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(54) **Length adjusters; garments and other articles with length adjustment**

(57) A length adjusting device, particularly for use in fabric articles such as garments, comprising a resiliently extensible tensile element (1) held at a substantially constant length between at least two holding means (2) such as cord locks fixed to a support (3) such as a plastic tube. The free portions (13) of the tensile element can be extended from the holding means, which in turn prevents

retraction of the extended portion into a shortened condition until released. The extended portion has an engagement or coupling element (11) for engagement with a corresponding portion (72) on an associated article (7), the length of which is to be adjusted. In the shortened condition, excess slack lengths outside the system can be avoided.

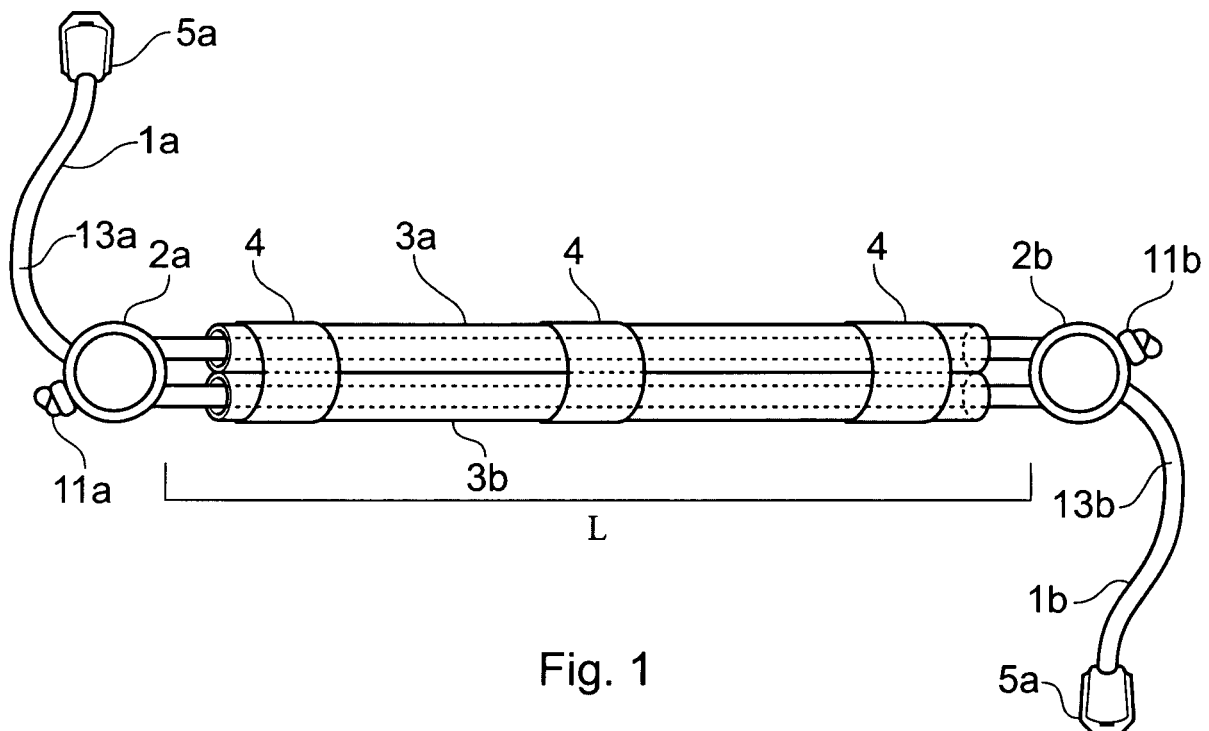


Fig. 1

Description

[0001] This invention has to do with devices for providing length adjustment, particularly but not exclusively in portions of fabric articles such as garments, accessories or bags.

BACKGROUND

[0002] In jackets and coats having hoods, it is conventional to have a tightening cord extending around the mouth of the hood - through a fabric tunnel formed at the edge - so that the front opening of the hood can be tightened around the face. With the cord slackened, the hood is easily pulled on and off. With it tightened, there is good protection from wind, rain etc. Typical arrangements have free cord ends emerging from the tunnel at the front to either side of the neck so that pulling on the ends with the right and left hands tightens the hood; they can then be knotted together. The cord ends usually have end enlargements or tags so that they do not retract entirely into the tunnel.

