United States Patent [19]

Peterson

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[45] **Apr. 30, 1974**

[54] **TROLLING MOTOR STEERING AND SPEED CONTROL MEANS**

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[73] Assignee: **Magalectric Corporation,** Tulsa, Okla.

[22] Filed: **Jan. 20, 1972**

[21] Appl. No.: **219,310**

[52] **U.S. Cl.** ..... **115/18 E,** 74/512, 114/153

[51] **Int. Cl.** **B63h 21/26**

[58] **Field of Search** ..... 115/18 R, 18 E; 114/153, 114/144 A; 74/512, 560, 561, 514; 200/86.5

[56] **References Cited**

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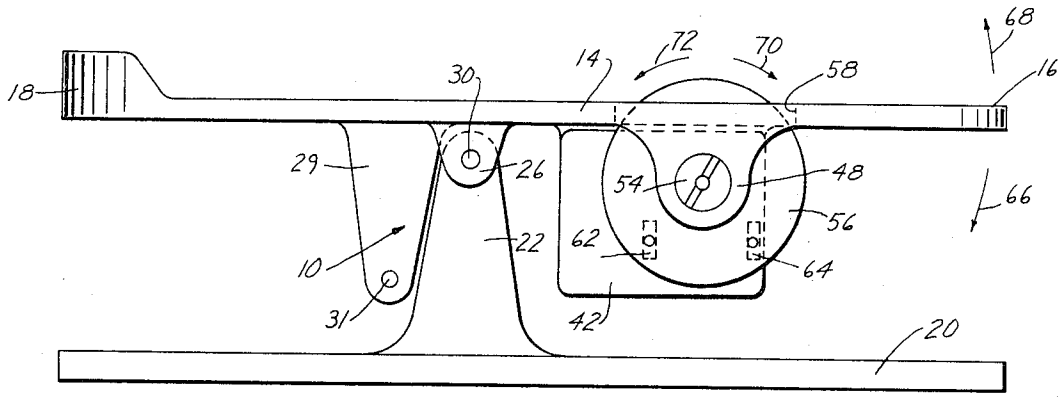
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Primary Examiner—George E. A. Halvosa
Assistant Examiner—Edward R. Kazenske
Attorney, Agent, or Firm—William S. Dorman

[57] **ABSTRACT**

A foot-operated mechanism for controlling both the speed and steering of a trolling motor which may be operated by one foot and conserves the available stored electrical power of a fishing boat. A pivotal foot lever is connected with the trolling motor in such a manner that the steering of the motor is accomplished by a rocking or pivotal action of the lever by a pivot action of the ankle of the operator, and the speed of the trolling motor is controlled by a substantially horizontal sliding motion of the foot which is pivoted from the knee of the operator, thus permitting control of the steering and speed of the motor by non-conflicting motions of the foot whereby the speed and steering may be controlled either simultaneously or independently.

