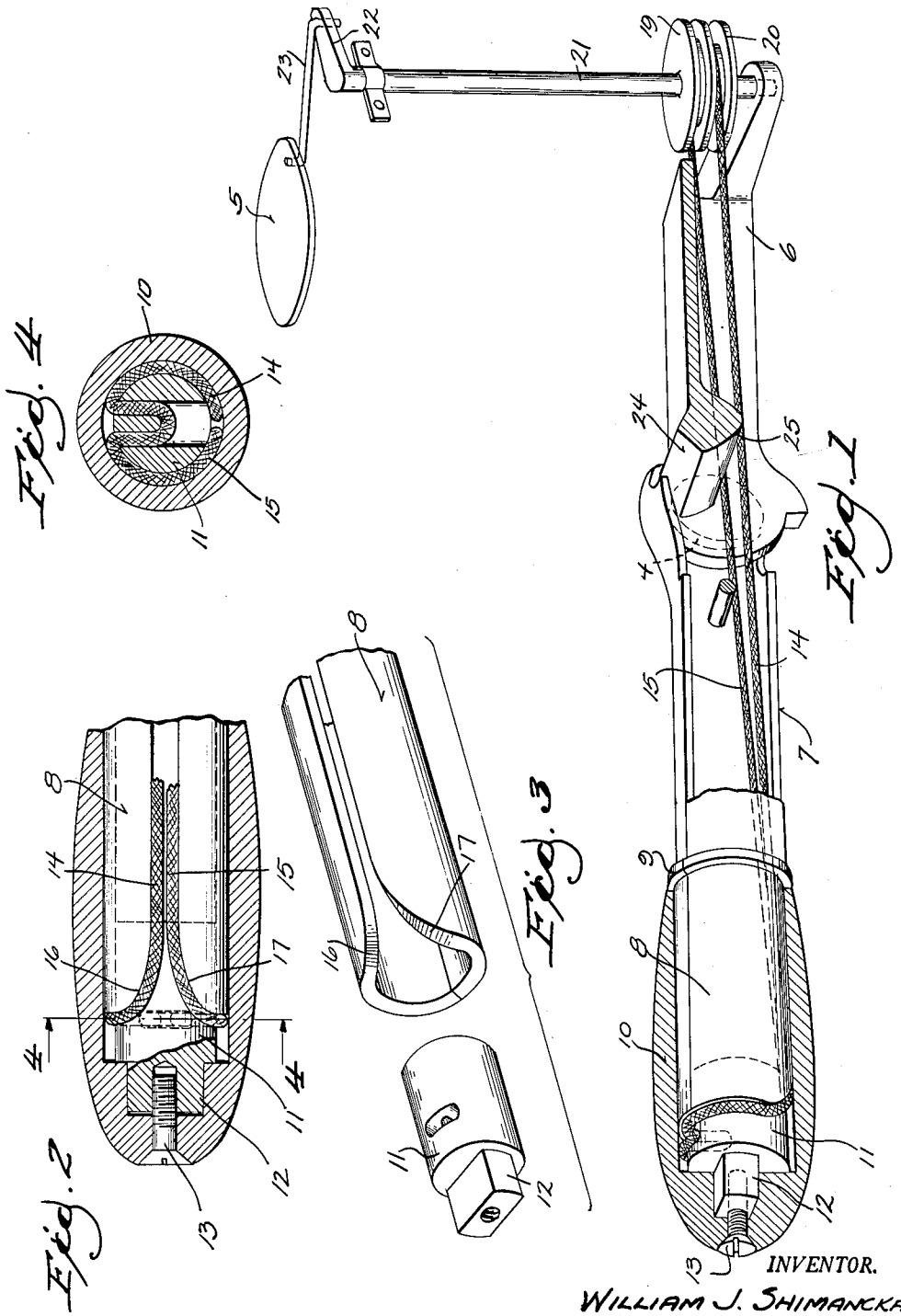
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CONTROL DEVICE FOR ROTATIVE TO LONGITUDINAL MOVEMENT

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CONTROL DEVICE FOR ROTATIVE TO LONGITUDINAL MOVEMENT

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This invention relates to a control device for translating the rotative movement of a control handle to effect movement of motion transmitting connection in a direction parallel to the axis of handle rotation. For exemplification, the device is incorporated in the tiller of an outboard motor and further includes an arrangement whereby cable tension is maintained in all positions of the pivoted terminal portion of the tiller.

The tiller is designed for use with an outboard motor of well-known design which rotates bodily upon a generally upright axis for steering and/or reversing. Since such an outboard motor is tiltable about a transverse axis in a direction to oscillate it over the boat transom upon which it is mounted, the free end portion of the tiller, including the hand grip, is pivoted to the base portion of the tiller upon a transverse horizontal axis to swing upwardly and thereby to avoid contact with the stern seat of the boat.

