DEVICE FOR A TELESCOPIC TUBE

(57) Abstract: The invention relates to an arrangement for a telescoping tube which is formed by an inner metal profile rail accommodated in such a way that it is guided inside an enclosing outer metal profile rail with interjacent rolling devices. The aforementioned outer metal profile rail (2) is so arranged, by the application of force (F) at an angle to its longitudinal extent, as to expand to permit its assembly with the inner metal profile rail (3) and the rolling device (4) and, in so doing, to permit the rails (2, 3) to be displaced relative to one another in the absence of friction and free play.
Device for a telescopic tube

The present invention relates to an arrangement for a telescoping tube which is formed by an inner metal profile rail accommodated in such a way that it is guided inside an enclosing outer metal profile rail with interjacent rolling devices and guide means.

When a telescoping tube is used, for example, to permit the supporting of furniture such as tables to permit adjustment readily to desired height positions, sliding heels have been utilized in previously disclosed solutions as a means of guidance and free play elimination between the telescoping tubes. The resulting friction has obliged the application of force in the downward direction, too. The aforementioned sliding heels also have a tendency to "stick" if a fairly long period of time elapses between adjustments, which requires the use of an over-dimensional motor in order to initiate a setting to a new position.

The principal object of the present invention is thus, in the first instance, to solve the aforementioned problems and, at the same time, to provide a construction from which free play is absent and which automatically eliminates variations in tolerance in the production phase.

The aforementioned object is achieved by means of an arrangement in accordance with the present invention, which is characterized essentially in that the aforementioned outer metal profile rail is so arranged, by the application of a force at an angle to its longitudinal extent, as to expand in a sprung fashion in order to accommodate the inner metal profile rail and the aforementioned rolling devices and, in so doing, to permit the rails to be displaced relative to one another in the absence of friction and free play.
The present invention is described below with reference to the accompanying drawings, in which

Figs. 1 and 2 show an outer tube and an inner tube in a telescoping assembly in accordance with the invention viewed in perspective at an angle from its one end;

Fig. 3 shows the aforementioned telescoping assembly viewed in perspective in an assembled and partly extended position;

Fig. 4 shows a sectional view of an assembled telescoping assembly;

Figs. 5 and 6 show a telescoping assembly in a position in use with a table, and with the telescoping assembly respectively fully extended and fully retracted;

Fig. 7 shows a sectional view of a fully retracted telescoping assembly;

Fig. 8 shows constituent rolling devices and holders for a telescoping assembly, shown here respectively as a side view, an end view and separate;

Fig. 9 shows in detail a deflection component contained in the telescoping assembly with a combined load relief lock;

Fig. 10 shows a longitudinal cross-section through a telescoping assembly in the fully extended position;

Fig. 11 shows a holder for the rolling device for a telescoping assembly in perspective;

Figs. 12 and 13 show the principle for the assembly of a telescoping assembly, whereby the outer telescoping tube is caused to expand by compression so that the rolling device and the inner telescoping tube can be introduced therein;

Fig. 14 shows an alternative of a telescoping arrangement viewed in a section respectively across the tubes and in the assembled position;

Fig. 15 shows a further alternative of a telescoping arrangement respectively as the components referred to and assembled;
Fig. 16 shows a sectioned view of yet a further example of a telescoping arrangement;
Fig. 17 shows constituent parts thereof;
Fig. 18 shows an example of a unilaterally actuated outer tube for a telescoping arrangement; and
Fig. 19 shows an example of an alternative application for the principle with a sprung outer profile and the assembly procedure utilized therewith.

The principal idea of the present invention is, when one of a pair of specially designed telescoping tubes is subjected during assembly to a force which acts at an angle to the longitudinal extent of the telescoping tube, for this to change the effective surface extent of the telescoping tube. This permits the rolling device to be introduced between the inner and outer telescoping tubes, which then form an easily moved telescoping unit from which free play is absent. The construction also means that relatively large plus and minus tolerances in the dimensions of the telescoping tubes are compensated for automatically without any disadvantages in the function.

More specifically, the invention comprises an arrangement 1 for at least two telescoping tubes 2, 3 interacting with one another, which are formed from an inner tubular metal profile rail 3 which is accommodated in such a way that it is guided by an enclosing outer metal profile rail 2 and with rolling devices 4 in the form of balls 4A and/or rollers 4B and/or wheels 4C situated between them.

