

Driving device for support column

Background

The present invention relates to a driving device for an articulated support column, like a telescopic column for supporting a desk, the driving device having a central longitudinal axis and comprising;

- a drivable rope drum for winding a rope, which driveable rope drum is supported by a drum support frame,
- a pulley for reversing a rope, which pulley is supported by a pulley bracket,

Such a driving device is known from DE10253362 A1 which discloses a height adjusting system for a telescopic legs of a table. The system has a drum attached to a support column. This is connected by an endless cable to a pulley which adjusts the height. DE10253362 has for its object to provide a height adjustment for table legs, which height adjustment is largely free of play and synchronous. This object is achieved in that the distance between the drum and the pulley may be adjusted and in that at least one end of the cable is attached by a spring to the fixed part of the leg or a related column.

The solution taught by DE10253362 is complex and has a high part count which is required to enable adjustment the distance between the drum and the pulley. In addition, this adjustment complicates installation and maintenance. There is room for improvement.

Summary of the invention

The invention aims to provide a driving device for an articulated support column, which driving device has less play.

Another object of the invention is to improve a driving device for an articulated support column, in that the number of parts is reduced.

Yet another object of the invention is to provide an alternative driving device for an articulated support column is provided wherein a problem with such a known driving device is at least partly solved.

According to a first aspect of the invention this is realized with a driving device for an articulated support column, like a column for supporting a desk, the driving

device having a central longitudinal axis and comprising;

- a drivable rope drum for winding a rope, which driveable rope drum is supported by a drum support frame,
- a pulley for reversing a rope, which pulley is supported by a pulley bracket,
- a first elongate frame member extending along the central longitudinal axis of the driving device and having one end coupled with the drum support frame and an opposite end coupled with the pulley bracket for spaced arrangement of the drum support frame and the pulley bracket, and wherein the elongate frame member is configured for tensioning a rope between the rope drum and the pulley,
- an endless rope coupled with the drum and pulley, which rope is wound a number of rope turns around the drum and turned around the pulley,
- a second elongate frame member moveably arranged with respect to the first elongate frame member, and coupled with the rope for moving with the rope over a second elongate frame member stroke between a retracted and an extended position,

wherein the rope comprises a drum coupling section which is permanently coupled with the drum such that the drum coupling section is tangentially fixed with respect to the drum.

The rope comprising a drum coupling section coupled with the drum such that the drum coupling section is tangentially fixed with respect to the drum assures that play is avoided and that synchronizing between columns provided with these driving devices is enabled.

Configured for tension in connection with the first elongate frame member here means the that the first elongate frame member has such strength that the rope may be prestressed.

The rope being endless has to be understood that lines of forces are closed. These lines of forces may pass through a coupling piece that couples the two ends of said rope. It will be understood that any suitable means like a line, (braided) steel wire, snare, may be used in the driving device.

The drum coupling section of the rope being permanently coupled with the drum means the section can not detach from its associated groove in the drum when

turning the drum.

The drum coupling section is coupled with the drum through a coupling piece, and the coupling piece extends radially into the drum. This enables fast coupling of the drum coupling section and the drum while still assuring tangential constraint of said drum coupling section with respect to the drum.

In an embodiment of the driving device, the drum coupling section is part of a central rope turn. Central here refers to the centre of the drum where the central rope turn is arranged. This drum coupling section being part of a central rope turn, allows to minimize the width of the drum at a given second elongate frame member stroke.

The number of rope turns determines the second elongate frame member stroke.

In an embodiment of the driving device, the number of rope turns is such that when the second elongate frame member takes its retracted position or its extended position, always at least one adjacent rope turn extends along each side of the drum coupling section of the rope. In this manner the drum coupling section is supported at both sides which aids in the coupling thereof with the drum.

In an embodiment of the driving device, the rope drum is rotatable around a drum axis, the pulley is rotatable around a pulley axis, and, seen along the central longitudinal axis of the driving device, the drum axis and the pulley axis enclose an angle α such that the pulley bridges about the width of the drum. This facilitate smooth running of the drum and pulley and avoids internal friction because the obliquity of both the rope sections, between the pulley and the drum, with respect to the central longitudinal axis of the driving device, is minimized.

In an embodiment of the driving device, the angle α is about 45° .

In an embodiment of the driving device, the number of rope turns covers about half of the width of the drum.

In an embodiment of the driving device, the rope is prestressed with a rope force of about 1000 N.

In an embodiment of the driving device, the first elongate frame member and the

second elongate frame member extend parallel next to each other.

