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MULTIPLE BOWDEN WIRE STRUCTURE

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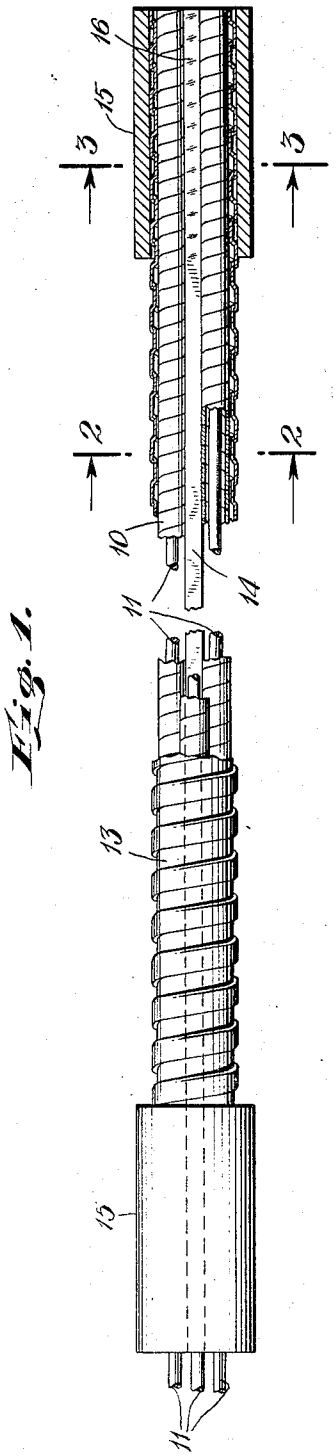

Fig. 1.

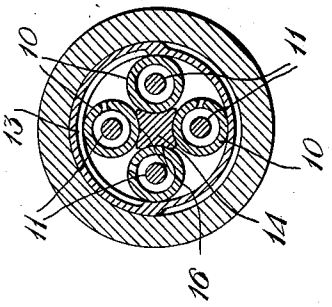

Fig. 3.

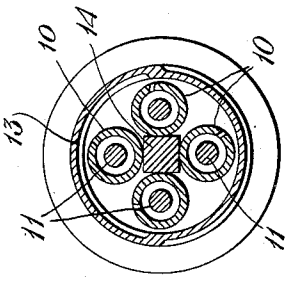

Fig. 2.

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MULITPLE BOWDEN WIRE STRUCTURE

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8 Claims. (Cl. 74—501)

The present invention relates to flexible power transmitting mechanism of the type generally known as a Bowden wire, in which a pair of elongated elements are disposed one within the other, whereby one will serve as a guide for the other, and in which power is transmitted by relatively sliding movement of said elements.

Such devices are commonly used to control the movement of a remote part to which rectilinear access cannot conveniently be provided from an operating point. Heretofore, separate Bowden wires have been provided for each control and each of such power transmitting devices has had to be individually mounted and suitably guarded from rattling or abrasion against intervening parts.

My invention has for an object to provide a multiple Bowden wire structure comprising a plurality of power transmitting elements which may be handled as a unitary structure. To this end, I provide a plurality of Bowden wire casings enclosed in a single flexible envelope, all of said casings being fixed to said envelope at at least one end thereof.

Another object of the invention is to provide means for maintaining the casings at a predetermined mutual spacing within the outer envelope.

A further object is to provide a central member within the envelope adapted to maintain the unit at constant length regardless of bends and regardless of push or pull movements transmitted by the unit.

Other objects and advantages of my invention will appear in the following description of a preferred embodiment and thereafter the novelty and scope of the invention will be pointed out in the claims.

In the accompanying drawing;

Figure 1 is a view partly in side elevation and partly in longitudinal section of my improved multiple Bowden wire;

Fig. 2 is a view in transverse section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a view in transverse section taken on the line 3—3 of Fig. 1.