8 Claims, 15 Drawing Figures



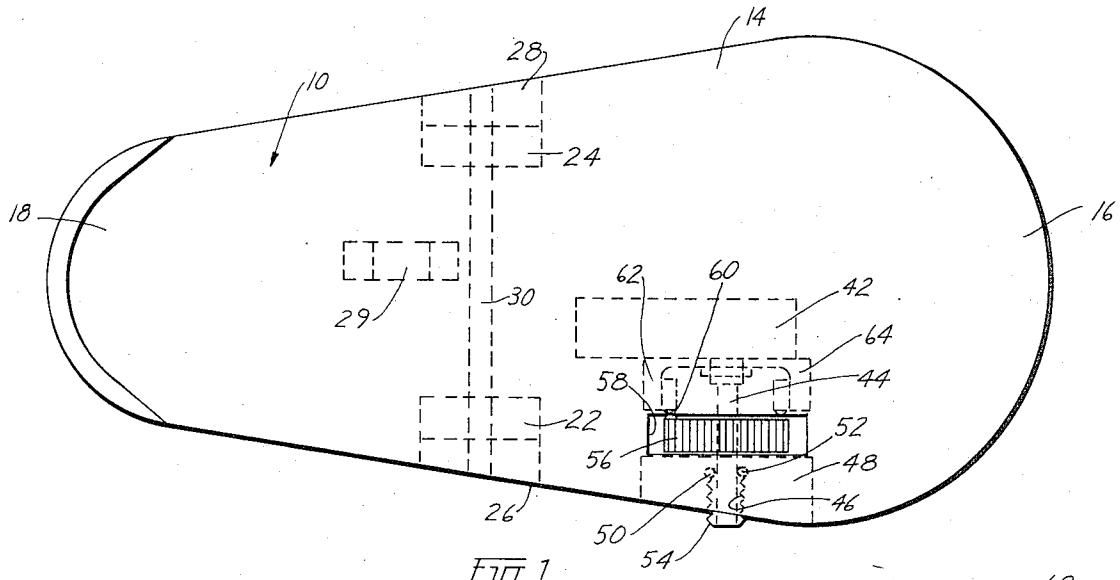


Fig 1

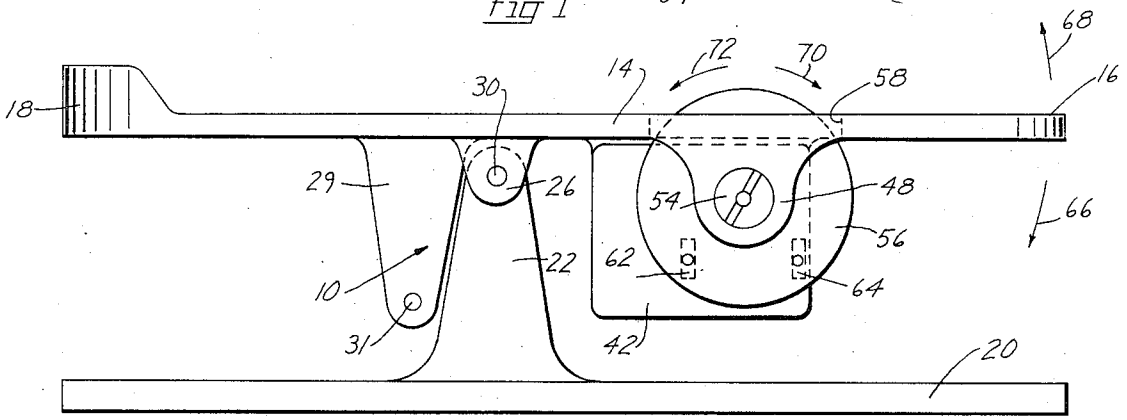


Fig 2

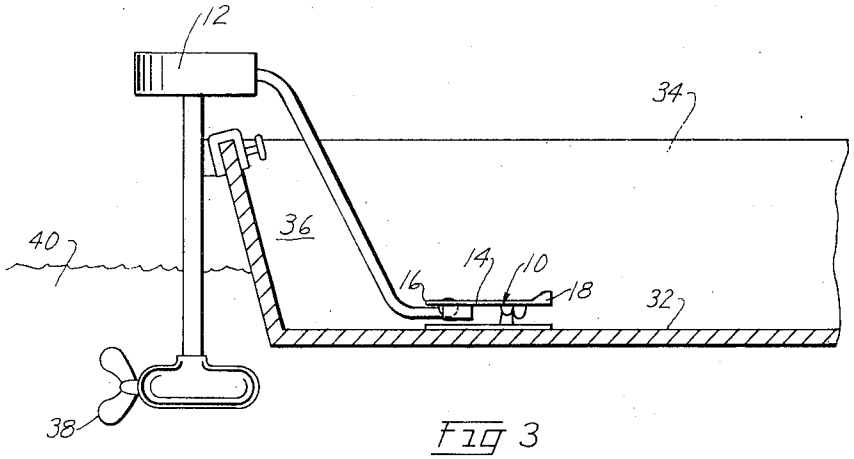


Fig 3

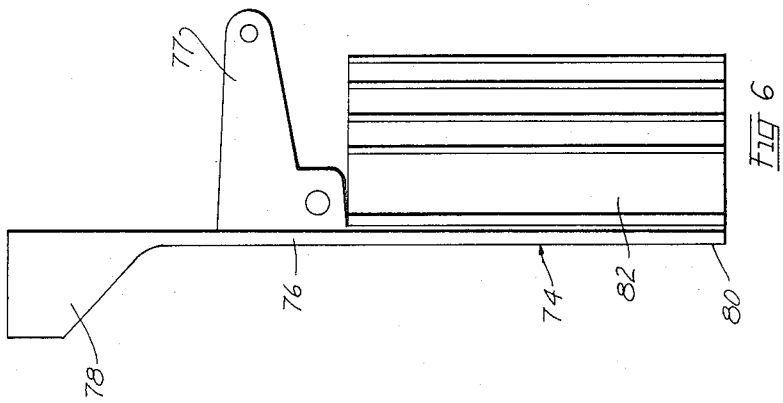


Fig 6

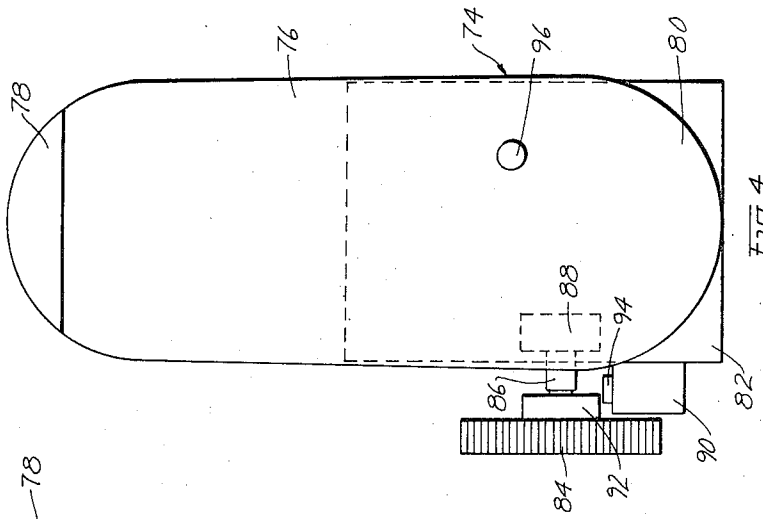


Fig 4

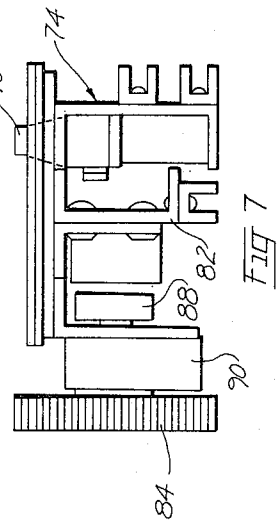


Fig 7

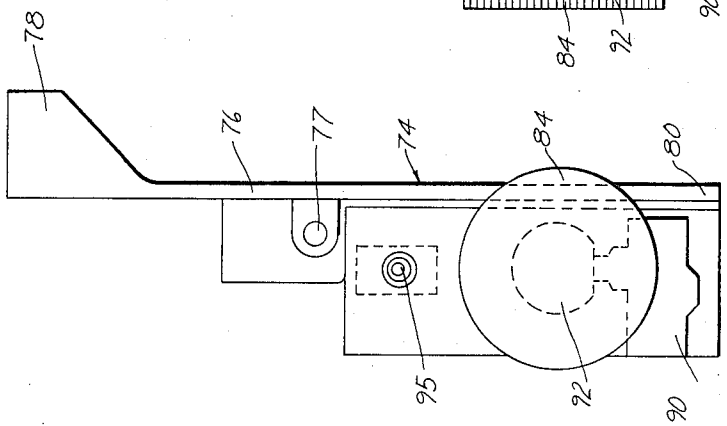


Fig 5

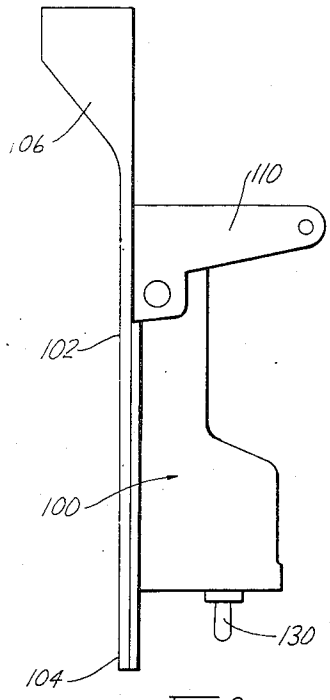


Fig 9

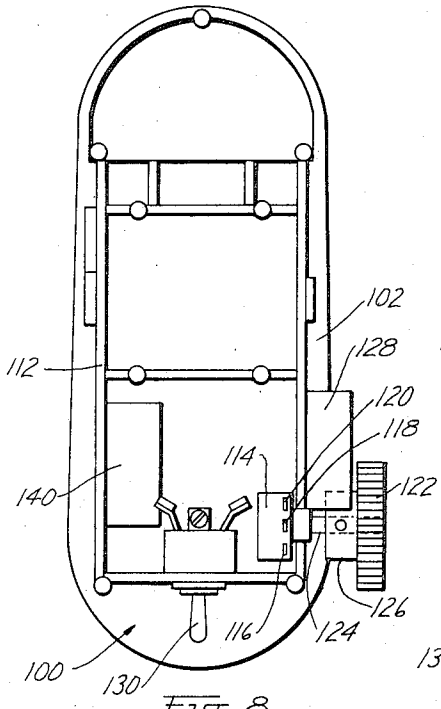


Fig 8