[0003] More sophisticated constructions use releasable cord locks through which the cord runs. In their default (released) condition they grip the cord frictionally, usually by having relatively movable adjacent parts through which the cord runs, and a spring urging these parts out of alignment to grip or kink the cord. The cord lock has a release button, pressed against the spring force, which brings the cord paths into alignment so that the cord can slide freely. Cord lock bodies may hang free on the hood cords, enabling tightening because they cannot pass back into the tunnel, or they may be fixed into the tunnel openings e.g. as in US 5263202.

[0004] Similar drawstring arrangements are used for other parts of garments, e.g. neck openings and waistbands, or even on fabric expanses away from openings such as in US 6317894 showing leg length adjustment. Tightening or adjustment of fabric mouths or fabric lengths is also an issue in bags, holdalls, accessories and the like.

THE INVENTION

[0005] What we now provide are new kinds of length adjustment devices, useful particularly but not exclusively in fabric articles such as garments, accessories and bags, and providing a novel mode of operation and some distinctive advantages.

[0006] In general terms, a length adjuster proposed herein has a resiliently extensible tensile element such as an elastic cord, and a support conduit, able to withstand longitudinal compression, through which the tensile element extends. The support conduit has at least first and second longitudinally-spaced holding means for restricting longitudinal movement of the elastic cord relative to the conduit. The tensile element has an extension portion which can be drawn out from a first end of the

support conduit, extending the part of the tensile element remaining in the support conduit against its resilient restoring force and thereby storing energy. With the extension portion in this extended condition, the first holding means is operable to engage the tensile element and restrain it from resiliently retracting the extension portion back into the support conduit. However the first holding means is also controllably releasable to allow such retraction of the extension portion at a chosen moment. The extension portion has an engagement or coupling element for engagement with a corresponding portion on an associated article in relation to which the length is to be adjusted. This may be for example an enlarged portion or end piece on the tensile element, the article having a restricted opening through which the tensile element passes but the enlarged portion/end piece cannot pass. Or, it may be a fixed anchorage to the article.

[0007] By this means a length adjustment is made available between the second holding means of the support conduit and the engagement/coupling element of the tensile element's extension portion. The length can be extended against a retracting force, which because of the first holding means does not retract the arrangement or put it under tension until the chosen time. This gives practical advantages: in the extended condition (which might correspond to the putting on/off of a hood, the filling/emptying of a bag or the securing of a gaiter) there is no need to work against the retraction/contraction tendency of the arrangement. Conversely, in the shortened or tightened condition excess slack lengths outside the system can be avoided. For example, the drawstring ends of a tightened hood may be held right against their tunnel openings rather than flapping free which can be dangerous or irritating.

[0008] Particular and preferred features of the arrangement are as follows.

[0009] The tensile element preferably is or comprises a length of elastic cord. Many kinds are known, e.g. the type known as "shock cord" available in a variety of thicknesses and degrees of elasticity according to the purpose. Desirably a single length of elastic cord extends through the support conduit and out past the first holding means to constitute also the extension portion.

[0010] The nature of the support conduit depends on the context of use. Where length adjustment is required in a flexible fabric portion, and particularly at a garment opening such as a hood or waistband, the support conduit is preferably laterally bendable or flexible while at the same time guiding or forming a correspondingly bent or bendable track for the tensile element and being able to withstand the compressive force when the tensile element is locked in the extended condition. The support conduit is therefore desirably a tube, and more preferably a flexible tube such as a polymeric tube. Preferably it is a close fit around the tensile element, for compactness and/or to reduce the likelihood of collapse under longitudinal compression, but not so close as to cause significant frictional resistance to movement of the cord along

inside it.