As shown in the drawing, I provide a plurality of flexible Bowden wire casings 10 each preferably formed of a coiled metallic ribbon. Each casing serves as a guide for a flexible power transmitting element 11 which passes therethrough. Each element 11 is preferably a solid wire although obviously any other suitable transmitting element may be employed. The casings 10 are inserted in an outer flexible casing or envelope 13 with a spacer 14 introduced between the casings 10. This spacer may consist of a flexible metal rod and is preferably (although not necessarily) formed with flat faces against which the casings 10 bear respectively. Thus, in the particular embodiment illustrated there are four Bowden wire casings 10 and the rod 14 is square in cross-section. The outer envelope 13 may be formed of a coiled metal ribbon, as shown. At each end of the envelope there is a ferrule 15 which is swaged upon the envelope 13 after the casings 10 have been introduced therein and by swaging the ferrule on the envelope the casings 10 are tightly embraced and pressed against the spacer rod so that all parts except, of course, the wires 11, are rigidly fixed together at the ends of the structure. However, intermediate the ferrules the casings have limited motion in the envelope. The rod 14 is preferably formed with corrugations 16 near each end to provide a better grip and ensure a tighter hold when the ferrules are swaged on.

This multiple casing may be flexed, as desired, to guide the wires 10 in any desired non-rectilinear path from the points of application of power to the parts thtat are to be actuated. As the structure is bent the central rod 14 serves to keep the unit at constant length. One of the obvious advantages of this unitary structure is that it avoids the necessity of providing individual ferrules for each Bowden wire casing and individual mountings therefor.

Obviously, the number of casings within the envelope may be varied, as desired, and the spacer modified accordingly. Thus, while I have described a specific embodiment of my invention it will be understood that this is not to be taken as limitative, but merely as illustrative, and that I reserve the right to make various changes in form, construction and arrangement of parts without departing from the spirit and scope of the following claims.

I claim:

1. A device of the character described comprising a plurality of flexible Bowden wire casings, a flexible tubular envelope in which said casings are loosely fitted, a spacer extending longitudinally between the casings, and means binding the envelope and casings and spacer together at each end of the device.

2. A device of the character described comprising a plurality of flexible Bowden wire casings, a flexible tubular envelope in which said casings are loosely fitted, a flexible rod disposed lengthwise between the casings and maintaining the same in mutually spaced relation, and means

binding the envelope, casings and rod together at each end of the device.

3. A device of the character described comprising a plurality of flexible Bowden wire casings, a flexible tubular envelope in which said casings are loosely fitted, a flexible rod disposed lengthwise between the casings and maintaining the same in mutually spaced relation, a ferrule at each end of the envelope binding the envelope, casings and rod together, and an elongated power transmitting element extending through each of said casings.

4. A device of the character described comprising a plurality of flexible Bowden wire casings, a flexible tubular envelope in which said casings are loosely fitted, a flexible rod fitted between the casings and formed with flattened faces against which the casings bear respectively, and a ferrule binding the envelope and casings and rod tightly together at each end of the device.

5. A device of the character described comprising a flexible tubular envelope, four flexible Bowden wire casings extending lengthwise through the envelope, a flexible rod spacing the casings apart, said rod being of square cross-section to provide a flat face for each casing to bear against, and a ferrule binding the envelope and casings and rod tightly together at each end of the device.

6. A device of the character described comprising a flexible tubular metallic envelope, a plurality of flexible Bowden wire casings within said envelope, means separating and holding said casings in mutually spaced relation within said envelope, and a ferrule swaged on an end of said envelope binding said envelope, casings and means together as a unitary structure.

7. A device of the character described comprising a flexible tubular metallic envelope, a plurality of flexible Bowden wire casings within said envelope, means separating and holding said casings in mutually spaced relation within said envelope, a ferrule swaged on an end of said envelope to hold the envelope, casings and means together as a unitary structure, said means comprising a metallic element having a number of faces equal to the number of casings, and corrugations in said faces cooperating with said casings.

8. A device of the character described comprising a flexible tubular metallic envelope, a plurality of flexible Bowden wire casings loosely fitting within said envelope, a flexible spacer rod extending longitudinally between said casings, and a ferrule swaged on each end of said envelope binding the envelope, casings and spacer rod together as a unitary structure.

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