(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 177 868**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **85112363.8**

(22) Date of filing: **30.09.85**

(51) Int. Cl.⁴: **B 25 H 1/16**

(30) Priority: **05.10.84 IT 2345884 U**

(43) Date of publication of application: **16.04.86**
Bulletin 86/16

(84) Designated Contracting States: **AT BE CH DE FR GB LI LU NL SE**

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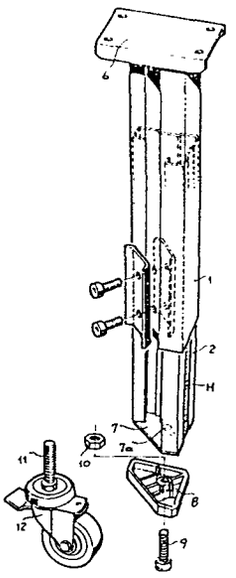
(54) Height-adjustable support leg, particularly for machine tools.

(57) In a height-adjustable support leg, particularly for machine tools - of the type comprising two elements slidable telescopically one into the other and locking means for fixing said elements in their mutual position -, each of the two telescopically slidable elements is of complex cross-sectional profile, comprising at least two flat sides converging towards the inside of the leg, with said flat sides there cooperating, from opposing directions, pairs of equally convergent faces, parallel to said sides, of two clamping plates forming said locking means.



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"HEIGHT-ADJUSTABLE SUPPORT LEG, PARTICULARLY FOR MACHINE TOOLS"

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For the support of work benches or machine tools in general, comprising a main frame mounted on support legs, it is known to often make use of legs which are adjustable in height to enable the machine to be located at the most suitable height for the operator's requirements.

Height-adjustable legs generally comprise two tubes slidable telescopically one into the other, one of them being the element which rests on the ground, while the other supports che machine tool. Locking means cooperate with these two tubes for fixing them one on the other in the required mutual position, in accordance with the total leg height to be attained.

Many types of locking means are known, these allowing either adjustment to various predetermined heights, or continous adjustment. Of these latter, widespread use is made of those consisting of a screw or bolt which screws into a threaded bore provided in the wall of the outer tube, and presses with its pointed end against the wall of the inner tube, or those consisting of a bolt which passes through a hole in the outer tube and through a vertical elongated slot in the inner tube, to screw into a plate disposed on the inside of this latter.

An adjustable leg provided with such locking means is unsatisfactory for many reasons. Such locking means in fact do not connect the two tube elements together securely and firmly without locally deforming the inner tube, unless they are of rather costly construction.

The object of the present invention is to provide an adjustable leg which, besides allowing continuous height adjustment, is of low manufacturing cost and ensures a perfect anchorage and self-alignment of the two telescopically slidable

leg elements. This result is attained principally in that each of the two telescopically slidable elements is of complex cross-sectional profile, comprising at least two flat sides converging towards the inside of the leg, and in that with said flat sides there cooperate, from opposing directions, pairs of equally convergent faces, parallel to said sides, of two clamping plates forming said locking means.

According to a preferred embodiment, each of the two slidable leg elements is formed from a bent metal sheet having a main cross-sectional profile of L-shape, with its ends being further L-bent, the terminal edges of these ends forming said convergent flat sides with which cooperate the end edges, bent obliquely to a complementary profile, of said clamping plates, these latter being pressed one against the other with a wedge effect by a bolt passing through a hole in the outer plate and screwed into a threaded seat in the inner plate.

Further characteristics and advantages of the adjustable leg according to the present invention will be apparent from the description given hereinafter of a preferred embodiment thereof, illustrated by way of example on the accompanying drawings, in which:

Fig. 1 is a diagrammatic perspective exploded view of the adjustable leg according to the invention; and

Fig. 2 is a horizontal cross-section.

As shown on the drawings, the leg according to the invention comprises two elements 1 and 2 slidable telescopically one into the other.

Each of these elements is constructed of bent sheet metal and has a main cross-sectional profile of L-shape - formed by the sides A and B for the outer element 1 and by the sides A' and B' for the inner element 2 - the ends of said elements being further L-bent to form the sides C, D and E, F for the element 1 and the

sides C', D' and E', F' for the element 2. By this configuration, the sides D and F, or D' and F' respectively, converge towards the leg centre, for the purpose described hereinafter.