[0011] It will be appreciated that the length change generally occurs between the first holding means and the engagement element of the tensile element, the distance between the first and second holding means remaining substantially the same. In some contexts this may be a straight line, so that the support conduit may be a stiff tube, or an open construction in which the first and second holding means are simply spaced locations on some stiff substrate and there is no need to surround or guide the tensile element. In such a variant the support does not need to be a conduit.

[0012] For the releasable holding means, a cord lock is preferred. The release action may be by pressing a release element such as a button. Various conventional cord locks are suitable. Preferably the cord lock force and the elasticity of the cord are chosen so that the cord can be pulled out through the cord lock to the extended position simply by pulling on its ends, overriding the lock without needing to press the release, but the locking force is then nevertheless sufficient to keep the cord extended when the user stops pulling on the end. However in alternative versions it may be necessary or preferable to release the holding means for extending the tensile element. The second holding means may be a simple anchor point in relation to the support conduit. In a simple form, this provides a single-ended construction with one end of the tensile element secured at the second holding means (anchor point) the other end being the extensible end. A first double-ended option is also possible, in which both the first and second holding means are releasable, and first and second opposite ends of the tensile element are extensible through their respective holding means. This might be e.g. a single length of elastic cord passing through a flexible tube, a cord lock at each end so that pulling on both ends of the cord extends both ends simultaneously. However we prefer a different double-ended arrangement, in which first and second single-ended arrangements extend overlapping side by side, e.g. attached together, with their respective extension portions at the opposite ends of the unit. This provides a greater length of elastic element overall, and a lesser percentage of elastic stretch for a given distance of extension, reducing the extensibility demands on the tensile element e.g. elastic cord, and correspondingly moderating the force at the holding means e.g. cord lock. This embodiment is particularly suitable for a hood opening or other opening e.g. a waist or bag opening.

[0013] With a cord as the tensile element, and particularly as its extension portion, the engagement or coupling element can be a simple e.g. a conventional "cord end" fitting, such as a simple plastics moulding with a through-hole and a cavity to receive a stopper knot in the end of the cord.

[0014] It will be appreciated that many variants are possible, according to the context. For example the tensile element may be a double or looped cord rather than a single strand.

[0015] The length adjuster device by itself is one aspect of the invention. Another aspect of the invention is an article comprising fabric, such as a garment, bag or accessory, incorporating a length adjuster device as described connected to a length-adjustable part of the article e.g. at or around an opening of the article. A preferred embodiment is at the opening of a garment hood.

[0016] An example is now described with reference to the accompanying drawings, in which:

Fig. 1 shows the elements of a double-ended length adjuster, somewhat foreshortened for clarity;

Fig. 2 is a schematic axial cross-section through a cord lock;

Fig. 3 is a schematic view of the Fig. 1 length adjuster in a retracted condition;

Fig. 4 is a schematic view of the same length adjuster in an extended condition;

Figs. 5, 6 and 7 show the use of the length adjuster in a hood opening.

[0017] With reference to Fig. 1, a double-ended length adjuster designed for use in a jacket hood opening is made from two pieces of thin elastic shock cord 1a,1b, two lengths of flexible plastic tubing 3a,3b and two cord locks 2a,2b.

[0018] The cord locks may be of any suitable type, preferably operating on the principle as seen in Fig. 2 which is conventional. That is to say, the cord lock 2 consists of a lower casing 21 and an upper button element 22 mounted slidably in the casing. The button element has a transverse cord channel 24, corresponding with opposed cord openings 29 through the wall of the casing. A spring 23 between the casing floor and the underside of the button urges the button upwards, tending to keep the casing and button cord openings 29,24 out of line so that cord 28 passing through is kinked and gripped frictionally. Pressure on the button 22 against the spring 23 brings the cord channels into line so that the cord 28 can slide through freely. In the illustrated embodiment, the cord locks 2a,2b have two channels each.

