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(54) Lockable telescopic members

(57) At least one pressure pad 13 extends through an aperture 12 in a first elongate member 10, and projects into a space formed inside a sleeve 14 which is securely mounted on a second elongate member 11. Said space is created by an internal cam surface 20 which is formed on said sleeve.

The two elongate members 10,11 can be moved relatively to one another in axial directions and angularly about their common axis until a desired setting has been achieved. The sleeve 14 is then moved angularly about said axis in order to cause said cam surface 20 to force the pressure pad 13 radially inwardly against the second elongate member 11 in order to lock said members together.

There may be two or more pads 13 and complementary cams 20 on the sleeve.

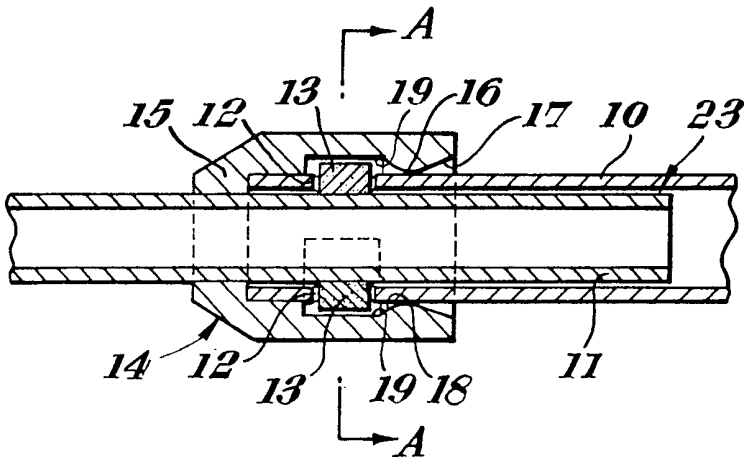

Fig. 1

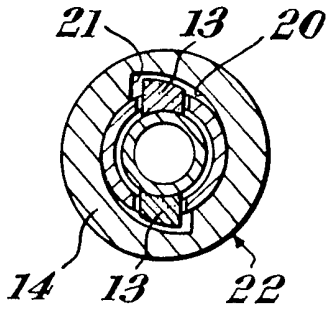

Fig. 2

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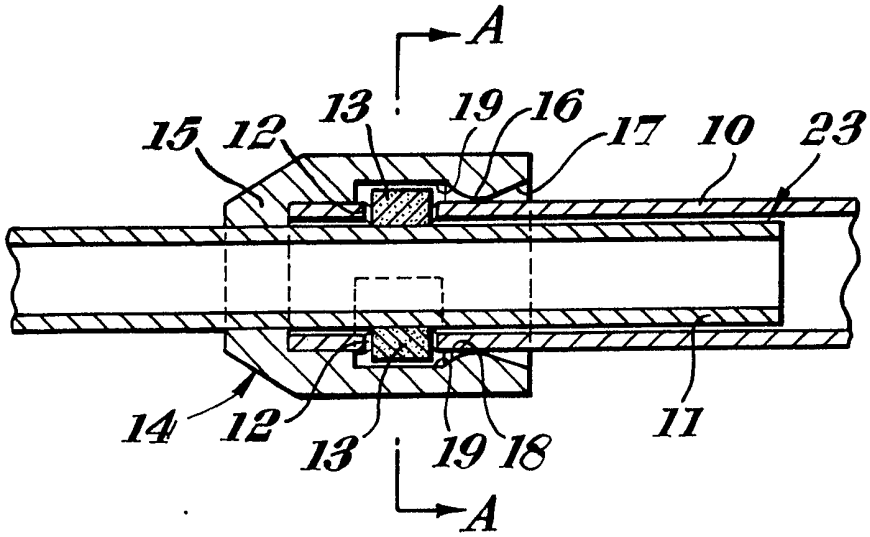

Fig. 1

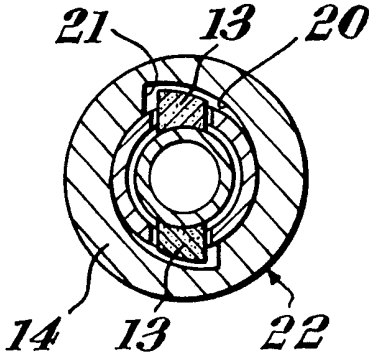

Fig. 2

SPECIFICATION

Lockable telescopic members

This invention relates to lockable telescopic members.