In an embodiment of the driving device, the first elongate frame member and the second elongate frame member are arranged at a mutual distance by a single spacing frame.

In an embodiment of the driving device, the spacing frame is fixedly coupled with the first elongate frame member proximate the pulley bracket and wherein the spacing frame is slideably coupled with the second elongate frame member.

In an embodiment of the driving device, the second elongate frame member is coupled with the rope at its end which faces towards the drum frame and wherein the second elongate frame member comprises a guiding element for engaging said column in a sliding manner, wherein the guiding element is arranged proximate said end.

In an embodiment, the driving device comprises coupling means for coupling the driving device to an articulated column.

The invention further relates to a device comprising one or more of the characterising features described in the description and/or shown in the attached drawings.

The invention further relates to a method comprising one or more of the characterising features described in the description and/or shown in the attached drawings.

The various aspects discussed in this patent can be combined in order to provide additional advantages.

Description of the drawings

The invention will be further elucidated referring to an preferred embodiment shown in the drawings wherein shown in:

Fig. 1 in side view a driving device according to the invention;

fig. 2 a front view of a detail of the driving device according to fig. 1;

fig. 3 a side view of the detail of fig. 2;

fig. 4 a perspective view of another detail of the driving device according to fig. 1;

fig. 5 a perspective view of another detail of fig. 1; and
fig. 6 a perspective view of another detail of fig. 1.

Detailed description of embodiments

The embodiment will now be described in more detail referring to all figures 1-6. In the figures there is shown a driving device 1 for an articulated support column, like a column for supporting a desk. The shown driving device 1 is in use installed in a height adjustable support column for e.g. a desk. Both the support column and the desk are not shown. The driving device 1 has a central longitudinal axis 5. The driving device 1 is length adjustable and drives a support column along the central longitudinal axis 5.

The driving device 1 comprises a drivable rope drum 2 for winding a rope 6. Driveable means that the driving device may be manually driven or driven by a electric motor. Usually, a number of driving devices are driven in parallel. The driveable rope drum 2 is supported by a drum support frame 3 in any suitable manner.

The driving device 1 comprises a pulley 4 for reversing the rope 6. The pulley is supported by a pulley bracket 7 in any suitable manner.

The rope drum 2 is rotatable around a drum axis 14. The pulley 4 is rotatable around a pulley axis 15. The drum 2 and the pulley are mutually arranged such that seen along the central longitudinal axis 5 of the driving device 1, the drum axis 14 and the pulley axis 15 enclose an angle. The enclosed angle α is configured such that the pulley 4 extends, or bridges, at least about the total width of the number of rope turns 9 provided on the drum 2. In this case, the enclosed angle α is about 45° .

The driving device 1 comprises a first elongate frame member 8. The elongate frame member 8 extends along the central longitudinal axis 5 of the driving device 1. One end 21 of the elongate frame 8 is coupled with the drum support frame 3 in any suitable manner like welding. Likewise, the opposite end 22 of the elongate frame 8 is coupled with the pulley bracket 7. In this manner the drum support frame 3 and the pulley bracket 7 are arranged at a mutual distance determined by the elongate frame member 8. The elongate frame member 8 is configured such that the rope 6 may be prestressed with a rope force of about 1000 N.

The driving device 1 comprises an endless rope 6 coupled with the drum 2 and pulley 4. The rope is wound a number of rope turns 9 around the drum 2 and turned around the pulley 4, here turned once around the pulley 4. The number of rope turns 9 determines the second elongate frame member stroke. The number of rope turns 9

covers about half of the width w of the drum 2. More precisely, the number of free grooves 23 of the drum 2 also determine the second elongate frame member stroke.

The rope 6 comprises a drum coupling section 11. The drum coupling section 11 is permanently coupled with the drum 2 such that the drum coupling section 11 is at least tangentially fixed with respect to the drum 2. In this manner, and in conjunction with the prestressed rope 6, the driving device 1 is able to drive a column (not shown) in a virtually backlash free way. It is conceivable that the drum coupling section 11 is also radially fixed with respect to the drum 2. The drum coupling section is part of a central rope turn 13. When the second elongate frame member 10 takes its retracted position or its extended position, always at least one adjacent rope turn 9 extends along the drum coupling section 11 of the rope 6 to provide lateral support to the drum coupling section 11.

The drum coupling section 11 is coupled with the drum 2 through a coupling piece 12. The coupling piece 12 extends radially into the drum 2. The coupling piece 12 may have a rectangular shape as shown in fig 2a, however it will be clear that any suitable shape will suffice for the coupling piece 12.