On the ends of the sides D and F there is welded a further metal sheet G extending obliquely to the sides A, B, to form a closed profile for the cross-section of the outer element 1. This element is thus tubular and, also thanks to the complex profile of its cross-section, it is perfectly able to withstand the torsional stresses to which the legs can be subjected. The inner element 2 terminates with the ends of its sides D' and F' spaced apart, between said ends there being formed a likewise diagonally positioned aperture through which the locking means described hereinafter operate.

The cross-section of the inner element 2 is obviously slightly smaller than that of the outer element 1, to allow the elements 1 and 2 to slide telescopically with a minimum slack when they are inserted one into the other.

The locking means consist of two plates 3 and 4 which can be clamped one against the other by two bolts 5. The plate 3 is positioned on the outside of the outer leg element 1, i.e. externally to the the metal sheet G, whereas the plate 4 is positioned on the inside of the inner element 2. As can be seen from the drawing, the plates 3 and 4 each have two faces 3a and 3b, or 4a and 4b respectively, converging towards the leg centre, i.e. parallel to the sides D and F of the element 1, and are joined together by a flat central part positioned obliquely in the same manner as the metal sheet G.

The bolts 5 cross through holes in the outer plate 3 and through holes in the metal sheet G, and screw into threaded bores provided in the inner plate 4

Thanks to the described configuration of the elements 1 and 2 and of the plates 3 and 4, the faces 3a, 4a - when in the

locking position - are positioned parallel and adjacent to the sides D, D', whereas the faces 3b, 4b are parallel and adjacent to the sides F, F'. Moreover, the face 3a of the plate 3 with the other faces parallel to it, and the face 3b with the other faces parallel to it, converge towards the leg centre. Consequently, when the bolts 5 are tightened, the plates 3 and 4 are pressed against each other, and the convergent surfaces 3a, 3b produce a wedge effect against the surfaces 4a and 4b, which tends to self-align these surfaces. This self-aligning action is also transferred to the surfaces D, F and D', F', so that the leg element 2 is forced to align with the element 1, with obvious advantages as far as leg functionality.

It is also apparent that, thanks to the said wedge effect, this tightening action also results in a reliable mutual clamping of the elements 1 and 2, which is highly strong and secure even under very high loads. On the other hand, this tightening action produces no local deformation of the elements 1 and 2, as it happens in certain devices of the known art.

According to a supplementary characteristic of the present invention, the inner element 2 comprises at least one depressed zone H, extending along the length of the side A' and/or B' and carrying a graduated scale. This graduated scale is used generally to allow all the machine legs to be immediately and easily adjusted in height to the same level. In addition, by taking account of the height of the machine tool frame, and more precisely of the distance between the upper working surface of the machine and the lower surface to which the leg is connected, the graduations of this scale can give a direct indication of the height of said working surface from the ground on which said machine tool is rested.

The fact that the graduated scale is provided in the depressed zone H, for example by engraving, or by applying a

graduated adhesive tape, or even by painting, means that this graduated scale is protected from the abrasive action which the outer element 1 could produce during the telescopic sliding of the elements 1 and 2 for their height adjustment.

A plate 6 is fixed, for example welded, to the upper end of the outer element 1 and carries a series of holes 6a, through which bolts (not shown) are inserted for fixing the leg to the machine tool frame.

A further plate 7 is fixed to the lower end of the inner element 2, and comprises at least one central hole 7a for fixing the foot which rests on the ground. The rest foot can be a simple shoe 8, fixed by a bolt 9 and self-locking nut 10. Preferably, to the side of the hole 7a there are provided two further holes 7b and 7c, in which the pins 8a, 8b of the shoe 8 engage to ensure correct positioning of the shoe with respect to the leg, without the risk of its rotation about the bolt 9.

Instead of the shoe 8, a castor 12 can be used, its shank 11 being inserted through the hole 7a to be fixed by means of a self-locking nut 10. In this case, the holes 7b and 7c are not used, as the castor 12 does not have to assume a determined precise angular position.