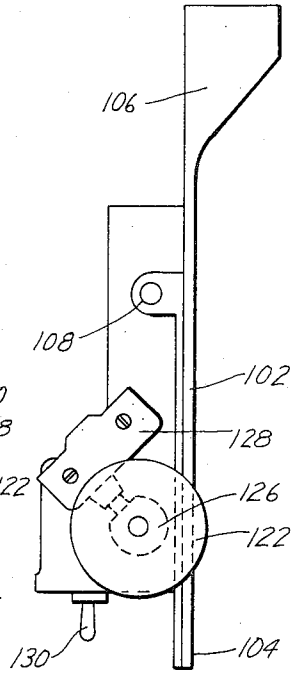


Fig 10

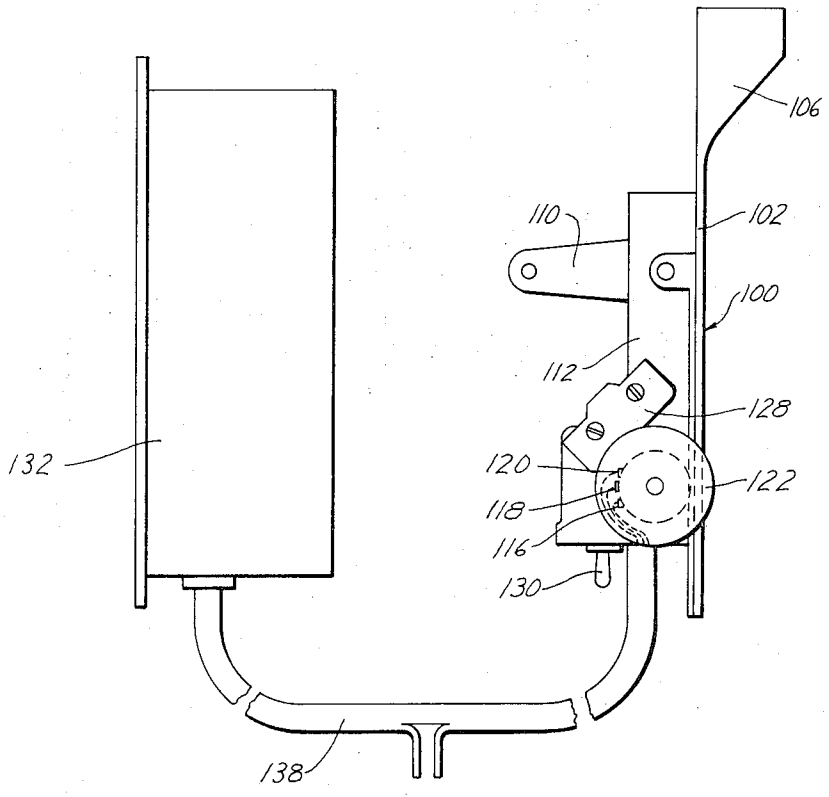


Fig 11

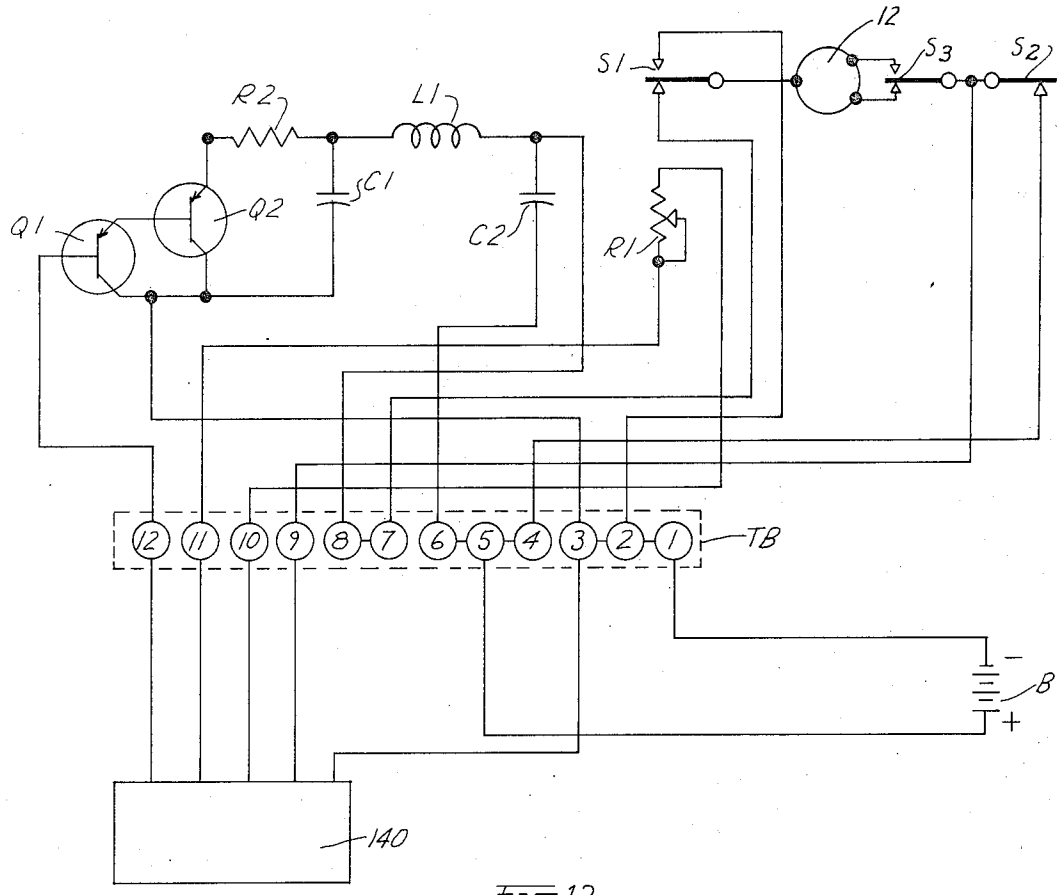

12
S1
S3
S2
R2
L1
C1
Q1
Q2
C2
R1
12
11
10
9
8
7
6
5
4
3
2
1
TB
B
140

Fig 12

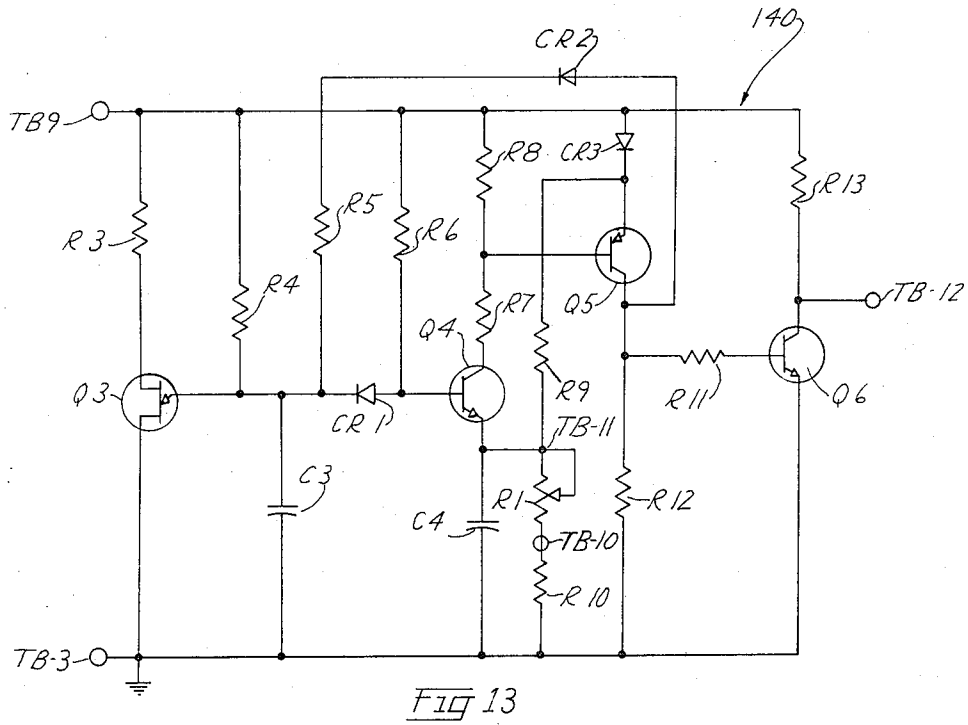

140
CR2
TB9
R8
CR3
R13
R3
R5
R6
R4
R7
Q5
TB-12
Q4
Q3
R9
R11
Q6
CR1
TB-11
C3
R1
R12
C4
TB-10
R10
TB-3

Fig 13

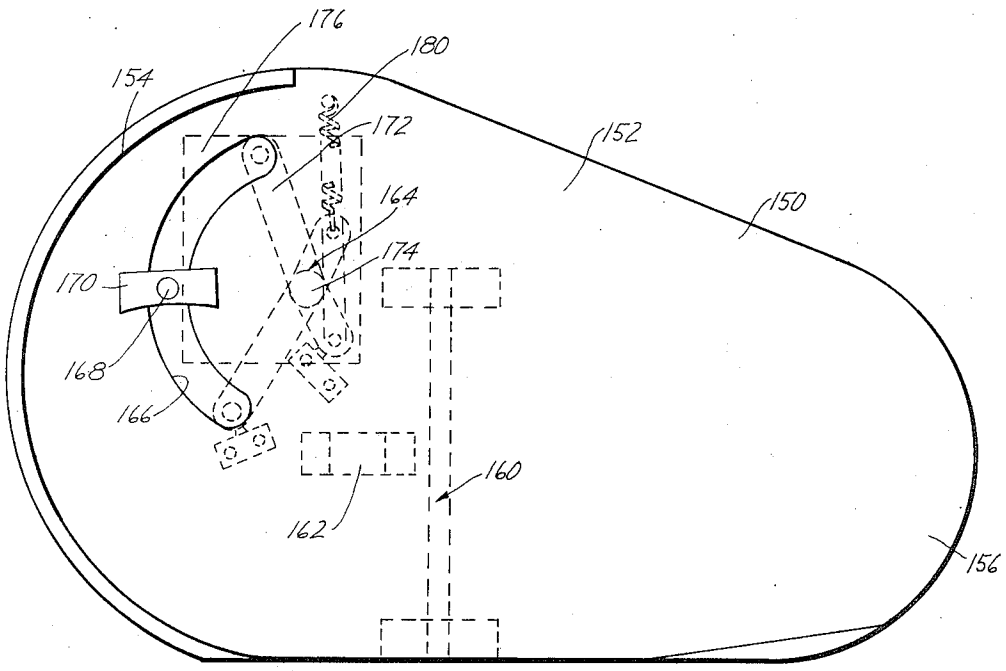

176
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Fig 14

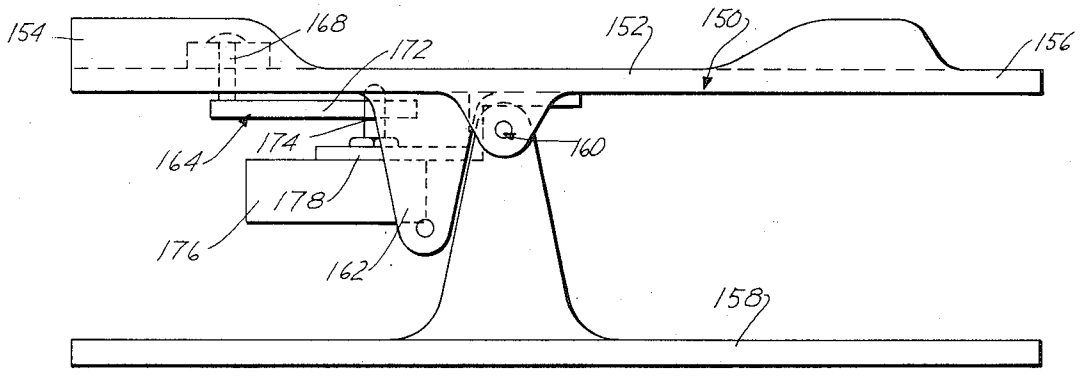

154
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178
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162
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Fig 15

TROLLING MOTOR STEERING AND SPEED CONTROL MEANS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to improvements in control devices and more particularly, but not by way of limitation, to a foot operated control means for controlling both the speed and the steering of a trolling motor on a fishing boat.