[0019] The two flexible plastic tube segments 3 are held together side by side by tape 4. [As an alternative, tubing with dual tunnelling can be used.] The tube segments are positioned between the two cord locks 2a,2b. Each cord 1 is threaded through a respective one of the tubes 3 and through respective holes of both of the cord locks 2. Each cord has an end stopper knot 11, pulled up against the casing of one of the cord locks as an anchor point. The other end of the cord has a free portion 13 extending out beyond the other cord lock, and terminating in a conventional plastic cord end fitting 5. The arrangement is symmetrical. The cord locks 2 are held against the tubes 3 by the cords 1, so they do not need to be fixed on. Double-channel cord locks are convenient for the construction, although in fact the cord ends with the stop knots 11 do not move in use and could be anchored differently if wished.

[0020] Fig. 1 shows the relaxed, retracted state of the cords i.e. the cords inside the tubes in the central section L are not under tension, and do not move even if the cord locks 2 are released by pressing their buttons. Fig. 3 shows this schematically, indicating the respective free lengths of the cords 1a, 1b as ℓ_a, ℓ_b .

[0021] Pulling firmly on both ends of the cords 1a, 1b overcomes the frictional resistance of the cord locks 2a, 2b and extends the whole length of each cord elastically, including the section inside the plastic tubes 3, against the reaction of their end stopper knots 11. Provided both ends 5 are pulled simultaneously no other holding is needed, although in principle it would be possible to pull one cord at a time, or to make the pulling easier by releasing the corresponding cord lock(s).

[0022] This pulling extends the length adjuster to the condition shown in Fig. 4, where the exposed free length of cord at each end is significantly longer than before. When the pull is released, the cord locks 2 prevent the elastic retraction of the cord back into the tubes 3 so that part L inside the tubes remains stretched, although the free portions 13 relax to an unstretched condition. The result is as shown in Fig. 4, i.e. with the overall length of the system significantly increased, the cords in the central section L under elastic extension with stored energy, but the exposed cord sections free of tension. The central construction of bound tubes 3 is able to withstand the compressive force required to react to the tension in the cord segments therein without collapsing. Importantly, even when these tubes are bent to follow a curved path, because they contain the cords they constrain them to follow the same path and stay under the same degree of tension as if they were straight.

[0023] It will now readily be understood that by pressing the release buttons 22 of the cord locks 2 the respective stretched cord segments inside the tubes 3 are able to relax, drawing part of the free ends 13 back inside the tube and thereby shortening the free ends back to the lengths as shown in Fig. 3.

[0024] Figs. 5 to 7 show how this can be used in a jacket hood 7. In the usual way, the hood 7 has a front edge forming a fabric tunnel at the hem, the tunnel terminating at right and left openings 72. The openings may be reinforced with eyelets to preserve the dimensions.

[0025] The length adjustable cord arrangement as in Fig. 1 is installed in this hood cord tunnel 71 symmetrically, with the plastic tubes lying at the brow portion where they give extra definition and stability to the peak of the hood, preventing collapse. Wire and plastic cord have been used for this previously. The cord ends with their plastic enlargements 5 project out through the eyelets 72. The cord locks 2 lie within the tunnel, and may have their rest positions marked e.g. by stitching or patterning 73. In fact a user can readily feel the cord locks through the fabric and does not need to see where they are.

[0026] Normally the adjuster is left in the relaxed (contracted) condition as in Fig. 3 to avoid weakening the cords. The brow region 75 of the hood tunnel fabric con-

tracts little, being occupied by the fixed-length tubes 3. The wing regions 74 of the fabric tunnel 71 are occupied by the free cord portions 13, and in the rest (contracted) condition of the adjuster are crumpled concertina-fashion into a shortened state because the cord end fittings 5 engage the tunnel eyelets. To put the hood on, the user first pulls firmly on both ends of the cords (Fig. 5). This increases the length of the free cord ends 13 inside the hood cord tunnel, extending and relaxing the previously foreshortened wing portions 74 so that the hood is loose and can easily be put on (Fig. 6). There is no need to keep hold of the cord ends, because the cord locks 2 keep the adjuster system extended.

