

HEIGHT-ADJUSTABLE TABLE

The invention relates to a table, more particularly to a height-adjustable table.

Referring to Figure 1, a conventional height-adjustable table, as disclosed in Taiwanese Publication No. I244910, includes a bottom support 11, an upright support 12 connected to the bottom support 11, two link rods 13, and a horizontal support 16 fixed to bottom rods 151 of a tabletop 15 to support the same and having a shaft 161 with two oppositely extending external threads 162. The link rods 13 have lower ends 131 connected pivotally to a top end of the upright support 12 and provided with convex teeth 14 that mesh with each other, and upper ends 132 connected to the horizontal support 16. Two adjustable seats 163 are connected threadedly and respectively to the external threads 162 and are connected pivotally and respectively to the upper ends 132 of the link rods 13 through pivot pins 164. The horizontal support 16 further has two axially extending slide grooves 165 for extension of the pivot pins 164 respectively therethrough, and a crank handle 17 connected to one end of the shaft 161.

In use, the crank handle 17 is operated to drive the shaft 161 to rotate. As the shaft 161 rotates, the adjustable seats 163 move threadedly toward or away from each other through the external threads 162, and bring therealong the link rods 13 to move closer or away from

each other, thereby moving vertically the horizontal support 16 and the tabletop 15.

Because the aforesaid height-adjustable table has link mechanisms that are complicated, the manufacturing cost thereof is high. Further, since the crank handle 17 is connected to one end of the shaft 161 and protrudes outwardly from one side of the tabletop 15, said one side of the tabletop 15 cannot be disposed against a wall, and people passing thereby can easily bump into the crank handle 17 or their clothes can easily catch on the crank handle 17.

Therefore, embodiments of the present invention provide a height-adjustable table that is capable of overcoming the aforementioned drawbacks of the prior art.

One aspect of the present invention provides a height-adjustable table comprising: a tabletop; a leg frame unit including two spaced-apart bottom frames, and two top frames connected telescopically and respectively to said bottom frames and supporting said tabletop; and a height-adjustment mechanism including two gear supports fixed respectively to said top frames, two gear units mounted, respectively to said gear supports, each of said gear units including an upper bevel gear, a lower bevel gear disposed under said upper bevel gear, and a middle bevel gear disposed between and meshing with said upper and lower bevel gears, two upper

threaded members fixed respectively to said lower bevel gears of said gear units, two lower threaded members fixed respectively to said bottom frames and engaging respectively said upper threaded members such that, when said upper threaded members are rotated respectively relative to said lower threaded members, said upper threaded members are moved respectively and vertically relative to said lower threaded members, thereby resulting in vertical movement of said top frames and said tabletop relative to said bottom frames, a crank handle disposed above said tabletop and extending through said tabletop to connect co-rotatably with said upper bevel gear of one of said gear units so that, when said crank handle is operated to rotate said upper, middle , and lower bevel gears of said one of said gear units, a corresponding one of said upper threaded members is rotated relative to a respective one of said lower threaded members to thereby result in vertical movement of the corresponding one of said upper threaded members relative to the respective one of said lower threaded members, and a link rod interconnecting fixedly said middle bevel gears of said gear units so as to allow rotation of said middle bevel gear of said one of said gear units to be transferred to said middle bevel gear of the other one of said gear units therethrough.

Other features and advantages of the present invention will become apparent in the following detailed

description of the preferred embodiment with reference to the accompanying drawings, of which:

Fig. 1 is a schematic view of a conventional height-adjustable table disclosed in Taiwanese Publication No. I244910;

Fig. 2 is a schematic side view of a height-adjustable table according to the preferred embodiment of the present invention;

Fig. 3 is an exploded perspective view of a leg frame unit and a height-adjustment mechanism of the preferred embodiment;

Fig. 4 is an exploded perspective view of a gear support and a gear unit of the height-adjustment mechanism of the preferred embodiment;

Fig. 5 is a perspective view of the gear support and the gear unit of the height-adjustment mechanism in an assembled state;

Fig. 6 is a schematic top view of the preferred embodiment without a crank handle;

Fig. 7 is a schematic front view of the preferred embodiment;

Fig. 8 is a fragmentary enlarged sectional view of the preferred embodiment, illustrating how the crank handle is connected to an upper bevel gear of the gear unit; and

Fig. 9 is a view similar to Fig. 2, but illustrating how operation of the crank handle can move a tabletop

upwardly.

Referring to Figs. 2 to 9, a height-adjustable table 3 according to the preferred embodiment of the present invention is shown to comprise a tabletop 4, a leg frame unit 5, and a height-adjustment mechanism 6.

The tabletop 4 has an aperture 41 extending through top and bottom faces thereof.

