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[54] ACTUATOR CABLE ADJUSTMENT DEVICE 1 Claim, 7 Drawing Figs.

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74/502, 287/58, 287/110, 285/303, 64/3

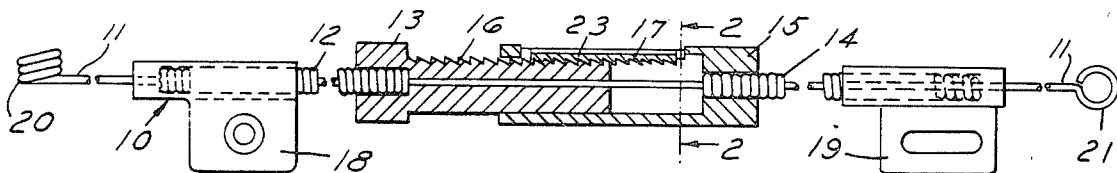
[51] Int. Cl. F16c 1/10,
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[50] Field of Search 74/501 (P),
501, 502; 287/58 (CT), 109, 110; 64/3; 285/302,
303

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ABSTRACT: A flexible actuator cable having an outer sheath and a coaxial wire and including an adjustable plug and a split sleeve socket combination integrated in the sheath and surrounding the wire wherein the plug is variably depthwise insertable in the socket to vary the extension of the sheath relative to the wire to adjust tension and pressure between the wire and the sheath and to improve ease and accuracy of operation. The plug and socket have interlocking serrations to secure their axial adjusted position and a cam on either the socket or plug forcibly engageable with the other by relative angular movement to expand the socket to disengage the serrations to permit axial movement between the plug and socket to adjust the extension of the sheath relative to the wire and upon release of cam engagement the socket contracting to reengage the serrations to lock the sheath in the adjusted axial extension.



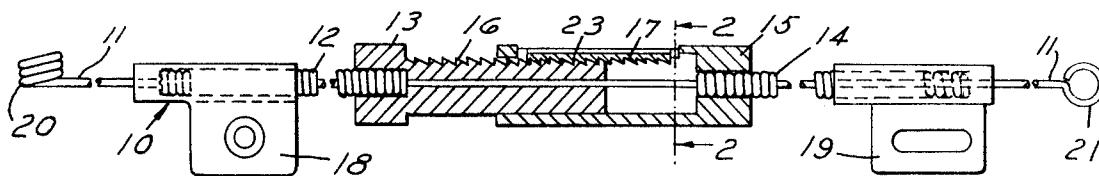


FIG. 1

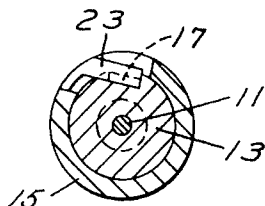


FIG. 2

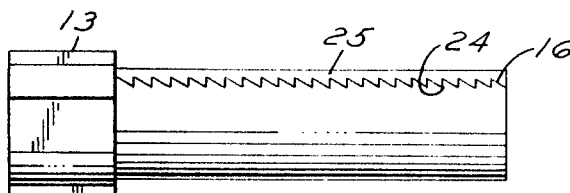


FIG. 3

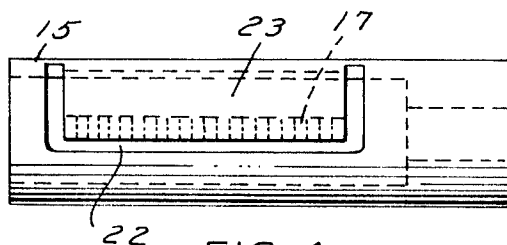


FIG. 4

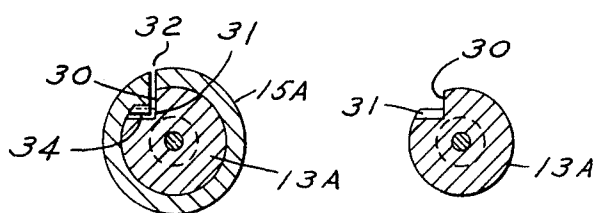


FIG. 5

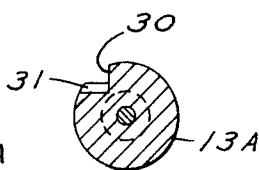


FIG. 6

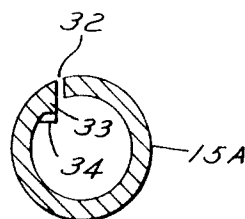


FIG. 7

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ACTUATOR CABLE ADJUSTMENT DEVICE

This invention relates to flexible actuator cables having a sheath and a coaxial wire and in particular to adjustment means integrated in the sheath to vary the extension of the sheath relative to the wire to improve ease and accuracy of operation.

It has been found that flexible actuator cables are difficult and inaccurate in operation when the sheath and wire bind against one another because of improper length of the sheath and/or the wire relative to one another.

It is therefore a primary object of the invention to provide quick, facile, and secure adjustment means associated with the sheath to adjust the length or extension of the sheath relative to the wire to improve ease and accuracy of operation of the flexible cable.

An object of the invention is to dispose a lengthwise adjustable plug and socket connector combination in the sheath for adjustably varying the extension of the sheath and the wire relative to one another.

An object of the invention is to provide interlocking serrations in the plug and socket to secure the sheath in the adjusted extension.

