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PUSH-PULL CONTROL UNIT

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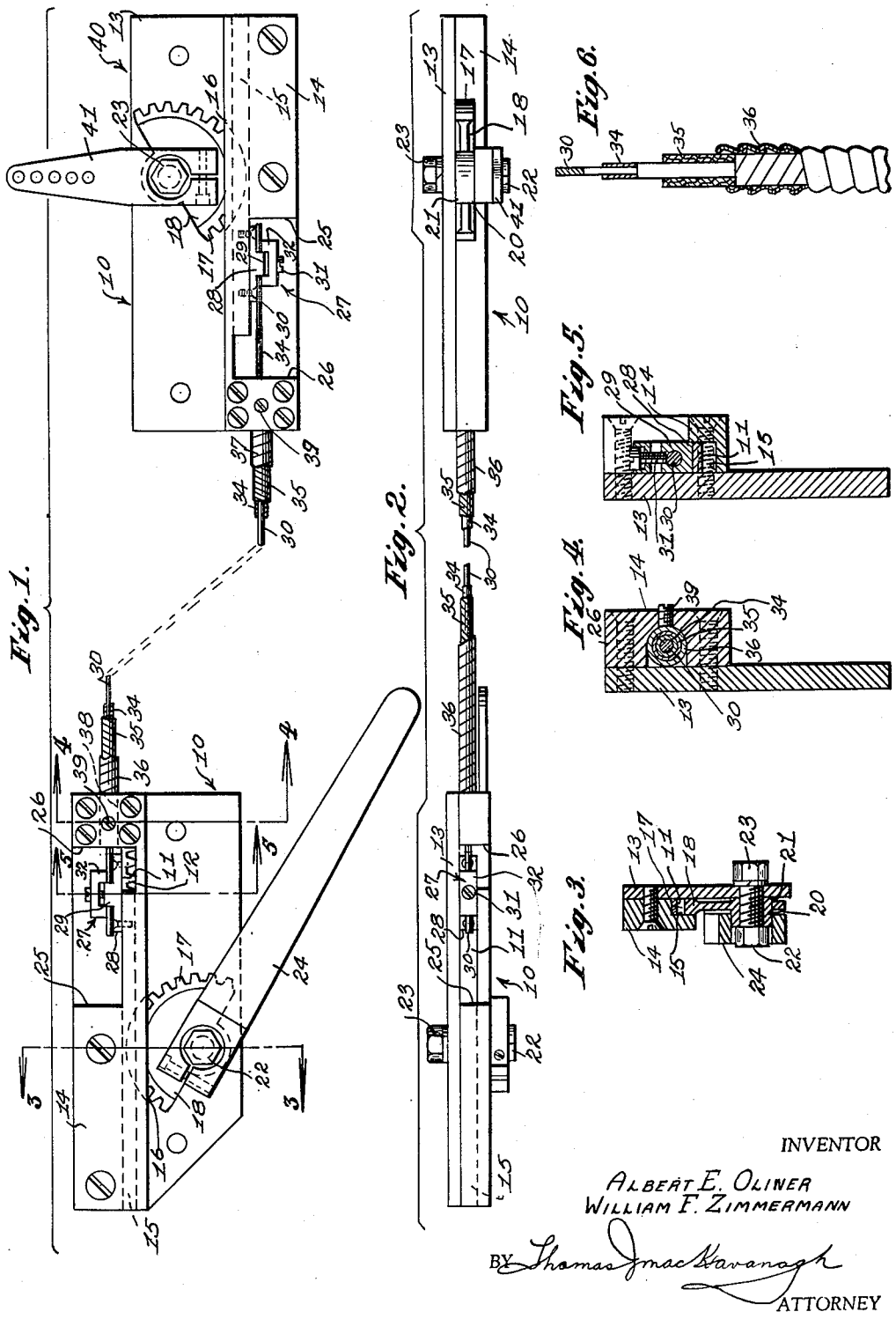


Fig. 1.

Fig. 2.

Fig. 6.

Fig. 5.