[0027] Once the hood is over the head, the user reaches up, locates the positions of the adjusters 2 by touch and presses their buttons (Fig. 6). The tension in the cords inside the tubes at once retracts their ends and shortens/tightens the wing section 74, tightening the hood around the face as seen in Fig. 7. The user can control the rate of retraction by the pressure on the cord lock buttons. Once retracted, the ends 5 of the cord system are again snug against the eyelets of the cord tunnel and do not dangle free, by contrast with conventional systems, in their tightened condition. This avoids loose lengths of cord flapping around in the wind and perhaps hitting the wearer in the face. From this position the elasticity of the free cord in the wing sections 74 allows the hood to be taken down reasonably easily even in the retracted mode, if so desired.

Claims

1. A length adjusting device comprising a resiliently extensible tensile element (1) extending along a support (3) able to withstand longitudinal compression and having at least first and second longitudinally-spaced holding means (2) for restricting longitudinal movement of the extensible tensile element (1) relative to the support, said extensible tensile element having an extension portion which can be drawn out from an end of the support, wherein the first holding means is operable to prevent retraction of the extension portion but is controllably releasable to allow such retraction, said extension portion having an engagement or coupling element (11) for engagement with a corresponding portion (72) on an associated article (7) in relation to which the length is to be adjusted.
2. A length adjusting device according to claim 1, wherein the support is a laterally bendable or flexible conduit (3).
3. A length adjusting device according to claim 2, wherein the support conduit (3) is a flexible tube.
4. A length adjusting device according to claim 1,

wherein the support is a stiff conduit (3).

5. A length adjusting device according to any one of claims 1 to 4, wherein the holding means (2) can be overridden to draw the tensile element (1) end out through the holding means without the need to activate the release. 5
6. A length adjusting device according to any one of claims 1 to 5, wherein the releasable holding means (2) is a cord lock. 10
7. A length adjusting device according to any one of claims 1 to 6, wherein the engagement (11) with a corresponding article is a fixed anchorage to the article, or an enlarged portion or end piece on the tensile element which cannot pass through a restrictive opening through which the tensile element passes. 15
8. A length adjusting device according to any one of claims 1 to 7, having a single-ended construction in which the second holding means (2) acts as an anchor point for one end of the tensile element (1) in relation to the support conduit (3), the other end being extensible. 20
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9. A double ended length adjusting device comprising first and second single-ended arrangements according to claim 8 extending side by side with their respective extension portions at opposite ends of the unit. 30
10. A length adjusting device according to any one of claims 1 to 9, wherein the extensible tensile element (1) is an elastic cord. 35
11. A garment, bag or accessory comprising fabric and having a length adjusting device according to any one of the preceding claims connected to a length adjustable part. 40
12. A garment, bag or accessory according to claim 11 in which the length adjustable part is at or around an opening. 45
13. A garment according to claim 12 in which the opening is a hood opening (7). 50

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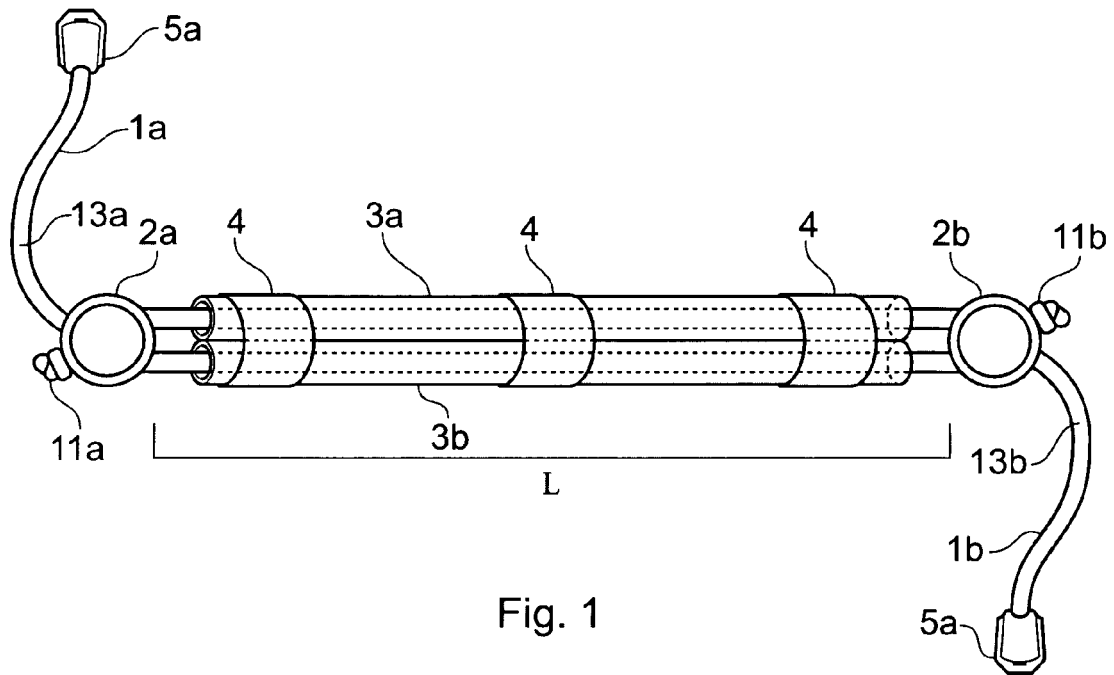


