Jan. 21, 1964 P. G. STALNACKE 3,118,705

ADJUSTABLE DESK AND CHAIR

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Fig. 1

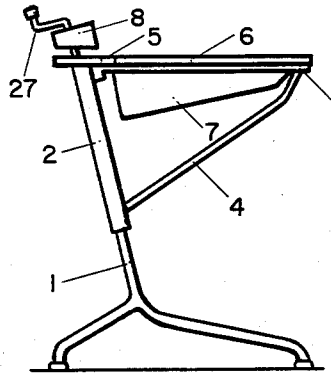


Fig. 3

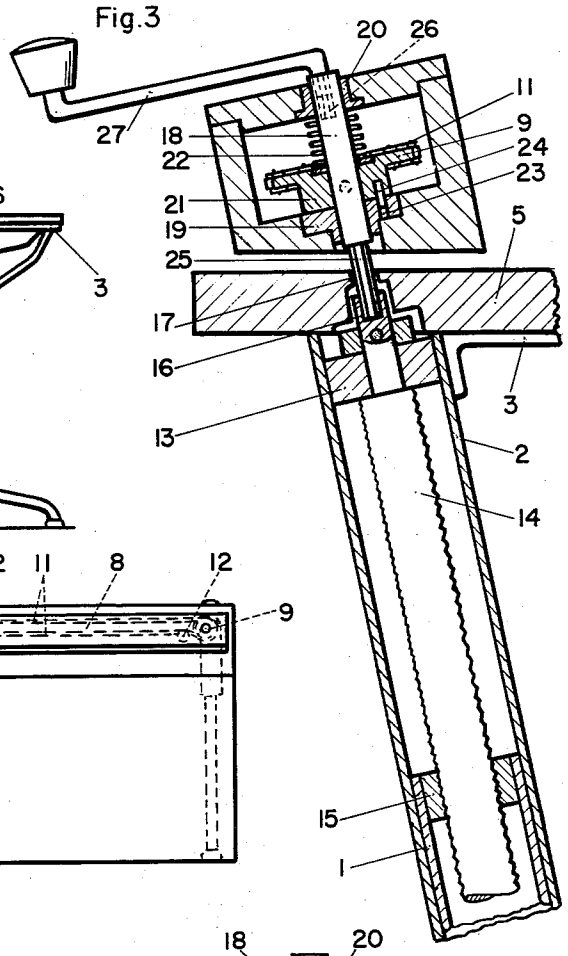


Fig. 2

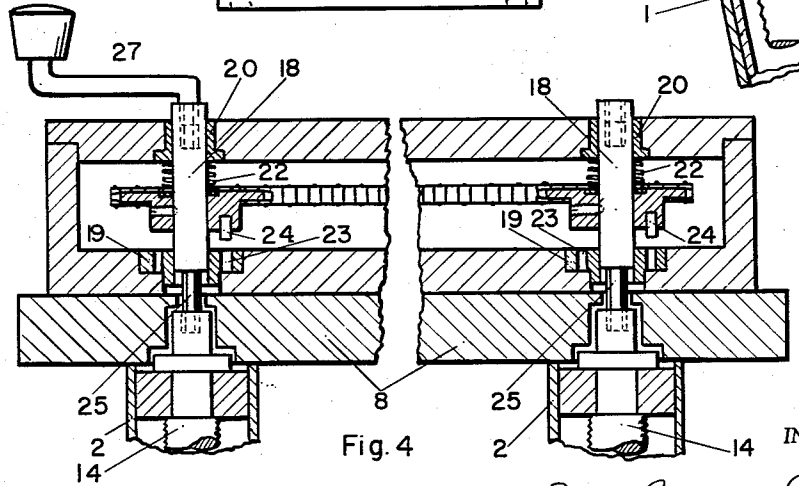


Fig. 4

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Fig. 5

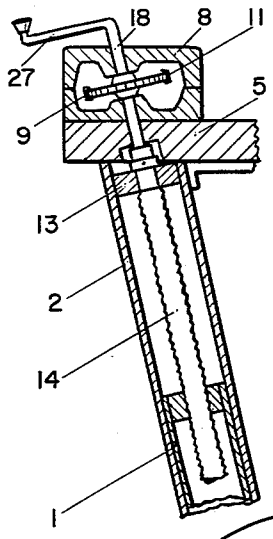


Fig. 6

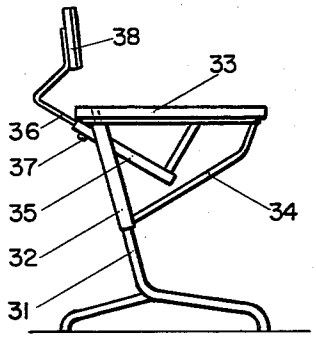


Fig. 8

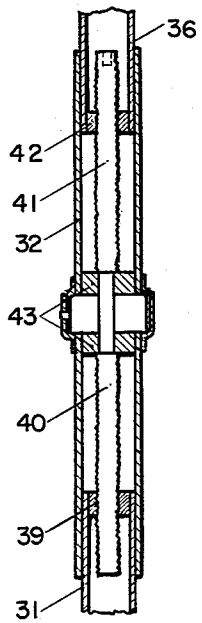


Fig. 7

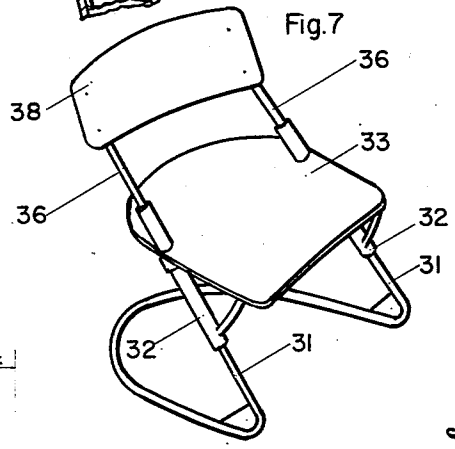
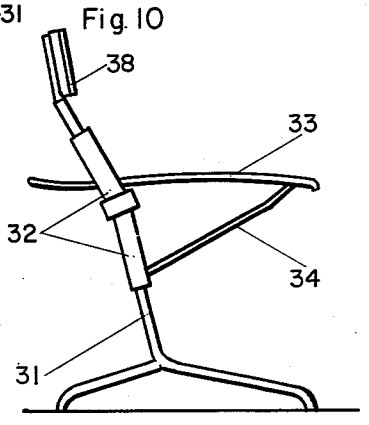


Fig. 10



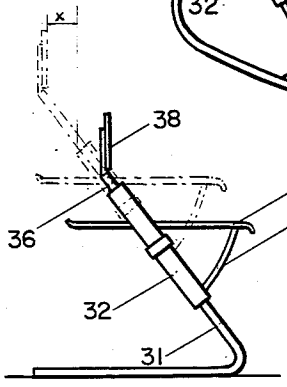


Fig. 9

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3,118,705

ADJUSTABLE DESK AND CHAIR

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Filed Nov. 2, 1960, Ser. No. 66,810
8 Claims. (Cl. 297—346)

This invention relates to a new or improved adjustable desk or chair particularly for school use.

It has previously been proposed to construct tables with telescopic legs each provided with a screw spindle as adjusting means and each screw spindle provided with a sprocket wheel immediately under the table top, the several sprocket wheels being linked together by an endless chain and manually actuated by a crank handle.

A feature of the present invention is to provide a desk or chair with such known telescopic legs adjustable by a screw spindle but the upper ends of all the screw spindles are without motion connection means, such as a chain, between them. Said ends are accessible at the top of the desk or chair and a separate transmission mechanism contains parallel shafts connected by motion transmitting means and of the same number and mutual distance as the number and mutual distance of the screw spindles, each end of the shafts projecting in the same direction being connectable with each said ends of the screw spindle, at least one of said shafts being provided with a crank handle or the like for manual actuation of the transmission mechanism actuating the screw spindles for adjusting the length of the legs. Thus, one transmission mechanism is sufficient for a large number of desks or chairs.

It is a further feature of the invention to provide a desk or chair with adjustment means in order to adjust not only the height but also the position in the forward backward direction. For this reason, the legs of the desk or chair are mutually parallel but simultaneously inclined relatively to the table top of the desk or seat of the chair so that a raising or lowering of the desk or chair causes a simultaneous horizontal movement of the table top or seat relative to the leg under portions. Thus, the desk or chair can be adjusted in a horizontal as well as vertical direction to suit the size of a person.

It is still a further feature of the invention to provide a chair with an adjustable seat back in order to adjust the height of the seat back as well as the size of the seat. For this reason, the holder of the seat back projects downwards and forwards to the seat, so that a raising or lowering of the seat back causes a backward or forward movement of the seat back relative to the seat and increases or decreases the seat space.

Another feature of the invention is the provision of a catch at each shaft of the transmission mechanism, which catches are disengaged only by forcing the shafts against the ends of the screw spindles.