In order that the operator grasping such a tiller may also have control of engine speed, the tiller grip is made rotatable. The present invention is concerned with the means whereby tiller grip rotation is communicated to the speed control member of the outboard motor engine. While the present invention relates to a mechanical motion which has other utility, it will be recognized that it has peculiar significance in the installation in which it is exemplified.

The grip is connected to a generally cylindrical cable anchor which is rotatable about an axis extending longitudinally of the pivoted free end of the tiller. The said free end of the tiller has curved guide surfaces which are contiguous to the anchor and are disposed within the grip to receive cable runs fastened to the cable anchor. As the cable anchor rotates with respect to the channeled portion of the tiller, the cable runs are drawn in along one of the surfaces and payed out along the other. These runs extend thence along the tiller to an oscillatable control part which connects to the engine speed control element and is caused to oscillate as the grip is twisted.

Where the runs of cable pass the joint in the tiller, they are guided about fixed surfaces which are arcuate in general concentricity with the pivot axis about which the terminal portion of the tiller moves respecting its base. This keeps the cable runs under tension in all positions of the tiller grip.

In the drawings:

Fig. 1 is a diagrammatic view in perspective showing a tiller installation embodying my invention, portions of the tiller being broken away to a generally longitudinal section to expose the interior construction.

Fig. 2 is a fragmentary detail view taken in section on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary terminal view in perspective showing the under side of the tiller member in which the cable anchor is rotatable.

Fig. 4 is a view taken in cross section on line 4—4 of Fig. 2.

While engine speed may be controlled either by means

of a throttle valve or an advancing or retarding movement of the timer, the armature plate 5 of the timer has been selected as an engine speed control member for the purpose of exemplifying the present invention. It requires about 90° of movement, more or less. The general arrangement is illustrated in a large number of United States patents including Patents 1,899,965; 1,905,096; and 2,651,296.

The base portion 6 of the tiller is mounted on that portion of the outboard motor which is designed for steering or reversing as in United States Patents 2,069,315 or 2,070,406. The end portion 7 of the tiller is pivotally movable respecting the portion 6 at a knuckle joint which includes a transverse pintle at 4 for permitting portion 7 of the tiller to pivot upwardly respecting portion 6, while maintaining an adequate motion transmitting connection between the parts for lateral movement in a horizontal plane for steering purposes.

The free ends of portion 7 of the tiller include a split bearing sleeve portion at 8 which is shown in detail in Fig. 3. It may be provided with a collar 9 abutted by the rotatable grip 10. Within sleeve 8 is a generally cylindrical cable anchor 11 which is keyed, as by means of its squared end 12, to the grip 10 for rotation therewith. A screw 13 may be used at the end of the grip to fasten the grip securely to the cable anchor 11 against axial removal.

The runs 14 and 15 of the motion transmitting cable are anchored in the rotatable member 11. From their points of anchorage, they pass peripherally about the cylindrical member 11 and are guided by curved surfaces 16, 17 on the split sleeve 8 to pass parallel to the axis of the oscillatory cylinder 11 to the interior of the tiller portions 7 and 6 and ultimately to sheaves 19 and 20 on a rock shaft 21. The cable runs 14, 15 pass in opposite directions about the sheaves 19, 20 so that, in the oscillation of the rock shaft 21, one run is payed out and the other one wound. Any suitable motion transmitting connection, such as the arm 22 and link 23, may be used to communicate motion from the rock shaft to the engine speed control element represented by armature plate 5.

At the point where the respective cable runs 14 and 15 pass the knuckle joint in the tiller, the relatively fixed base portion 6 of the tiller is provided with guide means concentric with the axis of pintle 4 about which the runs of the cable pass to maintain their tension in all positions of the terminal portions 7 of the tiller. In the device illustrated, fixed guide means are used, comprising simply a boss 24 having an arcuate surface 25 which may be concentric with the pintle axis.

The cables 14, 15 are nylon covered in practice as a means of minimizing abrasion and facilitating their free movement over the various fixed guide surfaces provided at 16, 17 and 25.

It will be apparent from the foregoing description that when the operator's hand engages the grip 10, he may swing the entire tiller unitarily from side to side for steering purposes and, while thus in full control of the steering of his outboard motor, he may rotate the grip 10 to wind one of the cable runs 14 or 15 on the cylindrical anchorage 11 while unwinding the other. The cable run which is wound on the cylindrical guide 11 is tensioned to unwind it from its appropriate sheave 19 or 20. The two sheaves being fixed to the shaft 21, it will be evident that the winding of one cable will pay out the other in equal proportion thus effecting the oscillation of shaft 21 to control the armature plate.