Fig. 4.

Fig. 3.

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PUSH-PULL CONTROL UNIT

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2 Claims. (Cl. 74—501)

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This invention relates to improvements in a mechanical control unit for the remote control of valves, steering equipment, and other devices for which a positive control unit of the push-pull type is desired.

An object of this invention is to provide an operating mechanism comprising a wire to be pushed or pulled through a plurality of tubular guiding means which are adapted to be curved to accommodate them to conditions on a motor boat or the like, or to be looped into a loop of short radius without impairing the ability of the wire in the assembly to move readily in pushing or pulling to actuate a controlled member in response to a manually operable control member at a remote point from the controlled device.

It is a further important object of this invention to provide a guide means for a wire connected at one end to manually operable means and at the other end to a controlled device so that the wire may be pushed or pulled through the guide means at will without the possibility of the wire binding in the guide means, or offering excessive resistance to movement in the guide means even though the guide means be curved or looped to admit of the guide means being installed in tortuous runs on a motor boat or the like.

It is a further important object of this invention to provide a cable assembly in which a springy wire is reciprocated in a copper tube of small bore, and with means disposed about the copper tube whereby it is possible to bend the tube to bends of about a two-inch radius without deforming the bore of the copper tube and impeding movement of the wire therein, and so make the assembly applicable for use under conditions in which short bends are desirable, or even necessary.

Other and important objects and advantages of this invention will be more apparent from the following detailed description of the mechanism constructed and operated according to the principles of this invention.

In the accompanying drawings:

Figure 1 is a side view in elevation, with a part broken, and showing the transmitter and receiver and cable assembly of this invention;

Figure 2 is a top view in elevation;

Figure 3 is a section view on line 3—3 of Figure 1;

Figure 4 is a section view on line 4—4 of Figure 1;

Figure 5 is a section view on line 5—5 of Figure 1, and

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Figure 6 is a view in section of the cable of Figure 1 with parts broken.

In the drawings, the numerals 10 indicate generally a transmitter assembly in which a rack bar 11, is arranged reciprocable in guide means provided by a base plate 13, and a cover plate 14, which is removably secured to the base plate.

The cover plate is thicker than the bar 11, and has a left-hand portion provided with a slot or channel 15, opening downwardly, so that this portion of the cover plate cooperates with the base plate to guidedly house the bar 11 on four sides as it moves in this portion of the cover plate. The cover plate is also provided with a side slot 16, entering the channel 15, and the teeth 17, of a quadrant 18, enters the slot 16 to engage with the teeth 12 of the bar 11. The portion of the quadrant 18, which is entered in the slot 16, is disposed between the base plate 13, and the spaced opposed portion 19, of the cover plate, so that vertical movement of the quadrant is effectively limited.

Because vertical and tilting movement of the quadrant are so limited simple means may be used to mount the quadrant for turning on the base plate. The quadrant 18 is provided with a bored top boss 20, and a bottom boss 21, and a bolt 22 is passed through the bosses and threaded into the base plate 13, and locked by a lock nut 23. An operating lever 24 is adjustably secured on the top boss 20.

A portion of the cover plate 14, is cut away to define abutments 25 and 26, e. g. respectively, and are engageable with the clamping assembly 27, on the bar 11, to limit travel of the bar.

The clamping assembly 27 comprises a bottom portion 28, secured to the bar 11, and having an upstanding arm 29 which is bored for the passage of a wire 30. The arm 29 is also tapped to receive a threaded bolt 31, adapted to push a saddle member 32 into engagement with the wire 30 to clamp the wire between the bottom portion and the saddle 32.

The right hand portion of the cover plate is channeled at 33, to receive the end of a cable assembly, indicated generally at 33, and to cooperate with the base plate 13 to define clamping means 37 for the end of the cable. The cable assembly 33 comprises a wire 30, of springy material such as piano wire, slidable in a copper tube 34. The wire 30 is inextensible under the conditions of operation contemplated for the device. The bore of the tube 34 is ample to allow longitudinal movement of the wire 30 therein without undue friction, but with just enough friction drag

to discourage creeping of the wire when at rest. A tape **35**, of a suitable treated cotton fabric, or of a suitable material from the resin family of plastics, is wrapped about the tube **34** to act as a cushion for a metallic tape **36**.