Still another feature of the invention is the provision of a construction for manufacturing the adjustable parts of the desk or chair in a simple and inexpensive manner and for adjustment of a large number of the desks or chairs in a handy manner by means of one and the same transmission mechanism for the several desks and chairs.

The invention is hereinafter described by way of example with reference to accompanying diagrammatic drawings, in which:

FIG. 1 is a side view of a school desk according to the invention;

FIG. 2 is a top view of the school desk;

FIG. 3 is a vertical section in a larger scale of one leg of the desk and adjacent parts;

FIG. 4 is a section through the upper part of the desk and a transmission mechanism thereon, but with a mid-portion broken away;

FIG. 5 is a vertical section, similar to FIG. 3, of another embodiment of the transmission mechanism;

FIG. 6 is a side view of a chair according to the invention;

FIG. 7 is a perspective view of another chair, according to the invention;

FIG. 8 is a longitudinal section in a larger scale of a part of a leg of the chair;

FIG. 9 is a side view of the chair in FIG. 7; and

FIG. 10 is still another chair according to the invention.

In carrying the invention into effect and with reference to the accompanying diagrammatic drawings, an improved desk according to FIGS. 1 to 4 is provided with two parallel legs, each formed by a tubular leg under-portion 1 and a tubular leg upper-portion 2 guided on the leg under-portion 1. To the two leg upper-portions 2 there is attached a rectangular frame 3 and two braces 4. To the frame 3 there is attached a plate 5 forming part of the table-top, the other part of which is formed by a desk lid 6 connected with the plate 5 by means of hinges and resting on the frame 3. From the frame 3 hangs a desk box 7. Upon the plate 5 rests a transmission casing 8 that contains a sprocket wheel 9 above each leg 1, 2 and an endless chain 11 around the sprocket wheels and against a stretch roll 12.

As more clearly shown in FIG. 3 there is attached in the upper end of the leg upper portion 2 a bearing 13 in which a screw spindle 14 is rotatably but axially undisplaceably journalled. This screw spindle 14 extends through a nut 15 that is fastened in the upper end of the leg under-portion 1. In the upper-portion of the screw spindle there is a blind hole 16, for example hexagonal, and straight above hole 16 there is a hole 17 through the desk plate. All these described details are present in each leg 1, 2.

The transmission casing 8 is placed upon the desk plate 5 and the sprocket wheel 9 is fastened to a shaft 18 that is journalled in bushings 19 and 20 fastened to the casing 8. The shaft 18 and the sprocket wheel 9 are axially displaceable in the bearing bushings 19, 20 but the hub 21 of the sprocket wheel 9 resting against the bushing 19 is influenced by a spring 22 around the shaft 18 and is located between the sprocket wheel 9 and the bushing 20. In the bushing 19 are four holes 23 in which a retaining peg 24 alternatively can enter. Furthermore, the shaft 18 in its lower end is provided with a shaft pin 25, for example hexagonal, projecting into the hole 16 of the screw spindle 18 and in its upper end also has a cornered hole 26, for example hexagonal, in which there is placed a crank handle 27. The described construction at the one sprocket wheel 9 exists also, except the crank handle 27, at the other sprocket wheel 9.

When one has placed the transmission casing 8 over a desk and put the shaft pins 25 into the screw spindle holes 16 the shaft pins 25 will be resting against the bottoms of the holes and the underside of the casing will be located a short distance above the desk. Each peg 24 engages into a hole 23 in the bushings 19, and it is impossible to turn the sprocket wheel 9 by means of the crank handle 27. Not until the casing 8 is pressed down against the desk so that both bushings 19 are displaced downwards and release their engagement with the pegs 24 is it possible to turn the sprocket wheels 9, 10 by means of the crank handle 27 so that each screw spindle 14 in the legs 1, 2 may also be turned. The legs 1, 2 are lengthened or shortened in the same degree for raising or lowering of the table top of the desk. If one or the other shaft pin 25 of the transmission mechanism has not been forced down to reach the bottom of the proper screw spindle hole 16, the proper shaft 18 does not get any support for permitting the bushing 19 to be drawn off from the peg 24 when the casing 8 is pressed downwards and

the sprocket wheel and also the shaft are being firmly engaged. Consequently, it is not possible to turn the shaft **18** or the screw spindle **14**. This means there is security in that none of the sprocket wheel shafts can be turned until both are duly connected with its screw spindle **14** and thereafter turned to the same degree. The result is that the upper part of the desk and both legs are raised or lowered in equal degree and a bar to an incorrect inclination of the table surface has been achieved.

