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Roller et al.

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[54] **CONTROL CABLE CONNECTION FOR AN ELECTRIC TROLLING MOTOR**

[75] Inventors: **William G. Roller**, Purdy, Mo.; **Emery L. West**, Oklahoma City, Okla.

[73] Assignee: **William G. Roller**, Purdy, Mo.

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[52] **U.S. Cl.** ..... **115/18 E**; 74/501 R; 114/153

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

[58] **Field of Search** ..... 115/18 E, 18 A, 18 R; 114/144 R, 144 A, 153; 74/484, 487, 489, 480 B, 501 R

[56] **References Cited**

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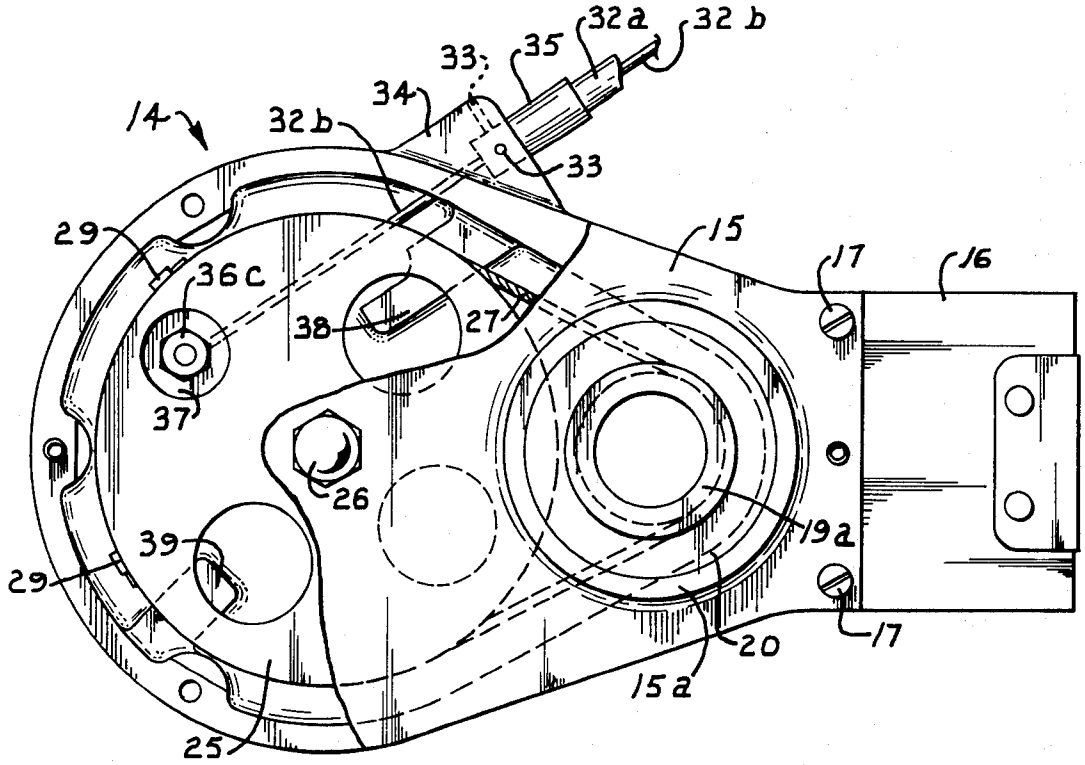
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Primary Examiner—Trygve M. Blix
Assistant Examiner—Charles E. Frankfort
Attorney, Agent, or Firm—Lowe, Kokjer, Kircher, Wharton & Bowman

[57] **ABSTRACT**

A connection for securing the control cable of a remotely controlled electric trolling motor to the drive wheel of the remote control unit. A connection post is pivotally mounted offset from the pivot axis of the wheel and is equipped with a radial slot and an axial bore for receiving the L-shaped end of the control cable. A pin transacting the radial slot above the cable securely retains the cable end in the slot and bore.