The arrangement shown has a very great advantage in an installation in which space is limited. Without enlarging the tiller grip, motion has been changed from rotative motion to reciprocable motion in a direction gen-

erally parallel to the axis of rotation—all within the interior radius of the grip.

I claim:

1. The combination with a member mounted for rotation and a confining element in which said member is rotatable, of cable means having portions at least partially encircling said element in opposite directions about said axis of rotation and portions extending along said member in a direction generally longitudinal of the axis of rotation of said element, the said element having guide surfaces for the cable means which extend about the axis of rotation and curvilinearly toward the path upon which the cable means extend longitudinally of said axis.

2. The device of claim 1 in which said element comprises a split bearing sleeve in which the member is rotatable, said sleeve having a terminal surface extending peripherally of the member and spaced side margins extending longitudinally of the member, the said guide surfaces extending arcuately in opposite peripheral directions about said member to said terminal surface.

3. A motion transmitting system including a rock shaft having sheave means, cable runs wound in opposite directions on the sheave means, whereby one cable run is wound and the other payed out upon rotation of the rock shaft, a cable anchorage to which the cable runs extend and to which they are fastened, said cable anchorage being mounted for rotation at a point remote from the rock shaft on an axis which is generally parallel to the path of the cable runs as they approach said anchorage, and means providing relatively fixed guide surfaces disposed about the cable anchorage and divergently curvilinear upon the path of the cable runs from a position of substantial parallelism with said axis to positions substantially at right angles to said axis at points arcuately spaced about the anchorage from the points of cable connection thereto, whereby rotation of the anchorage will wind one of the cable runs and pay out the other to effect rock shaft oscillation.

4. The device of claim 3 in which the means providing the fixed guide surfaces comprises a support for said anchorage extending in a direction generally radial from said rock shaft and having an interior passage through which such cable runs extend.

5. The device of claim 4 in which the means providing the guide surfaces further provides a bearing within which the cable anchorage is rotatably mounted.

6. In a motion transmitting control system, the combination with a split sleeve having spaced side margins and a terminal surface to which such margins curvilinearly extend, of a cable anchorage element rotatably mounted in said sleeve, cable runs fixed to said anchorage adjacent the terminal surface thereof and extending curvilinearly about the curved margins of the sleeve and between the spaced side margins, and a grip encircling sleeve and connected with the cable anchorage for effecting rotation thereof and for housing said cable, together with a controlled member mounted for oscillation at a distant point and with which said cables are connected at opposite sides of the axis of oscillation of said member for the oscillation thereof.

7. The combination with an outboard motor tiller and a part requiring control, of a grip member mounted on the tiller for rotation on an axis extending longitudinally of the tiller, and two motion transmitting connections extending circumferentially of the grip member in opposite directions and hence extending along the tiller to said part, said connections including tension elements connected with said grip for movement in opposite directions according to the direction of rotation of said grip.

8. The combination with an outboard motor tiller and a part requiring control of a grip member mounted on the tiller for rotation on an axis extending longitudinally of the tiller, and motion transmitting connections extending along the tiller from said grip member to said part, said connections including tension elements connected with said grip for movement in opposite directions according to the direction of rotation of said grip, the tiller having a knuckle joint upon which a terminal portion of the tiller is pivotable upwardly about a transverse axis, together with means providing guide surfaces for said tension elements whereby to maintain uniform tension thereon in various pivotal positions of the terminal portion of the tiller.

9. The combination with an outboard motor tiller and a part requiring control of a grip member mounted on the tiller for rotation on an axis extending longitudinally of the tiller, and motion transmitting connections extending along the tiller from said grip member to said part, said connections including tension elements connected with said grip for movement in opposite directions according to the direction of rotation of said grip, the tiller having a bearing portion about which the grip is rotatable and within which there is rotatably mounted a cylindrical actuating element with which the tension elements are connected and about which they extend peripherally from such connection, the end of the actuating element being connected to the grip for rotation therewith and the bearing portion of the tiller having arcuate guide surfaces for said tension elements for changing their direction of movement from a direction peripherally of the actuating element to a direction approximately parallel to the axis thereof.

10. The combination with an outboard motor tiller and a part requiring control of a grip member mounted on the tiller for rotation on an axis extending longitudinally of the tiller, and motion transmitting connections extending along the tiller from said grip member to said part, said connections including tension elements connected with said grip for movement in opposite directions according to the direction of rotation of said grip, a rock shaft having a mechanical connection with the said control part, the said tension elements being connected with the rock shaft at opposite sides of its axis.

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