One single transmission mechanism according to the invention is sufficient for all the adjustable desks in, for example, a school. The described desk may have a lower level of 21 inches and a higher level of 33 inches so that a desk can be adjusted not only for the pupil using it, but also in pace with a pupil's proceeding growth. Furthermore, the inclination of the legs **1, 2** has the effect that with a raising of the table top follows a movement of the table top away from the sitting place at the desk and the pupil will get more space.

When it can be guaranteed that the person using the transmission mechanism will never turn a shaft pin until both shaft pins are in engagement with the screw spindles, it is possible to exclude the catch means, as shown in the embodiment of FIG. 5. In this case each shaft **18** carrying a sprocket wheel **9** in engagement with the chain **11** is turnable but not displaceably journalled for axial movement in the casing **8**. The shaft ends are in engagement with the screw spindle **14** and one shaft **18** is provided with the crank handle **27**.

The invention is applicable to chairs in a manner shown in FIG. 6. A chair has two legs each formed by a tubular leg under-portion **31** and a tubular leg upper-portion **32**. A seat **33** is attached to the portions **32** and is supported by a brace **34** at each leg. The upper and lower-portions of each leg are mutually adjustable in the manner shown in FIG. 3 by means of an internal screw spindle the upper end of which is accessible through an aperture in the seat for application of the transmission mechanism according to FIGS. 3, 4 or 5. To the underside of the seat **33** and to the leg upper-portions **32** a longitudinal guide piece **35** is fastened. A holder **36** is slidably mounted in said guide piece **35** and retained by a locking bolt **37**. The holder **36** carries a seat back **38**. Preferably, there is one guide piece **35** only under the midportion of the seat, but there could be two guide pieces each located at a leg.

The legs of the chair are inclined and the guide piece **35** has an approximate 30° angle to the seat **33**, i.e. 120° to the seat back plane. Each alteration of the level of the seat causes a horizontal and a vertical displacement of the seat. Furthermore, every displacement of the seat back relative to the seat causes an alteration of the position of the seat back in both a horizontal and vertical direction.

A chair according to FIGS. 7 to 9 is also provided with two parallel legs each consisting of a tubular leg under-portion **31** and a tubular leg upper-portion **32** carrying a seat **33** supported by braces **34**. The legs contain, according to FIG. 8, a nut **39** in the upper end of the leg under-portion **31**, a screw spindle **40** in engagement with the nut **39**, a further screw spindle **41** firmly joined to the first mentioned screw spindle **40** and a nut **41** fastened to the inner end of the holder **36** and in engagement with the last-mentioned screw spindle **41**. Both spindles **40, 41** are turnably but not displaceably journalled for axial movement in two bearings **43**. The spindles **40, 41** are threaded in opposite directions so that a turning of the spindles causes the nuts **39, 42** and thus the parts **31** and **36** to move towards or away from each other. The upper ends of the screw spindles **41** are connectable with the above described transmission mechanism at the bending of the holder **36** behind the lower side of the seat back **38**.

As shown with dash-dot lines in FIG. 9, a raising of the seat **33** also causes a backward movement of the seat. The

seat back **38** is originally located straight above the upper end of the leg upper-portion **32**, but simultaneously with the raising of the seat **33** the seat back **6** is not only raised but also displaced backwards a distance x from the upper end of the portions **32** or relatively to the seat **33**.

By this means the chair, used in for example, a school, can be adjusted in such a way that the height of the seat is increased in step with the pupil's growing and simultaneously, the space for the pupil to the desk is increased. Moreover, the seat back is raised, and moved backwards relative to the seat and the pupil will get the seat back on the right level and the seat space increased. It is therefore possible to use one and the same desk as a chair for a pupil during his whole time at school, and the particular desks and chairs in a class room can be adjusted to suit each particular pupil.

The chair according to FIG. 10 has the same adjusting parts as shown in FIG. 8, but the screw spindles in the legs are not firmly connected but linked, for example by a universal joint, bevel gears or the like between the bearings. In this case, the seat back **38** has a larger horizontal movement than the seat **33** for each alteration of the levels of the seat back and the seat. A difference in the displacements of the seat and the seat back can be obtained by different pitch of the screw spindles too. As the distance between the legs of the chair usually is shorter than that of the desk legs, the transmission mechanism must have a shorter distance between its shafts for actuating the chair than for actuating the desk.