4 Claims, 5 Drawing Figures



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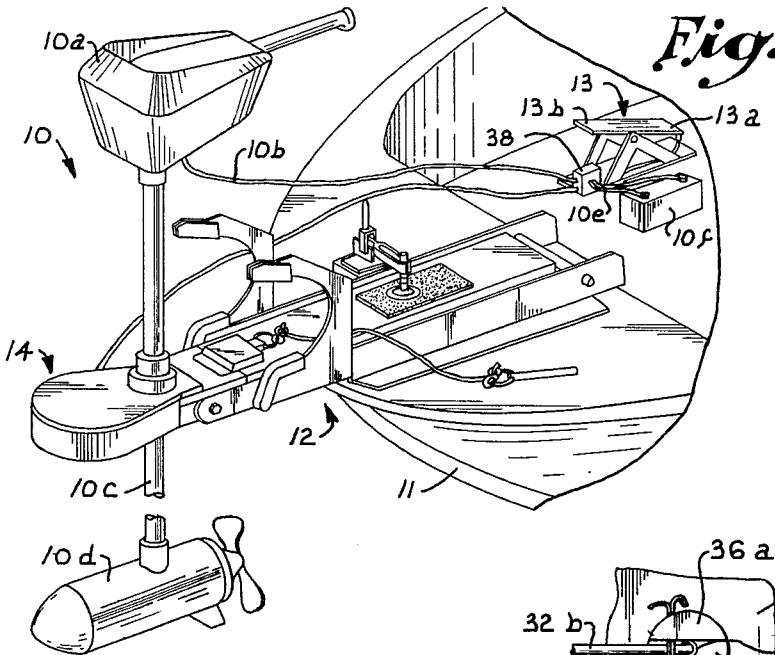


Fig. 1.

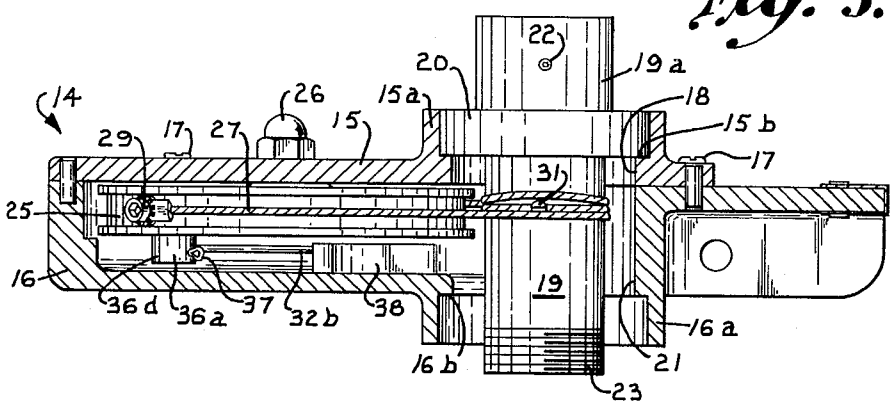


Fig. 3.

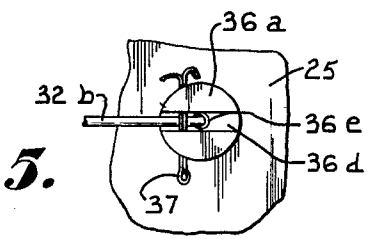


Fig. 5.

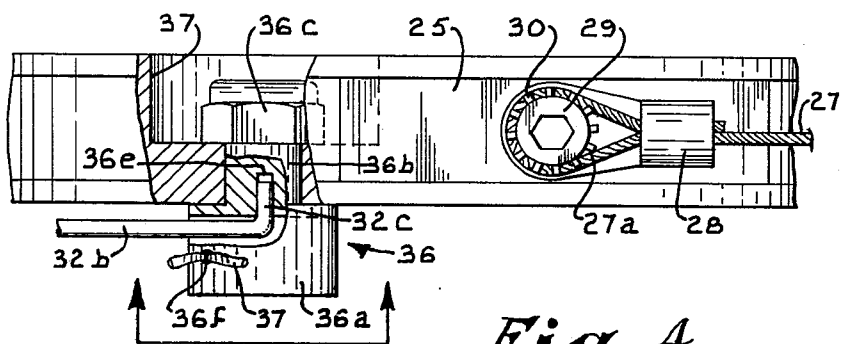


Fig. 4.