2. Description of Prior Art

Troll fishing is very popular with fishermen today, and is particularly used in fishing for bass. The trolling motor is usually an auxiliary motor provided on a boat in addition to the usual more powerful outboard motor or other motor used during normal operations of the boat. Many electric trolling motors are available today, and these motors are usually either completely hand operated or actuated by a combined hand and foot operation. In the entirely hand operated trolling motor, which is usually the most economical type, both the steering and speed control functions of the motor are accomplished by the use of the hands of the operator of the boat. In order to control the direction of travel, the motor is manually rotated in the manner of the operation of a boat tiller, while the speed is controlled by a hand operated switch or rheostat. It will be apparent that this type of trolling motor does not permit the operator to do much fishing since both of his hands are occupied by the operation of the motor for a considerable portion of the time.

In order to free the hands of the operator whereby he may spend more of his time fishing, foot pedal steering was developed. In this type of motor, a foot pedal is normally pivoted from the bottom of the fishing boat and is connected with the trolling motor steering or turning mechanism by a cable or lever arrangement whereby an up-down or pivotal action of the foot pedal steers the boat. Normally, a heel-down, toe-up motion of the foot turns the boat in one direction; and a heel-up, toe-down motion of the foot turns the boat in the opposite direction. Since steering is perhaps the most time consuming portion of the operation of a trolling motor, the foot pedal steering mechanism frees the fisherman's hands most of the time; however, control of the motor speed is still accomplished by hand controls.

As the art of using trolling motors advances, the use of speed changes is rapidly becoming as necessary as steering changes. In fact, a skilled trolling motor operator will generally use the speed and steering controls together to manipulate the boat along or through rough situations. For example, when fishing along a rocky bank with a heavy gusty wind lowing, speed changes become as vital and necessary as steering manipulations in order to keep the boat from grounding. Similarly, when manipulating the boat through a course of tree stumps and other brush, speed and steering control become synonymous. Both of these situations are quite typical, and even in the combined hand and foot operation of the trolling motor, the operator will find he must use his hands sufficiently that his time for fishing is greatly reduced.

SUMMARY OF THE INVENTION

The present invention contemplates a novel foot-

operated mechanism for controlling both the speed and steering of a trolling motor. The device comprises a pivotal lever mechanically connected with the steering mechanism of the motor whereby a rocking motion of the ankle of the operator will pivot the foot pedal or lever in such a manner as to control the steering of the boat. The foot lever is also electronically connected with the speed control portion of the motor whereby a substantially horizontal sliding motion of the foot pedal by a pivotal action of the leg of the operator from his knee will control the speed of the boat. Thus, the speed and steering of the boat may be accomplished either independently or simultaneously without the use of the hands, thereby permitting the fisherman to utilize more of this time in fishing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of a trolling motor foot pedal embodying the invention for control of both the speed and steering or direction of travel of the boat.

FIG. **2** is an elevational view of the foot pedal control shown in FIG. **1.**

FIG. **3** is a sectional view of a boat and a trolling motor having a foot pedal control mechanism embodying the invention provided in combination therewith.

FIG. **4** is a plan view of a modified foot pedal control mechanism embodying the invention.

FIG. **5** is an elevational view of one side of the foot pedal control shown in FIG. **4.**

FIG. **6** is an elevational view of the opposite side of the foot pedal control shown in FIGS. **4** and **5.**

FIG. **7** is an end elevational view of the foot pedal control shown in FIG. **4.**

FIG. **8** is a plan view of the underside of a foot pedal control embodying the invention.

FIG. **9** is an elevational view of one side of the foot pedal control shown in FIG. **8.**

FIG. **10** is an elevational view of the opposite side of the foot pedal control shown in FIGS. **8** and **9.**

FIG. **11** is a view depicting the foot pedal speed and direction control mechanism of the invention in relation to a remote means of electronic control.

FIG. **12** is a schematic circuit diagram of the trolling motor speed control of the present invention.

FIG. **13** is a schematic circuit diagram of the wave-shaping circuit portion of the trolling motor speed control.

FIG. **14** is a plan view of a further modification of a foot pedal control embodying the invention.

FIG. **15** is an elevational view of the foot pedal control depicted in FIG. **14.**

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in detail, and particularly to FIGS. **1, 2** and **3,** reference character **10** generally indicates a speed and steering control mechanism for a trolling motor **12** which comprises a foot pedal **14** having a toe end **16** and a heel end **18.** The pedal **14** is pivotally secured to a base plate or mounting plate **20** in any suitable manner and as shown herein a pair of spaced upstanding flange members **22** and **24** are provided on the plate **20** for cooperating with a pair of spaced downwardly extending bracket members or flanges **26** and **28** secured to the pedal **14** whereby a suitable bearing or pivot shaft **30** may be journalled therebetween to provide a pivotal connection between

the pedal **14** and the plate **20.** In addition a downwardly extending arm **29** having an aperture **31** provided therein is secured to the underside of the pedal **14** in any suitable manner whereby a rocking or pivotal movement of the pedal **14** about the shaft **30** will control the steering mechanism of the motor **12.** The arm **29** is secured to the steering control of the motor **12** in any well known manner such as by suitable cable means or lever means (not shown) for a purpose as will be hereinafter set forth.

The plate **20** is preferably bolted or otherwise secured to the bottom **32** of a suitable boat **34** in the general proximity of the prow **36** thereof. The trolling motor **12** is preferably of the electric type and is suitably mounted on the prow **36** of the boat **34** and may be secured thereon in such a manner that the propeller **38** extends into the water **40,** as is well known. In this manner the stern portion (not shown) of the boat **34** may be utilized for the normal larger combustion engine type outboard motor (not shown).

A suitable housing **42** is secured to the underside of the pedal **14** for encasing an electronic speed control circuit, as will be hereinafter set forth. A suitable potentiometer (not shown in FIGS. **1, 2** and **3**) is provided in the housing **42** and is actuated in the usual manner by a rotatable shaft **44** extending outwardly therefrom. The outer end of the shaft **44** preferably extends through an aperture **46** provided in a downwardly extending flange **48** provided on the underside of the pedal **14.** An O-ring **50** is disposed in the bore **46** around the shaft **48** and adjacent an annular shoulder **52** provided in the bore **46.** The O-ring provides a braking action during rotation of the shaft **44** as will be hereinafter set forth, and a braking screw **54** is threadedly secured in the bore **46** around the shaft **44** for engagement with the O-ring **50** for providing the desired pressure against the O-ring **50** to provide said braking action.