Fig. 1

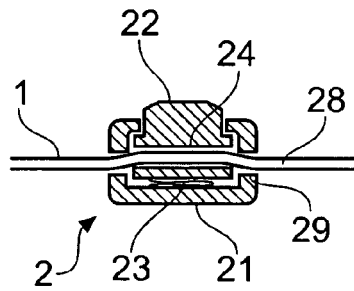


Fig. 2

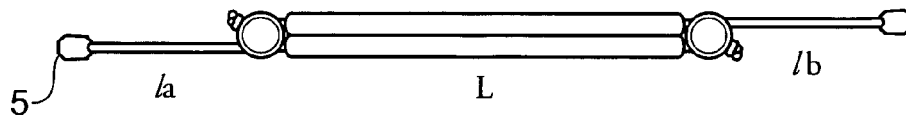


Fig. 3

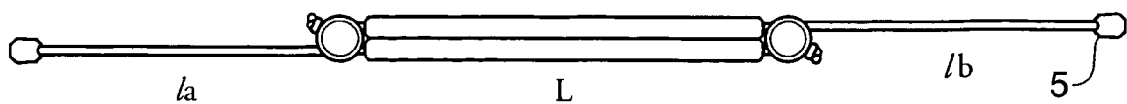


Fig. 4

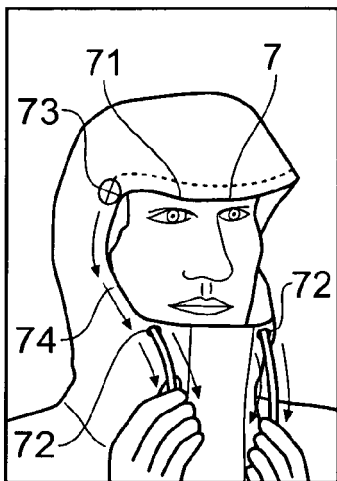


Fig. 5

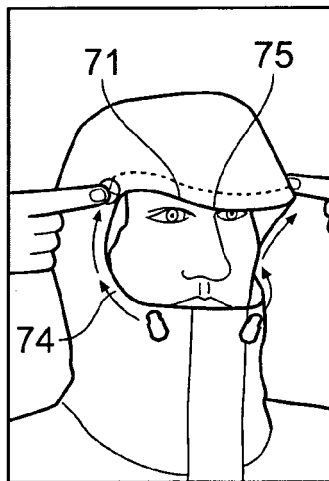


Fig. 6

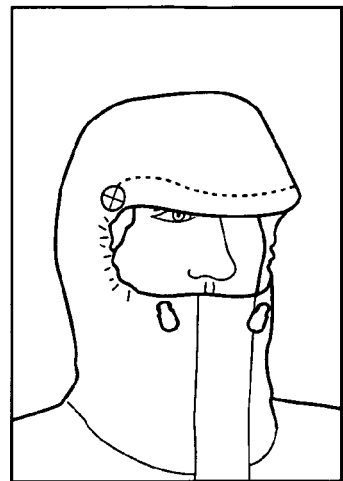


Fig. 7