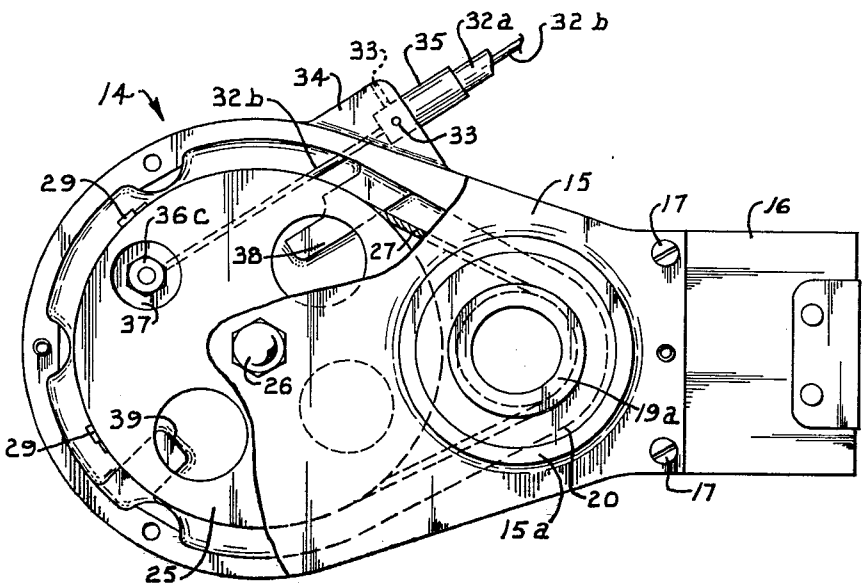


Fig. 2.

CONTROL CABLE CONNECTION FOR AN ELECTRIC TROLLING MOTOR

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a connection for the control cable of an electric trolling motor of the remote control type. More particularly, the invention relates to a method and apparatus for securely connecting the remote control cable to the driving wheel that is rotated by the cable to change the direction of travel of the boat.

In recent years, fishermen have come to rely on an electric outboard motor, generally known as "trolling motor," for boating noiselessly through water without alarming wary fish. Power for such motors is commonly supplied by a direct current voltage source, such as a wet cell DC battery, carried aboard the boat.

Electric trolling motors of this type characteristically fall into one of two catagories—a hand operated model and a remote control model. Each type of trolling motor includes an elongate shaft having a watertight DC motor equipped with a propeller on the work shaft. Electrical leads from the motor extend up through the elongate shaft and are ultimately connected to the necessary switching mechanism to control on-off operation and/or variable speed control of the motor. In the hand operated model, directional control is accomplished by rotatably turning a hand lever attached to the top of the elongate shaft. The second type of trolling motor, to which this invention particularly relates, is commonly referred to as a remote control or foot operated trolling motor and enables the fisherman to have free use of his hands since directional control of the motor as well as on-off operation and/or variable speed control is accomplished by the foot acting on a pedal lever which has the necessary switch and any speed control associated therewith.

Directional control for a remote control trolling motor is conventionally accomplished by extending or retracting a drive cable connected to a centrally pivoted pedal lever. Such action is achieved when the operator alternately depresses the upper portion of the pedal as with the toe of the foot or depresses the lower portion of the pedal as with the heel of the foot. The opposite end of the control cable is connected to a drive wheel or drum which in turn is geared or otherwise coupled to the elongate shaft of the trolling motor. Extension or retraction of the control cable thus rotatably moves the drive wheel and such rotation is imparted to the elongate shaft to change the direction of the propulsion unit in the water. With this means of control, it is desirable that the drive wheel be larger in diameter than the elongate shaft so that a small angular movement of the drive wheel causes a much larger angular movement of the elongate shaft.

Heretofore, the control cable wire has typically been connected to the drive wheel by extending it straight through a connection post and utilizing a set screw to hold it in place in the connector. This connection method has proven highly unsatisfactory, since vibration and wear after prolonged use causes the set screw to loosen and the secured parts frequently slip from operative engagement with one another. This slippage has resulted in the functional breakdown of the remote control unit and caused an expensive, time-consuming maintenance problem.

Consequently, there is need in the field of remote control electric trolling motor for a method of securely and permanently attaching the control cable to on the drive wheel. Fulfilling this need is a primary goal of this invention.

More specifically, an object of this invention is to provide, in a remote control type of electric trolling motor, a method and apparatus for assuring that the control cable does not slip from operative engagement with the drive wheel of the remote control unit and for assuring trouble free operation over the effective life of the trolling motor.

Another object of the invention is to provide, in a remote control type of electric trolling motor, an uncomplicated connection between the control cable and the drive wheel of the remote control unit which is quickly assembled.

A further objeect of the invention is to provide, in a remote control type of electric trolling motor, a connection between the control cable and the driving wheel of the remote control unit that is both economical to produce and easy to assemble.

Other and further objects of the invention, together with the features of novelty appurtenant thereto, will appear in the course of the following description of the drawing.