The driving device 1 comprises a second elongate frame member 10. The second elongate frame member 10 is moveably arranged with respect to the first elongate frame member 8. The second elongate frame member 10 is moveable along the central longitudinal axis 5 of the driving device 1. The first elongate frame member 8 and the second elongate frame member 10 extend parallel next to each other. The first elongate frame member 8 and the second elongate frame member 10 are arranged at a mutual distance by a single spacing frame 16 as best shown in fig. 4. In this case, the spacing frame 16 is fixedly coupled with the first elongate frame member 8 proximate the pulley bracket 7 as shown in fig. 5. The spacing frame 16 is slideably coupled with the second elongate frame member 10.

The second elongate frame member 10 is coupled with the rope 6 for moving with the rope 6 over a second elongate frame member stroke between a retracted and an extended position. In fig. 1 the second elongate frame member 10 is shown in a position between a retracted and an extended position. The second elongate frame member 10 is coupled with the rope 6 at its end which faces towards the drum frame 3 as best shown in fig. 3. The second elongate frame member 10 comprises a guiding element 24 for engaging said column (not shown) in a sliding manner. The guiding element 24 is arranged proximate said end which faces towards the drum frame 3.

The driving device 1 comprises coupling means 19, 25 for coupling the driving device 1 to an articulated column (not shown). Any suitable coupling means will suffice.

It will also be obvious after the above description and drawings are included to illustrate some embodiments of the invention, and not to limit the scope of protection. Starting from this disclosure, many more embodiments will be evident to a skilled person which are within the scope of protection and the essence of this invention and which are obvious combinations of prior art techniques and the disclosure of this patent.

Claims

1. Driving device (1) for an articulated support column, like a column for supporting a desk, the driving device having a central longitudinal axis (5) and comprising;
 - a drivable rope drum (2) for winding a rope (6), which driveable rope drum is supported by a drum support frame (3),
 - a pulley (4) for reversing a rope, which pulley is supported by a pulley bracket (7),
 - a first elongate frame member (8) extending along the central longitudinal axis of the driving device and having one end coupled with the drum support frame and an opposite end coupled with the pulley bracket for spaced arrangement of the drum support frame and the pulley bracket, and wherein the elongate frame member is configured for tensioning a rope between the rope drum and the pulley,
 - an endless rope (6) coupled with the drum and pulley, which rope is wound a number of rope turns (9) around the drum and turned around the pulley,
 - a second elongate frame member (10) moveably arranged with respect to the first elongate frame member, and coupled with the rope for moving with the rope over a second elongate frame member stroke between a retracted and an extended position,wherein the rope comprises a drum coupling section (11) permanently coupled with the drum such that the drum coupling section is tangentially fixed with respect to the drum, wherein the drum coupling section is coupled with the drum through a coupling piece (12), wherein the coupling piece extends radially into the drum, and wherein the number of rope turns determines the second elongate frame member stroke.

2. Driving device according to claim 1 , wherein the drum coupling section is part of a central rope turn (13).
3. Driving device according to a preceding claim, wherein the number of rope turns is such that when the second elongate frame member takes its retracted position or its extended position, always at least one adjacent rope turn extends along each side of the drum coupling section of the rope.
4. Driving device according to a preceding claim, wherein the rope drum is rotatable around a drum axis (14), the pulley is rotatable around a pulley axis (15), and, seen along the central longitudinal axis of the driving device, the drum axis and the pulley axis enclose an angle α such that the pulley bridges about the width of the drum.
5. Driving device according to claim 4, wherein the angle α is about 45° .
6. Driving device according to a preceding claim, wherein the number of rope turns covers about half of the width (w) of the drum.
7. Driving device according to a preceding claim, wherein the rope is prestressed with a rope force of about 1000 N.
8. Driving device according to a preceding claim, wherein the first elongate frame member and the second elongate frame member extend parallel next to each other.
9. Driving device according to a preceding claim, wherein the first elongate frame member and the second elongate frame member are arranged at a mutual distance by a single spacing frame (16).

10. Driving device according to claim 9, wherein the spacing frame is fixedly coupled with the first elongate frame member proximate the pulley bracket and wherein the spacing frame is slideably coupled with the second elongate frame member.
11. Driving device according to a preceding claim, wherein the second elongate frame member is coupled with the rope at its end which faces towards the drum frame and wherein the second elongate frame member comprises a guiding element (24) for engaging said column in a sliding manner, wherein the guiding element is arranged proximate said end.
12. Driving device according to a preceding claim, comprising coupling means (19, 25) for coupling the driving device to an articulated column.

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