The leg frame unit 5 includes two spaced-apart bottom frames 51, and two top frames 52 connected telescopically and respectively to the bottom frames 51 and supporting the tabletop 4. Each bottom frame 51 includes a generally horizontal bottom support rod 511, two hollow lower upright rods 513 extending upwardly from the bottom support rod 511 and spaced apart from each other along the length of the bottom support rod 511, and two levelers 512 attached respectively to two opposite bottom end faces of the bottom support rod 511. Each top frame 52 includes a generally horizontal top support rod 521 provided with a positioning hole 523 (see Fig. 7), and two hollow upper upright rods 522 projecting downwardly from a bottom face of the top support rod 521, spaced apart from each other along the length of the top support rod 521, and inserted telescopically and respectively into the lower upright rods 513. The positioning holes 523 in the top support rods 521 of the top frames 52 face each other and are aligned with each other.

The height-adjustment mechanism 6 includes two gear

supports 63, two gear units, two lower threaded members 61, two upper threaded members 62, a link rod 65, and a crank handle 67. Each gear support 63 is fixed to a respective top frame 52 within the top support rod 521, and includes a plurality of sidewalls 632 cooperatively confining a receiving space 633 and each provided with a cover-receiving hole 634, and a plurality of cover plates 635 received respectively in the cover-receiving holes 634 of the sidewalls 632 and screwed to the respective sidewalls 632. Each cover plate 635 has a through hole 637.

The gear units are mounted respectively to the gear supports 63 and each includes an upper bevel gear 64, a lower bevel gear 64' disposed under the upper bevel gear 64, and a middle bevel gear 64" disposed between and meshing with the upper and lower bevel gears 64, 64'. The upper, lower, and middle bevel gears 64, 64', 64" of each gear unit are disposed in the receiving space 633 of a respective gear support 63. Each of the upper, lower, and middle bevel gears 64, 64', 64" has a tubular rotating shaft portion 642 extending into the through hole 637 in a corresponding cover plate 635 and provided with an axial hole 643 having a polygonal cross section. A plurality of C-shaped retainers 66 are engaged respectively to the rotating shaft portions 642 of the upper, lower, and middle bevel gears 64, 64', 64" so as to retain the upper, lower, and middle bevel gears

64, 64', 64" to the corresponding cover plates 635. The axial hole 643 in the rotating shaft portion 642 of the upper bevel gear 64 of one of the gear units communicates spatially with the aperture 41 in the tabletop 41.

5 The lower threaded members 61 are fixed respectively to the bottom support rods 511 of the bottom frames 51, are surrounded by the respective upper upright rods 52, and are internally threaded. The upper threaded members 62 are externally threaded, and engage respectively the
10 lower threaded members 61. Each upper threaded member 62 has a top shaft portion 622 having a polygonal cross section and projecting upwardly therefrom and inserted fittingly into the axial hole 643 in the rotating shaft portion 642 of the lower bevel gear 64' of a respective
15 gear unit, thereby fixing each upper threaded member 62 to the lower bevel gear 64' of the respective gear unit. When the upper threaded members 62 rotate respectively relative to the lower threaded members 61, the upper threaded members 62 move vertically and
20 respectively relative to the lower threaded members 61, thereby resulting in vertical movement of the top frames 52 and the tabletop 4 relative to the bottom frames 51.

 The link rod 65 has two opposite ends extending through the positioning holes 523 in the top support
25 rods 521 of the respective top frames 52 and inserted respectively and fittingly into the axial holes 643 in the rotating shaft portions 642 of the middle bevel gears

64" of the gear units, thereby interconnecting fixedly the middle bevel gears 64" of the gear units. Through such a connection, rotation of the middle bevel gear 64" of one of the gear units can be allowed to be transferred to the middle bevel gear 64" of the other one of the gear units therethrough.

The crank handle 67, in this embodiment, is disposed removably above the tabletop 4, and has a shaft portion 671 extending through the aperture 41 and inserted fittingly into the axial hole 643 in the rotating shaft portion 642 of the upper bevel gear 64 of one of the gear units, thereby connecting co-rotatably the crank handle 67 with the upper bevel gear 64 of said one of the gear units.

With reference to Figs. 8 and 9, in use, the shaft portion 671 of the crank handle 67 is first inserted through the aperture 41 so as to be received fittingly in the axial hole 643 in the rotating shaft portion 642 of the upper bevel gear 64 of one of the gear units, and then the crank handle 67 is rotated so as to drive the upper bevel gear 64 of said one of the gear units to rotate therealong. Rotation of the upper bevel gear 64 of said one of the gear units brings the other bevel gears 64', 64" to rotate therealong. Through the simultaneous rotations of the middle bevel gears 64" of the gear units through the link rod 65, the upper threaded members 62 can rotate simultaneously and

vertically relative to the respective lower threaded members 61, thereby resulting in vertical movement of the top frames 52 and the tabletop 4 relative to the bottom frames 51. When the tabletop 4 reaches a suitable height, the crank handle 67 can be removed from the tabletop 4, so that the crank handle 67 will not obstruct the path of people passing by the table 3 nor reduce the usable area of the table 3.