DESCRIPTION OF THE DRAWING

In the accompanying drawing, which forms a part of the specification and is to be read in conjunction therewith, and in which like reference numerals are employed to indicate like parts in the various views:

FIG. **1** is a perspective view of a remote control type of electric trolling motor installed on the bow of a boat;

FIG. **2** is a top plan view of the directional control housing with a portion broken away to better illustrate the details of construction;

FIG. **3** is a side sectional view of the directional control housing shown in FIG. **2**;

FIG. **4** is an enlarged fragmentary, partially sectional view of the wheel and control cable connection shown in FIGS. **2** and **3**; and

FIG. **5** is a fragmentary, bottom plan view of the connection taken along line **5**—**5** of FIG. **4** in the direction of the arrows.

Referring to the drawing in greater detail, FIG. **1** illustrates a typical electric trolling motor, generally designated by the numeral **10**, mounted on the bow of a boat **11** by means of a bracket assembly **12**. The trolling motor **10** includes an upper housing **10***a* having electrical leads **10***b* connected to the on-off switch and/or motor variable speed control located on a foot operated pedal mechanism **13**. Electrical leads **10***e* from such switching are connected to a suitable voltage source **10***f*, such as a wet cell DC battery. The propulsion unit **10***d* contains an electric motor (not shown) which propels the boat through the water. The directional control housing **14** receives and rotates an elongate shaft **10***c* extending from the upper housing **10***a* to the propulsion unit **10***d* mounted on the lower end thereof, such rotation varying the direction of travel of the boat **11**.

As shown in FIGS. **2** and **3**, the directional control housing **14** includes a housing **15** and a housing body **16**, which are connected together by means of screws **17** to house the operating elements of the unit. Housing cover **15** is provided with a bore **18** for rotatably re-

ceiving a sleeve **19.** An seating flange **15***a* contains a bearing **20,** which seats on a shoulder **15***b* to rotatably support sleeve **19.** Sleeve **19** is provided with an enlarged integral collar **19***a* which contacts bearing **20** to limit the downward movement of the sleeve. Housing body **16** likewise contains a bore **21** and a seating flange **16***a*. Another bearing (not shown) similar to bearing **20** seats within flange **16***a* on shoulder **16***b* and is retained therein by a retaining collar (not shown), the retaining collar threadably engaging the threads **23** of the lower portion of the sleeve **19.** A set screw locks the retaining collar in position to limit the upward movement of sleeve **19.** Elongate shaft **10***c* fits slidably through sleeve **19,** and propulsion unit **10***d* may be fixed at any desired depth by tightening a lock screw (not shown but received through hole **22** in integral collar **19***a*) into engagement with shaft **10***c*. The lock screw also assures that shaft **10***c* will rotate with the sleeve **19.**

Rotatably attached to housing cover **15** by means of a shoulder bolt is a drive wheel **25,** the bolt extending centrally through wheel **25** into threading engagement with housing cover **15.** The bolt has a bushing or bearing surface to allow the rotation of wheel **25** about it, and a cap nut **26** is threaded onto the exposed end of the bolt. The ends of a driving cable **27** are formed into loops **27***a* and secured in that shape by cable clamps **28.** The two loops **27***a* are attached to the periphery of wheel **25** at different points by sets of screws **29** and lock washers **30.** Cable **27** is tautly wrapped around sleeve **19** and a portion of it is secured (as by soldering) to a cable lock **31,** a portion of which enters an aperture in sleeve **19** to securely affix cable lock **31** on the periphery of sleeve **19.** Cable **27** thus causes sleeve **19** (and elongate shaft **10***c* held therein) to rotate in response to the rotation of wheel **25.**

The remote control rotation of wheel **25** is effected by a control cable **32** comprising (FIG. 2) a cable shield or cover **32***a* (preferably constructed of a flexible synthetic material) and a cable wire **32***b* which extends centrally through cable cover **32***a* and is longitudinally movable therewithin. Formed integrally with housing body **16** is an apertured projection **34.** The end of cable cover **32***a* is secured within a hollow sleeve **35,** and sleeve **35** is threaded into the bore of projection **34** and retained therein by a pair of set screws **33.** The end **32***c* of cable wire **32***b* extends through the aperture of projection **34** and into the control housing **14** and is bent into an L-shape forming approximately a 90° angle (FIG. 4) with respect to the remainder of cable wire **32***b*.