In accordance with the invention, the aforementioned outer metal profile rail 2 is so arranged as to be caused to expand in a sprung fashion and to increase its effective width B by the application of a force F in a direction at an angle X to its longitudinal extent 5, thereby permitting the introduction of the inner profile rail 3 and the roller/ball guide 27, 4 acting between them.
In accordance with one illustrative embodiment of the invention, as shown specifically in Fig. 18 and more generally in the other Figures 1-17, at least one broad side 6, 7 of the outer metal profile rail 2 is so arranged as to expand in a sprung fashion in a direction laterally outwards 8, 9 towards the short sides of the aforementioned profile rail 2, in the event that the profile rails 2, 3 exhibit rectangular form or some other asymmetrical form. In the case of the application of an outer force F, for example as shown in Fig. 4, the aforementioned broad side 6, 7 is pressed in a direction inwards towards the central area 10 of the rails, and the aforementioned expansion in the transverse direction 8, 9 of the rails is achieved in this way.

Fig. 18 shows how only one side 6 of the outer profile 2 is arranged in such a way that it expands sideways 8, 9 while the other side 7 is so executed as not to expand.

Shown in other Figures are examples of the invention in which the aforementioned outer metal profile rail 2 is so arranged as to expand with both of its broad sides 6, 7 in a direction outwards 8, 9 from the rail assembly 2, 3.

The aforementioned outer profile rail 2 can be formed, as in the example shown in Figs. 4, 14, 16 and 17, from pairs of welded 11 sprung sheet metal profiles 12, 13.

The inner profile rail 3 can also be produced in the same way.

The spring effect of the outer profile rail 2 can be achieved in a variety of ways, both through form and processing. In accordance with the preferred embodiment, a straight, a curved, an angled or an inclined short side component 19, 18 extends from the respective centre 14, 15 of the two short sides 16, 17 of the outer profile rail, which components are in turn transformed into a broad side component 20, 21 extending at a small angle of inclination, which come together at a centrally located angled part 22.
where the force $F$ is intended to be applied to cause the outer telescoping tube to expand and, in so doing, to be permitted to be displaced in relation to the inner telescoping tube. The outer profile rail 2 is essentially identical viewed in a direction towards the respective broad side 23, 24.

In accordance with most examples, each outer profile rail 2 expands at the centre 25, 26 of the respective broad side 23, 24.

In accordance with a further illustrative embodiment, which is shown in Fig. 19, an aforementioned outer metal profile rail 2 is pretensioned in such a way as to extend in a direction inwards towards the inside of the centre of the rail assembly formed by the inner metal profile rail 3 and the outer profile rail 2.

By applying an outward-directed force $CF$ to the outer profile rail 2, as shown in Fig. 19, it is easy to adjust the aforementioned telescope in the desired direction and to the desired length setting.

Accommodated between the aforementioned inner and outer rails 3, 2 are rolling device holders 27, which are provided with a recess 28 so adapted as to accommodate appropriate rolling devices 4A, 4B, 4C therein at the respective corner area 29, for example as shown in Figs. 8 and 11 respectively.

The inner profile rail 3 can, as shown in Fig. 14, exhibit angled recesses 30 in the corners of the aforementioned rail 3 for accommodating the rolling devices.

The aforementioned inner metal profile rail 3 exhibits an inwardly bent recess part 31 at its respective centrally located area on the respective broad side for reinforcing purposes.

With reference to Figs. 12 and 13, the assembly procedure is described by the following mechanism:
The clamping jaws 32 and 33 are pressed towards one another in the direction of the arrows, in conjunction with which the closed outer profile 2 is caused to expand in a lateral direction 8, 9 so that the inner profile 3 and the balls 4 and ball holder 27 can be installed. The sprung material in the outer profile 2 returns when the clamping pressure is removed to a position in which the guiding balls 4 are in contact under spring pressure with both the inner and the outer profiles 3, 2, which totally eliminates any free play and yet permits the profiles 2, 3 to slide easily longitudinally inside one another.

Shown in Figs. 5 and 6 is a table 34 to which the invention is applied, which is illustrated here with the table fully raised and fully lowered.

The detailed telescoping mechanism is shown in greater detail in Figs. 7 and 9-11, where a line, belt or other drawing means 35 connects together the two metal profile telescopes 2, 3, which are extensible relative to one another. One end 35A of the drawing means 35 is wound around a rolling shaft 36, which is motor-driven or hand-driven via a self-braking gear arrangement or a locking device (not shown) for the purpose of winding in or winding out the drawing means 35 on the aforementioned rolling shaft 36. The other end 35B of the drawing arrangement 35 is attached to the outer metal profile rail 2.