The aforegoing description relates to a preferred embodiment in which the cross-section of the leg elements 1, 2 is overall in the form of a right-angled triangle. Other equivalent profiles, for example square or rectangular, can however be adopted, all resulting into a configuration apt to cooperate with the convergent faces of the clamping plates in order to obtain the described self-aligning wedge effect, in accordance with the main characteristic of the present invention.

CLAIMS

1) A height-adjustable support leg, in particular for machine tools, of the type comprising two elements slidable telescopically one into the other and locking means for fixing said elements in their mutual position, characterised in that each of the two telescopically slidable elements is of complex cross-sectional profile, comprising at least two flat sides converging towards the inside of the leg, and in that, with said flat sides there cooperate, from opposing directions, pairs of equally convergent faces, parallel to said sides, of two clamping plates forming said locking means.

2) A support leg as in claim 1), wherein each of the two slidable leg elements is formed from a bent metal sheet having a main cross-sectional profile of L-shape, with its ends being further L-bent, the terminal edges of these ends forming said convergent flat sides with which cooperate the end edges, bent obliquely to a complementary profile, of said clamping plates, these latter being pressed one against the other by at least one bolt passing through a hole in the outer plate and screwed into a threaded seat in the inner plate.

3) A support leg as in claim 1) or 2) wherein, on said further L-bent ends of the outer element, there is welded a diagonal metal sheet which closes the cross-sectional profile of said element, making it tubular.

4) A support leg as in claim 1) or 2) wherein, between said further L-bent ends of the inner element, there is formed a diagonally positioned aperture through which said locking means operate.

5) A support leg as in claim 1) or 2), wherein said clamping plates comprise a flat face, parallel to said diagonal metal sheet and to said diagonal aperture, and two end faces bent to 45° to

form said convergent faces.

6) A support leg as in claim 1) or 2), wherein two bolts are provided for clamping said plates one against the other, said bolts freely crossing holes provided in the outer plate and in the diagonal metal sheet, and screwing into threaded bores of the inner plate.

7) A support leg as in claim 1), wherein a depressed zone carrying a graduated scale is formed on at least one of the main sides of the inner element.

8) A support leg as in claim 7), wherein said graduated scale is engraved, or applied by adhesive tape, or else painted on the outer surface of said depressed zone.

9) A support leg as in claim 8), wherein the graduations of said scale represent the height of the machine tool working surface from the lower rest end of the support leg.

10) A support leg as in claim 1), wherein a plate for fixing the leg to the lower surface of the machine tool frame is welded to the upper end of the outer element.

11) A support leg as in claim 1), wherein a baseplate is welded to the lower end of the leg, carrying means for fixing the foot resting on the ground.

12) A support leg as in claim 11), wherein said fixing means consist of three holes, of which the central hole is apt to receive a retention bolt for a foot in the form of a shoe, and the lateral holes receive position-adjustment pins projecting from the foot.

13) A support leg as in claim 11), wherein said fixing means consist of a hole, apt to receive the threaded shank of a castor.

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Fig. 1

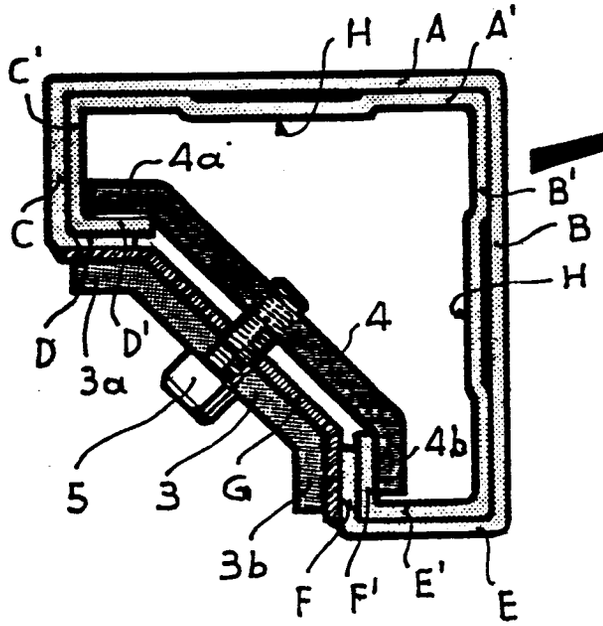

Fig. 2