in the horizontal plane, a vertical shaft housing pivotally mounted and extending downward from said frame, the pivoting

axis for said vertical shaft housing being in the vertical plane, a rotatable vertical shaft mounted inside said vertical housing, said vertical shaft being geared to a horizontal shaft at the base of said vertical housing, a screw-type propeller mounted on said horizontal shaft, sprocket means mounted on the top portion of said vertical rotatable shaft, said sprocket means comprising two sprockets mounted on said vertical shaft each of which includes inner and outer concentric members in slidable contact with one another, each of said inner concentric members being rigidly attached to said vertical shaft and having a slot in the periphery thereof, each of said slots having a deep end and a shallow end disposed about the periphery of said inner concentric member, a roller member for each said slot, said roller member having a diameter greater than the depth of said slot at the shallow end and less than the depth of said slot at the deep end, each said slot having a spring therein impinging on said roller member and propelling it toward the shallow end of said slot, and drive means with portions trained about said sprockets for alternately rotating the same simultaneously in opposite directions.

5. A manually propelled outboard motor comprising a frame, means for removably securing the frame to the stern of a boat, a screw-type propeller rotatable on the frame, gearing carried by the frame from which the propeller is driven, a single shaft transmitting power through said gearing, a pair of overrunning clutches mounted on said shaft and having members alternately engaging one of the clutches with said shaft for simultaneous rotation while disengaging the other clutch to provide an application of power to the propeller in one direction only, and a foot treadle power mechanism having portions engaging said clutches for simultaneously and sequentially rotating the same in opposite directions to provide substantially continuous power impulses to said gearing.

CHARLES L. RAYFIELD.

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