A suitable knurled knob **56** is keyed or otherwise secured to the shaft **44** for simultaneous rotation therebetween. The knob **56** extends through or projects upwardly through a slot **58** provided in the pedal **14** whereby the knob **56** may be engaged by the foot (not shown) of the operator of the apparatus **10.** A boss member **60** is provided on one side of the knob **56** and extends in a direction toward the housing **42** for selective engagement with a pair of spaced micro-switches **62** and **64** which are carried by the housing **42.** One of the microswitches, such as the switch **62** is an on-off switch for the electronic speed control circuit mounted in the housing **42,** and the other microswitch, such as the switch **64,** is a maximum speed switch. A sliding motion of the foot (not shown) of the operator of the apparatus **10** will rotate the wheel or knob **56** for controlling the speed of the motor **12,** as will be hereinafter set forth.

The electronic speed control circuit is operably connected with the motor **12** for controlling the speed thereof in a manner as will be hereinafter set forth. When the trolling motor **12** is a relatively small motor, the entire electronic control circuitry may be contained in the small housing **42** disposed beneath the pedal **14,** as shown in FIGS. **1, 2** and **3.** In this embodiment, it may be preferable to have the power transistors heat-sinked to the metal material of the foot pedal **14.** When larger trolling motors are utilized, however, the power that must be dissipated may be larger than can be handled by the foot pedal itself. In this instance, the electronic apparatus may be mounted in a different manner as is more particularly shown in FIGS. **4** through **7** and as will be hereinafter set forth. In hot climates or during summer months, these arrangements for the electronic apparatus may become objectionable because of the heat present in the area of the foot of the operator. Under these conditions it may be desirable to provide still another arrangement for the electronic apparatus as set forth in FIGS. **8** through **11,** and as will be hereinafter set forth in detail.

The steering function of the boat **34** through the control of the trolling motor **12** is accomplished through the cable (not shown) or lever mechanism (not shown) connecting the arm **29** with the steering mechanism (not shown) of the motor **12.** The cable or lever mechanism acts through a gear and ratchet arrangement (not shown) to rotate the electric trolling motor **12** with respect to the longitudinal axis of the boat **34,** as is well known in foot pedal operator motors of this type. The pivotal action of the foot pedal **14** about the shaft **30** transmits rotation to the motor **12** through the cable or lever connection. For example, a toe-down, heel-up position for the pedal **14** as indicated by the arrow **66** rotates the motor **12** in one direction for turning the boat **34** in a right-hand direction, whereby a heel-down, toe-up position for the pedal **14** as indicated by the arrow **68** rotates the motor **12** in an opposite direction for turning the boat **34** in a left-hand direction. Of course, it will be apparent that the rotation of the motor **12** may be reversed with respect to the pivoting of the pedal **14,** if desired, and is not limited to the particular relationship between the positions of the pedal **14** and the direction of turning as hereinbefore set forth.

Rotation of the wheel or knob **56** controls the speed of the motor **12** through the electronic speed control circuit. For example, rotation of the wheel **56** in a forward or clockwise direction as viewed in FIG. **2** causes the boss **60** to pass the microswitch **62** for activating the electronic speed control circuit, and a continued forward or clockwise rotation of the wheel **56** as indicated by the arrow **70** operates the potentiometer of the electrical circuit for increasing the speed of the motor **12.** When the maximum speed for the motor **12** has been reached, the boss **60** will engage the microswitch **64** for achieving the maximum speed for the motor **12.** A counterclockwise rotation of the wheel **56** as indicated by the arrow **72** will actuate the potentiometer in a manner for decreasing the speed of the motor **12,** and of course when the boss **60** engages the microswitch **62,** the electronic speed control circuit will be deactivated.

A hereinbefore set forth, the wheel **56** protrudes above the surface of the foot pedal **14** a sufficient amount for permitting engagement thereof by the sole or ball of the foot of the operator of the apparatus **10.** A relatively slight substantially horizontal backward and forward sliding motion of the foot of the operator along the pedal **14** will transmit rotation to the wheel **56** for controlling the speed of the motor **12.** This action may be accomplished by swinging the foot and leg from the knee. A pivotal action of the foot of the operator will pivot the pedal **14** about the shaft **30** for controlling the steering of the motor **12.** This action may be accomplished by pivoting the foot at the ankle. It will be readily apparent that the motions of the foot re-

quired for controlling the speed and the steering of the motor 12 are non-conflicting motions of the operator's foot, leaving both his hands free for fishing. With a little practice, the two motions may be accomplished simultaneously, when desired, or they may be accomplished independently of each, as desired.

The actuation of the on-off microswitch 62 and the maximum speed microswitch 64 by the wheel 56 is an important feature. It is preferable to provide suitable stop means (not shown) for limiting the rotation of the wheel 56 in both the clockwise and counterclockwise directions whereby one extreme rotational position of the wheel 56 causes the boss 60 to engage the on-off microswitch 62 and the other extreme rotational position of the wheel 56 causes the boss 60 to engage the maximum speed microswitch 64. When the boss 60 is moved into engagement with the maximum speed microswitch, full power is substantially instantaneously applied to the trolling motor to produce full speed ahead very suddenly or quickly. This is particularly important when controlling a fishing boat, or the like, in "tight" situations such as may be encountered or experienced when trolling through stumps, or along a rocky bank while a stiff or gusty wind is blowing.

Referring now to FIGS. 4 through 7, a modified speed and steering control apparatus is generally indicated at 74 which is similar to the apparatus 10, but is particularly designed for use in combination with relatively large trolling motors. The control device 74 comprises a foot pedal 76 generally similar to pedal 14 and pivotally connected with a base plate, such as the base plate 20 (not shown in FIG. 4 through 7) by means of a pivot and bearing shaft arrangement similar to that shown in connection with the pedal 14. A lever arm 77 similar to the arm 29 is provided on the pedal 76 for connection with the steering mechanism (not shown) of the motor 12 as hereinbefore set forth. The pedal 76 is provided with a heel portion 78 and a toe portion 80 similar to the pedal 14. A suitable heat sink 82 is secured or mounted to the underside of the pedal 76 for housing the electronic speed control apparatus. A knurled speed control knob or wheel 84 is keyed or otherwise secured to a shaft 86 of a potentiometer 88 which is contained in the electronic apparatus as will be hereinafter set forth. A high speed or maximum speed microswitch 90 is carried by the heat sink 82 and disposed exteriorly thereof, and is similar to and for the same purpose and the maximum speed microswitch 64 of the apparatus 10. The switch 90 bypasses the electronic control apparatus and connects the motor 12 directly across a battery B (FIG. 12). A cam 92 is secured to the shaft 86 and engages the plunger 94 of the switch 90 upon proper rotation of the wheel 84 and shaft 86, as will be hereinafter set forth, for actuation of the microswitch 90 in much the same manner as the actuation of the switch 64 of the apparatus 10. It is to be noted that the wheel 84 is disposed at the side of the pedal 76 and spaced slightly therefrom, and the outer periphery of the wheel 84 projects slightly above the outer or upper surface of the pedal 76 whereby the wheel 84 may be readily engaged by the ball of the foot of the operator as in the case of the wheel 56.