It will be understood that the invention is not limited to the particular embodiments hereinbefore described. For instance, each leg may consist of two mutually guided bars and the transmission means between said shafts may be a steel wire, a V-belt or a shaft with gears or the like.

What is claimed is:

1. An adjustable height mechanism for tables and chairs having at least two legs comprising an upper leg portion and a lower leg portion for each leg, the upper portion being telescopically displaceable relative to the lower portion; a screw spindle rotatably attached within the upper leg portion at its upper end and extending into the lower leg portion, the spindle being threadedly mounted on a nut fixed to the upper end of the lower leg portion; shaft pin receiving means at the uppermost end of said spindle; and a removable transmission mechanism enclosed in a separate casing and comprising at least two shaft pins projecting from below said casing for simultaneous engagement with the respective pin receiving means of the spindles, and power transmitting means within the casing for simultaneous rotation of the pins, the power transmitting means comprising a shaft fixed to each of the shaft pins at one end thereof, bushings rotatably attaching each shaft to the casing, each shaft being longitudinally displaceable in the casing, a sprocket wheel fixed to each shaft, a chain drive joining the sprocket wheel, crank receiving means at the other end of at least one shaft, and catch means preventing rotation of the pins when the transmission mechanism is removed.

2. An adjustable height mechanism according to claim 1, wherein said catch means comprise a retaining peg projecting from at least one wheel engageable in holes in one of said bushings and a spring urging the engagement.

3. An adjustable height mechanism according to claim 1, particularly for use in chairs with backs, and further comprising a chair back guiding means for guiding the chair back downward and forward relative to the chair seat when lowering the chair height and upward and backward relative to the chair seat when raising the chair height.

4. An adjustable height mechanism according to claim 1, particularly for use in chairs, having an adjustable back and further comprising an extension of the upper leg portion and a back attaching portion telescopingly displaceable relative to the extension of upper leg portion, wherein said spindle extends into the back attaching portion

and is threadedly mounted on a nut fixed to the back attaching portion.

5. An adjustable height mechanism according to claim 4 wherein the upper leg portion is at an angle with the extension thereof and the spindle comprises two sections joined at the angle by linking means.

6. In combination with a table having a horizontal top portion or a seat having a horizontal seat portion, an adjustable height mechanism comprising: at least two legs depending from the said horizontal portion, each leg including a tubular upper leg portion fixed to the horizontal portion and a tubular lower leg portion telescopically displaceable within the upper leg portion; a screw spindle rotatably attached within each upper leg portion at its upper end and extending into the respective lower leg portion; a nut fixed to the upper end of the lower leg portion, the nut being threadably mounted on the said spindle; shaft pin receiving means at the uppermost end of each spindle; means defining holes within the horizontal portion for access to the shaft pin receiving means from above the said horizontal portion; and a removable transmission mechanism including a casing separate from the said table or chair, at least two shaft pins projecting from below said casing for simultaneous engagement with the pin receiving means through the holes within the said horizontal portions, a shaft fixed to each of the shaft pins at one end thereof and bushings rotatably attaching each shaft to the casing, chain drive means within the casing joining the two said shafts, and crank receiving means at the other end of at least one shaft accessible from outside the said casing.

7. An adjustable height mechanism according to claim 6, particularly for use in chairs, and further comprising

a longitudinal back guide piece below and fixed to the said horizontal seat portion at an angle thereto, a back holder slideably mounted in the said guide piece, and a locking bolt for fixing the position of the holder relative to the said guide piece.

8. An adjustable height mechanism according to claim 7 wherein the guide piece is at an angle of approximately 30° to the horizontal seat portion, the guide piece being at an angle of 120° to a seat back fixed to the back holder, the back being movable downward and forward relative to the seat portion when lowering its height and upward and backward relative to the seat portion when raising its height.

References Cited in the file of this patent

UNITED STATES PATENTS

545,827	Silcott	Sept. 3, 1895
914,538	Watkins	Mar. 9, 1909
919,559	Duff	Apr. 27, 1909
968,449	Cogger	Aug. 23, 1910
1,237,499	Gammeter et al.	Aug. 21, 1917
1,263,435	Klingbiel	Apr. 23, 1918
1,356,555	Oringderff	Oct. 26, 1920
1,731,375	Engers	Oct. 15, 1929
1,943,280	Arnold	Jan. 16, 1934
2,368,748	Doty	Feb. 6, 1945
2,553,939	Pivovaroff	May 22, 1951
2,721,106	Chaney	Oct. 18, 1955

FOREIGN PATENTS

144,289	Australia	Nov. 20, 1951