An object of the invention is to provide cam means between the socket and plug for expanding the socket to disengage the serrations upon angular movement to permit axial movement of the plug and socket relative to one another so that they can be moved inwardly or outwardly relative to one another to shorten or lengthen the extension of the sheath relative to the wire.

These and other objects of the invention will become apparent by reference to the following description of an adjustable flexible actuator cable embodying the invention taken in connection with the accompanying drawing, in which:

FIG. 1 is a side elevational view of a actuator cable, interrupted and foreshortened to conserve space, and showing the plug and socket portion in cross section.

FIG. 2 is an enlarged cross-sectional view of the device shown in FIG. 1 taken on the line 2-2 thereof showing the split socket and the cam on the plug portion.

FIG. 3 is an enlarged side elevational view of the plug portion seen in FIGS. 1 and 2.

FIG. 4 is an enlarged side elevational view of the split socket portion seen in FIGS. 1 and 2 indicating internal structure in broken lines.

FIG. 5 is a cross-sectional view similar to FIG. 2, showing a modification where the cam is on the socket and the recess is in the plug.

FIG. 6 is a separate showing of the plug as seen in FIG. 5; and

FIG. 7 is a separate showing of the socket as seen in FIG. 5.

Referring now to the drawing wherein like numerals refer to like and corresponding parts throughout the several views, the flexible actuator cable 10 comprises a wire 11, a first sheath portion 12, a plug 13 secured to the sheath portion 12, a second sheath portion 14, a split socket 15 secured to the sheath portion 14, and interlocking serrations 16 and 17 on the plug 13 and socket 15 respectively securing them together in lengthwise position relative to one another. Tabs or flaps 18 and 19 are secured to the outer ends of the sheath portions 12 and 14 respectively for anchoring the sheath. The wire 11 has coiled ends 20 and 21 for securing the wire to the actuator and the device actuated.

In the embodiment of FIGS. 1-4, the socket has a U-shaped split 22 defining a flap 23 in the wall of the socket 15. The serrations 17 are on the flap 23 internally of the socket 15. The flap 23 and split 22 may be molded in the socket 15 as shown. The plug 13 has the serrations 16 externally thereof on a flat surface 24 of the plug 13 as molded formed by a longitudinal relief 25 on the plug 13. The flap 23 extends tangentially into the area of the plug 13 as allowed by the relief 25 of the

plug 13. This arrangement normally holds the serrations 16 and 17 angularly in alignment with one another as the flap 23 and relief 25 act as a tongue and groove. The periphery of the body of the plug 13 radially outwardly of the flap 23 acts as a cam relative to the flap 23.

Upon forced angular movement between the plug 13 and socket 15, the body of the plug 13 cams the flap 23 outwardly disengaging the serrations 16-17 so that the plug 13 and socket 15 may then be moved axially toward or away from each other. Upon release of the forced engagement and counterrotation of the plug 13 and socket 15, the serrations 16-17 are reengaged locking the plug 13 and socket 15 in their adjusted lengthwise relationship.

In the embodiment shown in FIGS. 5-7, the plug 13A has a relief 30 and serrations 31 and the socket 15A has a longitudinal split 32, and inwardly extending cam strip 33, and serrations 34 on the cam strip 33. With the serrations 34-31 in engagement, FIG. 5, the plug 13A and socket 15A are locked in axial position. Upon forced relative angular movement between the plug 13A and the socket 15A, the plug 13A engages the cam strip 33 on the socket 15A and moves it radially outwardly disengaging the serrations 34-31 releasing the plug 13A and socket 15A for free relative axial movement. The socket 15A and plug 13A are then adjusted axially to adjust the sheath portions lengthwise and with reverse rotation, the serrations 34-31 again engage securing the sheath portions 12-14 in adjusted extension relative to the wire 11.

The plug and socket are molded of suitable synthetic resin material, such as polypropylene and the sheath may be coiled wire or molded tubing, etc. The socket is thus relatively flexible for movement by the cam to disengage the interlocking serrations.

The scope of the invention is defined by the appended claim.

I claim:

1. A flexible actuator cable including an outer sheath and a coaxial wire having means for adjusting the extension of said sheath and said wire relative to one another to improve ease and accuracy of operation, comprising

- a first sheath portion;
- a relatively long plug on said first sheath portion having external serrations;
- a second sheath portion;
- a relatively deep socket on said second sheath portion having internal serrations; said socket being made of relatively flexible material;
- said plug and socket having apertures receiving said wire;
- said plug being variably depthwise insertable in said socket with their respective serrations interlocking to interconnect said plug and socket and also said sheath portions;
- said socket having a side wall interrupted by a longitudinally extending radial slot permitting said socket to expand and contract;
- a longitudinal cam portion on one said socket and said plug respectively;
- a recess in said other socket and said plug normally inactive-ly receiving said cam portion;

forced relative angular movement between said socket and said plug engaging said cam portion on one said socket and plug with the other said socket and plug adjacent said recess expanding said socket to disengage the interlocking of said serrations;

said socket and plug with said serrations so disengaged being axially movable relative to one another to adjust the extension of said sheath portions relative to said wire;

release of forced angular movement and reverse rotation disengaging said cam portion and allowing said socket to contract to reengage said serrations locking said plug and said socket together in the adjusted axial position thereby adjusting the extension of said sheath relative to said wire.