A suitable high-low switch 95 is provided for the electronic apparatus contained in the heat sink 82 for selection of the appropriate motor windings. A suitable on-off switch 96 is provided in connection with the heat sink 82 and operably connected with the electronic control apparatus therein. The switch 96 projects slightly above the upper surface of the pedal 76 for convenient operation by the foot of the operator and functions for the purpose and in the same manner as the on-off microswitch 62 of the apparatus 10 for connecting battery power to the motor 12 and electronic control apparatus.

The operation of the speed and steering control apparatus 74 is generally similar to the operation of the apparatus 10. The pedal 76 may be pivoted by a rocking motion of the foot of the operator for controlling the steering of the boat 34 through the motor 12. The on-off switch 96 may be actuated by the pressure of the foot thereagainst for activating the electronic speed control apparatus, and the wheel 84 may be rotated by the ball of the foot by a slight backward and forward movement of the foot for varying the speed of the motor 12. Of course, suitable stop means (not shown) is preferably provided for limiting both the clockwise and counterclockwise rotation of the wheel 84, and when the wheel 84 is rotated through a sufficient distance, the cam 92 will actuate the high speed or maximum speed switch 90 for providing a sudden spurt of high speed when desired.

Referring to FIGS. 8 through 11, a further modified speed and steering control device generally indicated at 100 is shown which comprises a foot pedal 102 similar to the pedal 14 and having the usual toe portion 104 and heel portion 106. The pedal 102 is pivotally secured to a base plate, such as the plate 20 (not shown in FIG. 8, 9 and 10) by a suitable bearing and shaft connection 108 similar to the pivotal connection of the pedal 14 with the plate 20. An arm 110 similar to the arm 29 is provided on the underside of the pedal 102 for connection with the steering portion of the motor 12 in any suitable manner as hereinafter set forth. A support bracket or support structure 112 is suitably secured to the underside of the pedal 102 for support of the electronic speed control apparatus. A potentiometer 114 is provided in the electronic control system and carried by the structure 112, and is provided with suitable electrical terminals 116, 118 and 120. A knob or wheel 122 similar to the wheels 56 and 84 is secured to the shaft 124 of the potentiometer 114 for actuation thereof, as is well known, and a cam member 126 similar to the cam member 92 is also secured to the shaft 124 for actuation of a high speed or maximum speed microswitch 128 in a manner and for a purpose similar to that hereinafter set forth in connection with the switches 64 and 90. A suitable high-low winding switch 130 is carried by the bracket 112 which provides the same purpose and function as the switch 94 hereinbefore set forth in the apparatus 74.

It is to be noted that the embodiment depicted in FIGS. 8 through 11 represents a form of the invention wherein the control foot pedal 102 is remotely disposed with respect to the electronic apparatus. As particularly shown in FIG. 11, the electronic apparatus or components are contained in a suitable housing 132 which may be mounted at any suitable or convenient location in the boat 34 remote from the pedal 102, and a suitable cable 134 is provided for interconnecting the electronic apparatus within the housing 132 to the electrical components carried by the pedal 102. It is further to be noted that the wheel 122 is disposed at the side of the pedal 102 and spaced slightly therefrom, as in the apparatus 74, but projects slightly above the sur-

face of the pedal **102** whereby the wheel **122** may be rotated by the ball of the foot of the operator as hereinbefore set forth.

Referring now to FIG. **12**, an electrical schematic or circuit is shown for controlling the speed of the motor **12**. The electronic control apparatus as shown in FIG. **12** comprises a pair of power transistors Q_1 and Q_2 connected together in a Darlington configuration and which control the electrical current fed to the trolling motor **12**. This electrical current is, in turn, controlled by a potentiometer R_1 (**88** in FIG. **4**, **120** in FIG. **8**) operating through a duty-cycle controller **140** (carried by the support bracket **112** in FIG. **8**) to provide the base drive on the transistor Q_1. In addition, the potentiometer R_1 operates switch S_1 (**90** in FIG. **4**, **128** in FIG. **8**) by means of the cam on the potentiometer shaft, as hereinbefore set forth, to connect one side of the motor **12** either to the transistor control circuit and thence to the negative side of a storage battery B, or directly to the negative terminal of the battery B with the transistor control circuit cut off. Thus, the boat trolling motor operator using an "educated" foot on the speed control wheel (**84** in FIG. **4**, **122** in FIG. **8**) can normally be trolling at reduced speed, with both hands on his fishing pole, and quite suddenly apply full power to the trolling motor, at a selected tilt of his foot, an correspondingly change the direction of travel of the boat to overcome or "get out" of a tough situation. The speed change and direction change may be either simultaneous, or independent of each other, depending upon the particular situation.

A switch S_2 is operably connected with the motor **12** and is a separate on-off switch (**62** in FIG. **1**, **90** in FIG. **4**) which opens the power circuit, or it may be a limit switch operating on the reduced speed end of the control wheels, as previously explained. A switch S_3 (**130** in FIG. **8**) is also operably connected in the electronic circuit and is a motor winding selector switch which is utilized to add more range to the speed control circuit, or to spread the controlling range over a greater range of rotation of the speed control wheel.

In the simplest forms of transistor speed control circuits, such as used in connection with the embodiments of the invention shown in FIGS. **1** and **2**, and FIGS. **4** through **7**, the motor power controlling circuit consists only of the pair of transistors Q_1 and Q_2 and the duty cycle control circuit **140**. With modern technology, this simplified circuit can be made sufficiently small that it may be disposed under the foot pedal, as hereinbefore set forth. To avoid excessive transistor dissipation, the duty cycle controller **140** provides a pulsating flow of current having an almost perfect rectangular wave shape, and control is accomplished by regulating the proportions of time the current is "full on" or "completely off". That is, the average current to the motor can be adjusted through a full range of values from zero to the maximum available from the control circuit.

While motors can be constructed or manufactured which will operate quietly on this form of pulsating current, the usual, less expensive trolling motor presently available makes a considerably amount of noise, and noise while trolling, especially at night, is considered a great disadvantage. This motor noise not only greatly annoys the fisherman, but also may drive or scare the fish away. To overcome the noise generated in the motor by the rectangular wave shape of the simple controller, a filter circuit comprised of a resistor R_2, and inductor L_1 and capacitors C_1 and C_2 is provided. Of course, in view of the fact that all of these components have "size" as compared with all of the remaining components of the control circuit, it is not practical to assemble them on the controlling foot pedal. Accordingly, the entire control circuit, with the exception of the potentiometer R_1, and switches S_1, and S_2 and S_3 are preferably mounted in a separate box **132** as hereinbefore set forth and shown in FIG. **11**.