From the aforementioned description, it is apparent that adjustment of the height of the table 3 of the present invention can be accomplished by simply operating the crank handle 67, and after a desired height of the tabletop 4 is reached, the crank handle 67 can be removed from the tabletop 4. Hence, operation for adjusting the height of the table 3 is simple and easy. Further, the height-adjustment mechanism 6 for controlling the vertical movement of the tabletop 4 has a simple transmitting mechanism, so that the manufacturing cost of the table 3 of the present invention can be minimized.

CLAIMS:

1. A height-adjustable table comprising:

a tabletop;

a leg frame unit including two spaced-apart bottom
5 frames, and two top frames connected telescopically
and respectively to said bottom frames and supporting
said tabletop; and

a height-adjustment mechanism including

10 two gear supports fixed respectively to said
top frames,

two gear units mounted respectively to said
gear supports, each of said gear units including
an upper bevel gear, a lower bevel gear disposed
under said upper bevel gear, and a middle bevel
15 gear disposed between and meshing with said upper
and lower bevel gears,

two upper threaded members fixed respectively
to said lower bevel gears of said gear units,

20 two lower threaded members fixed respectively
to said bottom frames and engaging respectively
said upper threaded members such that, when said
upper threaded members are rotated respectively
relative to said lower threaded members, said
upper threaded members are moved respectively and
25 vertically relative to said lower threaded
members, thereby resulting in vertical movement
of said top frames and said tabletop relative to

said bottom frames,

5 a crank handle disposed above said tabletop and extending through said tabletop to connect co-rotatably with said upper bevel gear of one of said gear units so that, when said crank handle is operated to rotate said upper, middle, and lower bevel gears of said one of said gear units, a corresponding one of said upper threaded members is rotated relative to a respective one of said lower threaded members to thereby result in vertical movement of the corresponding one of said upper threaded members relative to the respective one of said lower threaded members, and

10 a link rod interconnecting fixedly said middle bevel gears of said gear units so as to allow rotation of said middle bevel gear of said one of said gear units to be transferred to said middle bevel gear of the other one of said gear units therethrough.

20 2. The height-adjustable table of Claim 1, wherein said crank handle is disposed removably above said tabletop.

25 3. The height-adjustable table of Claim 1, wherein each of said bottom frames includes a generally horizontal bottom support rod, and two hollow lower upright rods

extending upwardly from said bottom support rod and spaced apart from each other along the length of said bottom support rod, each of said top frames including a generally horizontal top support rod, and two hollow upper upright rods projecting downwardly from said top support rod, spaced apart from each other along the length of said top support rod, and inserted telescopically and respectively into said lower upright rods.

4. The height-adjustable table of Claim 3, wherein each of said upper, lower, and middle bevel gears has a tubular rotating shaft portion provided with an axial hole, each of two opposite ends of said link rod being inserted into said axial hole in said rotating shaft portion of said middle bevel gear of a respective said gear unit.

5. The height-adjustable table of Claim 4, wherein said axial hole in said rotating shaft portion of said middle bevel gear of each of said gear units has a polygonal cross section, and said two opposite ends of said link rod engage respectively and fittingly said axial holes in said rotating shaft portions of said middle bevel gears of said gear units.

6. The height-adjustable table of Claim 4, wherein each

of said gear supports includes a plurality of sidewalls cooperatively confining a receiving space and each provided with a cover-receiving hole, and a plurality of cover plates received fixedly and respectively in said cover-receiving holes in said sidewalls, each of said cover plates having a through hole, said upper, lower, and middle bevel gears of each of said gear units being disposed in said receiving space of a respective said gear support, said rotating shaft portion of each of said upper, lower, and middle bevel gears extending into said through hole in a corresponding one of said cover plates.

7. The height-adjustable table of Claim 6, further comprising a plurality of C-shaped retainers each engaged to said rotating shaft portion of a respective one of said upper, lower, and middle bevel gears to retain each of said upper, lower, and middle bevel gears to the corresponding one of said cover plates.

8. The height-adjustable table of Claim 4, wherein each of said lower threaded members is internally threaded, and each of said upper threaded members is externally threaded.

9. The height-adjustable table of Claim 8, wherein each of said upper threaded members has a top shaft portion

inserted fittingly into said axial hole in said rotating shaft portion of said lower bevel gear in a respective said gear unit, said top shaft portion having a polygonal cross section.

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10. The height-adjustable table of Claim 4, wherein said tabletop has an aperture formed therethrough and communicated spatially with said axial hole in said rotating shaft portion of said upper bevel gear of one of said gear units, said crank handle extending through said aperture and inserted fittingly into said axial hole in said rotating shaft portion of said upper bevel gear of said one of said gear units.

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