The present invention consists in telescopically arranged first and second elongate members which are temporarily securable, in any relative positions to which they have been adjusted, by a releasable locking device which includes a sleeve mounted on the first elongate member and pressure transmitting means, said sleeve having internal cam means and being angularly movable in a first direction about the axis of said first elongate member in order to cause the cam means to apply a braking force to the second elongate member by means of the pressure transmitting means.

Said pressure transmitting means may consist of two pressure pads which extend through diametrically opposed apertures in said first elongate member. Said pressure pads may be connected to one another by a thin strip of material, whereby assembly of said releasable locking device on the elongate members is facilitated.

In the case where the pressure transmitting means consists of said two pressure pads, the sleeve is provided with diametrically opposed cam surfaces which are in contact with the radially outer surfaces of the respective pressure pads when said braking force is applied.

The sleeve and the pressure transmitting means may be made of a suitable plastics material.

The present invention further consists in lockable telescopic members constructed, arranged and adapted to operate substantially as hereinafter described with reference to and as illustrated in the accompanying diagrammatic drawing. Said drawing illustrates one embodiment (by way of example) of lockable telescopic members according to the invention,

Figure 1 being an axial section through coaxial tubular elongate members which are encircled by a sleeve which forms part of a releasable locking device; and

Figure 2 being a section taken on the line A-A in Figure 1.

Referring to the drawing, portions of two elongate members 10, 11 (hereinafter called tubes) are arranged one within the other for relative axial movement. The tube 10 has diametrically opposed apertures 12 in which are disposed pressure pads 13 which may be separate from one another or which may be joined to one another by a thin strip of material. A sleeve 14 is mounted on one end of the tube 10 and the end 15 of the sleeve is of such an internal diameter as to encircle the tube 11 snugly. The opposite end of the sleeve 14 is so formed as to provide an annular seal 16 whose smallest internal diameter is approximately equal to the outside diameter of the tube 10. The seal 16 has an axially extending surface 17 which is frusto-conical and an axially extending surface 18 which may be curved (as shown) or frusto-conical; the angle of inclination of any part of the surface 17 with respect to the common longitudinal axis of the tubes 10,11 is 16° in the illustrated embodiment whereas the angle of inclination of the surface 18 with respect to said axis is approximately 30°.

The sleeve 14 is formed with diametrically opposed recesses 19 each of which (in radial section) has a wall 20 whose curvature is drawn from a centre different from that of the right-cylindrical portions of the sleeve, and a wall 21; the walls 21 of the two recesses 19 lie in parallel planes which are disposed symmetrically one each side of the longitudinal axis of the sleeve 14.

The outer surface 22 may be provided with knurling (not shown) in order to improve the grip between a hand and the sleeve 14, and the radially inner and radially outer surfaces of each of the pads 13 may also be curved (approximately as shown in Figure 2).

With the sleeve 14 in the position,relative to the pads 13, shown in Figure 2, the tubes 10,11 can be moved axially relatively to one another. When the desired adjustment of the tubes has been made, the tube 10 will be gripped by one hand near to the sleeve 14 and the sleeve 14 will then be moved angularly about the common axis of said tubes; this angular movement will be anti-clockwise as seen in Figure 2. Such angular movement of the sleeve will cause the internal cam means constituted by the pair of surfaces 20 to force the pads 13 radially inwardly and thereby to apply a braking force to the inner tube 11. The braking force applied by said pads to the tube 11 is adequate to maintain the desired setting of the tubes 10,11. Obviously, in order to undo the locking device, it is simply necessary to move the sleeve 14 in the opposite direction (clockwise, Figure 2) in order to remove the radially inwardly directed pressure exerted on the pads 13 by said surfaces 20.

It will be apparent that the number of pads 13/holes 12/cams 20 can be varied to suit the existing circumstances; there could be one pad 13/ hole 12/cam 20 if the tubes 10,11 are of small diameter and/or wall thickness, or there could for example be three pads 13/holes 12/cams 20 spaced 120° apart about the common axis if the tubes 10,11 are of relatively large diameter.