FIG. **13** is an electrical circuit diagram of the duty-cycle control circuit **140** which has been adapted from circuits which are well known in the art of electronics. The duty-cycle control circuit **140** comprises suitable transistors Q_3, Q_4, Q_5 and Q_6; resistors R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, and R_{13}; capacitors C_3 and C_4; diodes CR_1, CR_2 and CR_3; all operably connected in the circuit as is well known and shown in FIG. **13**, and connected with the electronic circuit shown in FIG. **12** in the well known manner through the terminal board TB having terminals **1** through **12** thereon.

Referring now to FIGS. **14** and **15**, still another embodiment of a speed and steering control mechanism is generally indicated at **150**. The control mechanism **150** comprises a foot pedal **152** having a heel portion **154** and toe portion **156**. The pedal **152** is pivotally connected to a base plate **158** by a suitable bearing and pivot shaft connection arrangement **160**, as hereinbefore set forth, and an arm **162**, similar to the arm **29** of the apparatus **10**, is provided on the underside of the pedal **152** for connection with the steering portion of the motor **12** by means of suitable cable connection means or lever means (not shown) as hereinbefore set forth, whereby pivoting of the pedal **152** about the pivot connection **160** controls the steering of the boat **34**.

In the control mechanism **150**, the wheel for actuation of the potentiometer is replaced by a simple lever arrangement generally indicated at **164**. An arcuate slot **166** is provided in the heel portion **154** of the pedal **152**, and a relatively short shaft **168** extends through the slot **166** for connection with a suitable stop member **170** which is slidable along the upper surface of the pedal **152**. The shaft **168** is pivotally or suitably connected to one end of a lever **172** which is connected to the shaft **174** of a potentiometer **176** which is suitably secured to a support bracket **178** secured to the underside of the pedal **152**. A suitable return spring **180** is anchored between the opposite end of the lever **172** and the foot pedal **152** for returning the lever **172** to a normal non-operative position. The speed of the motor **12** is controlled by the apparatus **150** through engagement of the heel of the foot of the operator with the stop member **170**. A side wise movement of the heel moves the stop **170** and shaft **168** in either a left hand or right hand direction, as desired, for controlling the speed of the motor **12** through the potentiometer **176** in the manner as hereinbefore set forth.

From the foregoing it will be apparent that the present invention provides a novel foot pedal mechanism for controlling both the speed and steering of a trolling motor by non-conflicting motions of the foot of the operator of the fishing boat. The novel foot pedal mechanism is operably connected with the steering portion of the motor through a suitable cable or lever arrangement whereby a rocking or up and down pivotal movement of the foot pedal controls the direction of travel of the boat. An electronic speed control circuit is pro-

vided for the trolling motor which is controlled by a movement of the foot of the operator, said movement being different from and non-conflicting with the movement of the foot required for the rocking of the pedal during the steering control operations. Thus, the steering and speed may be varied either simultaneously or independently through the use of the foot, thus leaving the hands of the operator free for fishing. The novel foot pedal control is simple and efficient in operation and economical and durable in construction.

Whereas the present invention has been described in particular relation to the drawings attached hereto, it should be understood that other and further modifications, apart from those shown or suggested herein, may be made within the spirit and scope of this invention.

What is claimed is:

1. In combination with a trolling motor for a fishing boat, foot operated control means operably connected with the trolling motor for control of the steering and speed of the motor, and comprising pivotal foot pedal means operably connected with the motor for controlling the steering thereof upon pivotal movement of the pedal means, said pedal means comprising a pedal having upper and lower surfaces and having a toe portion and a heel portion and movable to alternate toe-up, heel-down and toe-down, heel-up positions by a rocking motion of the foot, said movement of the pedal providing a control of the steering of the motor, electronic control means operably connected to the motor for controlling the speed thereof, said electronic control means including an actuator means carried by the foot pedal, said actuator means having at least a portion thereof projecting upwardly above the upper surface of said foot pedal so as to be engagable by the foot for controlling the speed of said motor by a sliding motion of the foot on the upper surface of the foot pedal, whereby the speed of the motor may be controlled simultaneously with the steering thereof without removing the foot from the pedal.

2. In combination with a trolling motor for a fishing boat, foot operated control means as set forth in claim **1** wherein the electronic control means includes a potentiometer for varying the speed of the motor, and said actuator means comprises pivotal lever means operably connected with the potentiometer for actuation thereof, shaft means carried by the lever means, arcuate means provided in the pedal for receiving the shaft therethrough, said shaft means projecting above the upper surface of said pedal and being engagable by the foot for slidable movement within the arcuate means for selectively varying the speed of the motor.

3. In combination with a trolling motor for a fishing boat, foot operated control means as set forth in claim **1** wherein the electronic control means includes a potentiometer operable by said actuator means for varying the speed of the motor, and switch means operable by said actuator means for selectively providing substantially instantaneous maximum speed for the motor.

4. In combination with a trolling motor for a fishing boat, foot operated control means as set forth in claim **3** wherein the actuator means comprises a wheel member operably connected with the potentiometer and engagable by the foot for actuation of the potentiometer either independently of or simultaneously with the actuation of the foot pedal.

5. In combination with a trolling motor for a fishing boat, foot operated control means as set forth in claim **1** wherein said actuator means comprises a rotatable wheel means operably connected with the electronic control means, said wheel means extending slightly above the outer surface of the foot pedal for engagement by the foot.

6. In combination with a trolling motor for fishing boats, foot operated control means as set forth in claim **5** wherein the electronic control means includes a potentiometer means operably connected with the wheel means for actuation thereby, cam means operably simultaneously with the wheel means, switch means engagable by the cam means for selectively providing substantially instantaneous maximum speed for the motor.

7. In combination with a trolling motor for a fishing boat, foot operated control means as set forth in claim **5** wherein the pedal is provided with a slot for receiving a portion of the wheel means therethrough.

8. In combination with a trolling motor for fishing boats, foot operated control means as set forth in claim **7** wherein the electronic control means includes potentiometer means operably connected with the wheel means for actuation thereby to control the speed of the motor, projection means carried by the wheel means, on-off switch means selectively engagable by the projection means, second switch means selectively engagable by the projection means for selectively providing substantially instantaneous maximum speed for the motor.

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