A deflection arrangement 37, preferably in the form of a rotating roller or a wheel, is supported at the inner/lower end 3A of the inner rail 3. The aforementioned roller, etc., 37 is supported by a pivoting arm 38 mounted about a shaft 38B which is attached to the inner rail 3. The aforementioned arm 38 is caused by a spring 39 to pivot the arm a downward direction so that its opposing cam-shaped end 38C engages with and locks the inner rail 3 against the outer rail 2 when the line 35 is released, which occurs if, for example, you lift the table top as illustrated in Figs. 5, 6.
The invention is not restricted to the illustrative embodiments described above and illustrated in the drawings. It is thus possible, for example, for the illustrative embodiments shown here with a roller and a line to be replaced by a screw and a nut or a hydraulic telescope, and to be varied in other respects within the scope of the Patent Claims without departing from the idea of invention.
Patent Claims

1. Arrangement (1) for a telescoping tube (2, 3) which is formed by an inner metal profile rail (3) accommodated in such a way that it is guided inside an enclosing outer metal profile (2) rail with interjacent rolling devices (4) and guide means (27), characterized in that the aforementioned outer metal profile rail (2) is so arranged, by the application of force (F) at an angle (X) to its longitudinal extent (5), as to expand in a sprung fashion in order to accommodate the inner metal profile rail (3) and the aforementioned rolling devices (4, 27) and, in so doing, to permit the rails (2, 3) to be displaced relative to one another in the absence of friction and free play.

2. Arrangement in accordance with Patent Claim 1, characterized in that at least one broad side (6, 7) of the outer metal profile rail (2) expands in a direction outwards (8, 9) towards the short sides of the aforementioned profile rail (2) and is so arranged, in the event of the application of an outer force, as to be pressed in towards the central area (10) of the rails and, in so doing, to expand in the transverse direction (8, 9) of the rails.

3. Arrangement in accordance with Patent Claim 2, characterized in that the aforementioned outer metal profile rail (2) is so arranged as to expand with both of its broad sides (6, 7) in a direction outwards (8, 9) from the rail assembly (2, 3).

4. Arrangement in accordance with one or other of Patent Claims 2-3, characterized in that the outer profile rail (2) is formed from pairs of welded (11) sprung sheet metal profiles (12, 13).

5. Arrangement in accordance with Patent Claim 4, characterized in that a straight, a curved, an angled or an
inclined short side component (19, 18) extends from the respective centre (14, 15) of the two short sides (16, 17) of the outer profile rail, which components are in turn transformed into a broad side component (20, 21) extending at a small angle of inclination, which come together at a centrally located angled part (22).

6. Arrangement in accordance with one or other of Patent Claims 4-5, characterized in that the outer profile rail (2) is essentially identical viewed in a direction towards the respective broad side (23, 24).

7. Arrangement in accordance with one or other of Patent Claims 1-6, characterized in that each outer profile rail (2) expands at the centre (25, 26) of the respective broad side (23, 24).

8. Arrangement in accordance with Patent Claim 1, characterized in that the aforementioned outer metal profile rail (2\textsuperscript{1}) is pretensioned in such a way as to extend in a direction inwards towards the centre of the rail assembly (2, 3; 2\textsuperscript{1}, 3\textsuperscript{1}).

9. Arrangement in accordance with one or other of the foregoing Patent Claims, characterized in that rolling device holders (27) are accommodated between the aforementioned inner (3) and outer (2) rails and extend in the form of a C with the recess (28).

10. Arrangement in accordance with Patent Claim 9, characterized in that the inner profile rail (3) exhibits angled recesses (30) in the corners for accommodating the rolling devices.

11. Arrangement in accordance with one or other of the foregoing Patent Claims, characterized in that the aforementioned inner metal profile rail (3) exhibits an inwardly bent recess part (31) at its respective centrally located area on the respective broad side.

12. Arrangement in accordance with one or other of the foregoing Patent Claims, characterized in that locking
devices (37, 38 and 39) are installed, in the event of a negative load, in order to prevent movement between the metal profile rails (2, 3).
### INTERNATIONAL SEARCH REPORT

#### A. CLASSIFICATION OF SUBJECT MATTER

**IPC7: A47B 9/20, F16B 7/10**

According to International Patent Classification (IPC) or to both national classification and IPC

#### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC7: A47B, F16B**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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**X** Further documents are listed in the continuation of Box C.  **X** See patent family annex.

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