The axially outwardly flared surface 17 on the sleeve 14 enables the sleeve to be pushed onto the tube 10 once the pads 13 have been placed in their respective apertures 12. The pads 13 could be compressible to at least a small degree and/or the sleeve 14 could be

such as to flex to the extent necessary to enable the seal 16 to ride over the pads. The degree of flare assists the movement of the seal 16 over the pads 13 but the angle of inclination of the surface 18 is such as to make it virtually impossible for the sleeve 14 to be taken off the end of the tube 10 once it has been properly mounted thereon.

The pads 13, particularly in the two-pad embodiment illustrated, could be joined by a very thin strip of material; if the pads 13 are made of a plastics material, the pads and the joining strip could be made in one operation by injection moulding. Joining the pads to one another in this manner could greatly assist assembly which might otherwise be difficult and fiddly if two separate pads have to be manipulated whilst trying to apply the sleeve.

The inner tube 11 could, of course, be replaced by a rod, and the end 23 of the tube or rod 11 may be swaged or otherwise treated in order to provide a radially outwardly projecting part which will prevent the user from accidentally pulling the tube or rod 11 out of the tube 10 past the end 15 of the sleeve.

Suitable materials (by way of example only) for the manufacture of the pad(s) 13 and the sleeve 14 are considered to be nylon and polypropylene, and said pad(s) and sleeve could well be moulded from said materials; on the other hand, the pad(s) and sleeve could be made of machinable material. Thus, if the tube/rod 11 is to be inserted into the tube 10 after the pad(s) 13 and the sleeve 14 have been assembled on said tube 10, the pad(s) and sleeve could be made of any suitable material (for example, of a metal). If, however, it is required to assemble the pad(s) 13 and the sleeve 14 on the tube 10 after the tube/rod 11 has been inserted into the tube 10, some elastically deformable material (e.g. polypropylene) must be used for said pad(s) and sleeve.

It will be understood that,when the lock has been applied, it will not be possible to move the elongate members 10, 11 relatively to one another either axially or angularly about the longitudinal axis previously referred to.

CLAIMS

1. Telescopically arranged first and second elongate members which are temporarily securable, in any relative positions to which they have been adjusted, by a releasable locking device which includes a sleeve mounted on the first elongate member and pressure transmitting means, said sleeve having internal cam means and being angularly movable in a first direction about the axis of said first elongate mamber in order to cause the cam means to apply a braking force to the second elongate member by means of the pressure transmitting means.

2. The arrangement as claimed in Claim 1, wherein said pressure transmitting means consists of two pressure pads which extend through diametrically opposed apertures in said first elongate member.

3. The arrangement as claimed in Claim 2, wherein said pressure pads are connected to one another by a thin strip of material, whereby assembly of said releasable locking device on the elongate means is facilitated.

4. The arrangement as claimed in Claim 2 or Claim 3, wherein the sleeve is provided with diametrically opposed cam surfaces which are in contact with the radially outer surfaces of the respective pressure pads when said braking force is applied.

5. The arrangement as claimed in any one of the preceding Claims, wherein the sleeve and the pressure transmitting means are made of a plastics material.

6. The arrangement as claimed in any one of the preceding Claims, wherein one end of the sleeve encircles the second elongate member snugly and the other end of said sleeve has an annular seal whose smallest internal diameter is approximately equal to the outside diameter of said first elongate member.

7. The arrangement as claimed in Claim 6, wherein said annular seal is of such cross-sectional shape as to have, essentially, two portions which slope away from one another at different angles measured with respect to the axis of rotation of said sleeve.

8. The arrangement as claimed in Claim 7, wherein the first of said two portions is inclined to said axis of rotation at an angle of 16° and has its greatest diameter remote from said internal cam means, and wherein the second of said two portions is inclined to said axis of rotation at an angle of 30° and has its greatest diameter adjacent to said internal cam means, those parts of each said portion which are of least diameter merging into one another.

9. Telescopically arranged first and second elongate members which are temporarily securable, in any relative positions to which they have been adjusted, by a releasable locking device, the arrangement being constructed, arranged and adapted to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

10. Any features of novelty, taken singly or in combination, of the embodiments of the invention hereinbefore described with reference to the accompanying drawing.

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