The metallic tape is wound about the tape **35** while both are being wound about the copper tube in a forming machine, and the metallic tape **36** is wound to define a tight fitting tube of interlocked helical convolutions pressed into locking engagement with the cushioning material, and pressing the cushioning material into intimate engagement with the copper tube. The metallic tape **36** is of bronze, or other non-magnetic material when the device is used adjacent to compasses.

The clamping means **37** hold the end of the outer tube **36** in clamped relation, and also the end of the tube **34**, frictionally held to the tube **36** by the cushioning material **35**, while adapted to allow movement of the wire **30**, as the bar **11** is reciprocated, and to which bar it is clamped by the clamping means **27**. Because of the helically convoluted surface of the tube **36** it is a simple matter to so proportion the slot **38** in the right hand end of the cover plate that the end portion of the cable assembly can be pushed sidewise into the slot with little effort and still resist considerable pull. However, a locking screw **39** is provided to engage the armor tube **36** in cooperation with the surfaces defining the slot **38** and the opposed surface of the plate **13**.

The operating handle **24** with its cooperating instrumentalities may be termed the actuated member, while the remote end of the wire **30** is connected to a receiver or operated member **40**, which comprises a similar arrangement of parts, and to which similar numerals have been applied with the exception of the driven handle to which the numerals **41** have been applied.

The push-pull devices just described are particularly adapted for use on motor boats, with the transmitter mounted convenient to the steering position and with the receiver connected to the engine controls. Because the copper tube is effectively anchored to the outer armor the cable is adapted for short bends in the assembly and for the conditions usually met with in motor boat installations. The outer armor, cooperating with the cushioning material, provides means whereby the copper tube can be bent to take short bends without distortion of the wall of the tube. It is a common expedient to fill a tube with rosin so that it may be bent without distortion of its bore. In the cable assembly just described, bending of the copper tube to about a two-inch radius can be effected without distortion of the bore of the tube. The springy wire in the copper tube creates just enough drag to beneficially hold the controls connected to it at any desired setting without creeping.

We claim:

1. A push-pull mechanism for the transmission of push and of pull between an actuated part and an operated part, said mechanism comprising an actuated part mounted for movement on a first rigid base, an operated part mounted for movement on a second rigid base, a flexible and springy but normally inextensible wire connecting said actuated part with said operated part, a flexible housing for said wire, said housing comprising a first cylindrical metal tube receiving said wire for sliding movement therein and with friction drag to oppose creep of the wire in the tube, a cushion of yieldable material tightly wound about the outer surface of said first tube, and a metallic tape wound in tight engagement with said cushion and formed during the winding thereof about said cushion to define a second tube having interlocked helical convolutions, and means on said first and second bases, respectively, securing the ends of said second tube stationary with respect to said bases and to thereby secure the ends of the said first tube through frictional engagement of said tube with said cushion and said second tube, and without deforming said first tube.

2. A push-pull mechanism for the transmission of push and of pull between an actuated part and an operated part, said mechanism comprising an actuated part mounted for movement on a first rigid base, an operated part mounted for movement on a second rigid base, a flexible and springy but normally inextensible wire connecting said actuated part with said operated part, a flexible housing for said wire, said housing comprising a first cylindrical metal tube receiving said wire for sliding movement therein with friction drag to oppose creep of the wire in the tube, a cushion of yieldable material wrapped tightly about said first tube, and a metallic tape wound tightly about said cushion and formed during the winding thereof about said cushion to define a second metal tube having interlocked helical convolutions in substantially locked engagement with said cushion, and clamp means on said first and second bases, respectively, securing the ends of said second tube stationary with respect to said bases and to thereby secure the ends of said first tube through frictional engagement of said first tube with said cushion and said second tube and without deforming said first tube.

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