Pivotally mounted to wheel **25** at a position offset from the wheel's axis of rotation is cable connection post **36.** Connection **36** comprises a bulbous head **36***a*, a shank **36***b* pivotally received through a hole in the drive wheel **25,** and a lock nut **36***c* which seats in a depression **37** on the opposite face of wheel **25** to pivotally secure the cable connection **36** to the wheel. Head **36***a* contains a channel or slot **36***d* which is cut transversely along a diameter of head **36***a* and which extends vertically through a major portion of head **36***a*. Slot **36***d* is of sufficient width to receive the diameter of the cable wire **32***b*. A small bore **36***e* (slightly larger than the diameter of cable wire **32***b* and slightly deeper than the length of bent end **32***c*) extends centrally from the inward extremity of slot **36***d* into shank **36***b* on the axis thereof to receive the bent end **32***c* of the cable wire. The portion of cable wire **32** *b* adjacent bent end **32***c* is disposed in the bottom of slot **36***d* with bent end **32***c* extending into bore **36***e*, and the cable wire is permanently but removably connected to cable post **36** by a cotter pin **37** overlying the cable wire **32***b* at a position such that the distance between the top of the wire **32***b* (when same is disposed in the bottom of the slot **36***d*) and the pin **37** is less than the length of the bent end **32***c*. The cotter pin **37** is received in holes through the head **36** to transect slot **36***d* at a position outwardly offset from bore **36***e* to prevent removal of the cable wire from engagement with cable post **36** when the pin **37** is thus inserted.

The opposite end of cable wire **32***b* is conventionally connected to the rear portion **13***a* of the pivotal pedal **13** located within the boat **11,** and the end of cable cover **32***a* is secured to fixed block **38** to assure that it will remain stationary as pedal **13** pivots. Downward pivoting of rear pedal portion **13***a* (as is effected by the operator depressing his heel thereupon) pushes cable wire **32***b* forwardly, which causes wheel **25,** sleeve **19,** and shaft **10***c* to rotate counterclockwise as viewed in FIG. **2,** thereby steering the boat **11** to the left. Conversely, upward pivoting of lever portion **13***a* (as is effected by the operator depressing his toe on forward pedal portion **13***b*) draws cable wire **32***b* rearwardly, which causes shaft **10***c* to rotate clockwise as viewed in FIG. **2,** thereby steering the boat **11** to the right.

Bosses **38** and **39,** which are integral with the interior face of housing body **16** positively limit the extent to which wheel **25** can be rotated by engaging cable connection head **36***a* when the limiting position is reached. It can be seen that the maximum angle through which wheel **25** may be rotated is approximately 180° which, because of the larger diameter of wheel **25** in relation to the sleeve **19,** imparts at least **360°** of rotation to the elongate shaft **10***c*. It should be noted that cable wire **32***b* is strong and rather rigid wire but is flexible enough to bend slightly within housing **14,** such flexibility permitting its end to move from alignement with the aperture through which it enters housing **14** as it rotates wheel **25.**

From the foregoing, it will be seen that this invention is one well adapted to attain all the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

Since many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

1. In a remote control unit for directionally controlling an electric trolling motor having an elongate shaft with a water submergible propulsion unit on the lower end thereof, the combination comprising:

a housing equipped with a rotatable sleeve which receives and fixedly retains the elongate shaft of the trolling motor to correspondingly rotate said shaft with said sleeve;

a wheel member pivotally mounted within said hous-

ing and being larger in diameter than said sleeve;

linkage means interconnecting said wheel member and said sleeve to impart rotational movement of said wheel member to said sleeve;

a retractable and extendable control wire partially disposed within said housing and having a bent end to form substantially an L-shaped portion on the end of said wire;

a post-like connector pivotally installed on said wheel member outwardly from the axis of rotation thereof, said connector having a vertical slot and a bore therein to receive the end portion of said control wire with said bent end disposed within said bore and the portion of control wire immediately adjacent said bent end disposed within said slot; and

a pin member transversely disposed within said slot and overlying said control wire to permanently but removably secure connection of said wire to said connector.

2. The combination as in claim **1**, said bore of said connector being slightly deeper than the length of said bent end of the control wire and being slightly larger in diameter than said control wire.

3. The combination as in claim **1**, said bore being axially disposed in said connector and said pin member being offset from the axis of said connector.

4. The combination as in claim **1**, said pin member positioned such that the distance between the top of the control wire and the pin is less than the distance the bent end of the control wire penetrates said bore.

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