

June 20, 1961

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2,988,843

DRAWING TABLE

Filed Dec. 9, 1958

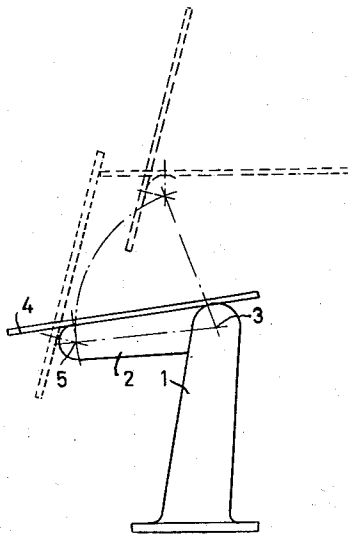


Fig. 1

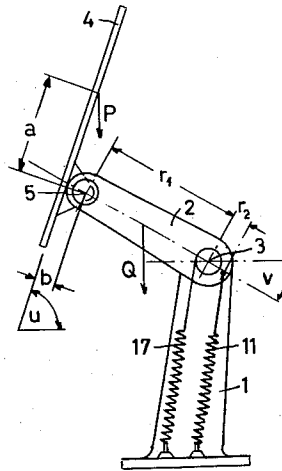


Fig. 4

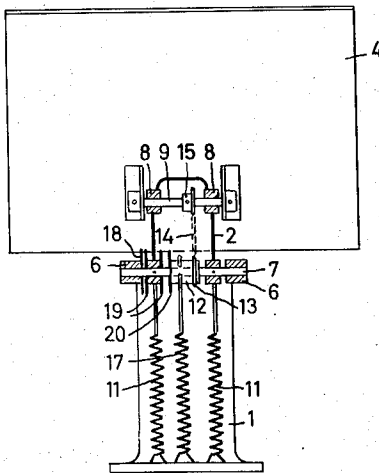


Fig. 3

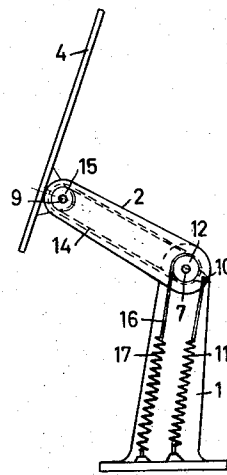


Fig. 2

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DRAWING TABLE

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Filed Dec. 9, 1958, Ser. No. 779,200

Claims priority, application Denmark Dec. 12, 1957

3 Claims. (Cl. 45—131)

This invention relates to a drawing table comprising a stationary support carrying an arm which is tiltable around a first axis and in turn carries a drawing board tiltable in relation to the arm around a second axis which is parallel to said first axis, and in which at least one balancing spring is inserted between the support and the arm.

Supposing that the said two axes are chosen with a suitable location, such a drawing table fulfills the principal requirements which ought to be fulfilled with regard to the adjustability of the drawing board. These principal requirements can be defined as follows:

(1) When the draftsman works in a standing position and with the drawing board vertical or approximately vertical, it must be possible to adjust the level of the board so that work may conveniently be performed at any part of the face of the drawing board. For a person of average height this will correspond to the drawing board being adjustable between a lower position, in which the upper edge of the board is situated at a level of about 150 cm. from the floor, and an upper position in which the lower edge of the board is at a level of about 120 cm. from the floor.

(2) When the draftsman works in a sitting position with the drawing board vertical or almost vertical, it must be possible to lower the bottom edge of the board close to the knees of the draftsman, which corresponds to the bottom edge of the board in this case being at a level of about 60 cm. from the floor.

(3) When the draftsman works in a standing position and with the drawing board horizontal or substantially horizontal, the level of the drawing board above the floor should be about 100 cm.

(4) When the draftsman works in a sitting position and with the drawing board horizontal or almost horizontal, the level of the drawing table above the floor should be about 80 cm.

(5) Within the extreme positions stated under points (1), (2), (3), and (4) the drawing board should be adjustable at will.

Furthermore, the following requirement should be fulfilled in order that the drawing table is easy and convenient to work with:

(6) In any position the drawing board with accessories, if any, such as a drawing machine and a drawing lamp, should be so balanced that the position of the drawing board can easily and quickly be varied at will.

The six requirements stated have only been partly fulfilled by the drawing tables hitherto known.

There are for example drawing tables in which the drawing board is adjustable as to level to the desired extent and fully balanced, but in this case the drawing board is constantly in a vertical or almost vertical position so that only the requirements stated under (1) and (2) are fulfilled.

Drawing tables are likewise known where the board constantly lies in a horizontal or almost horizontal position, i.e. corresponding to the above requirements (3) and (4).

Furthermore, drawing tables are known where the board is adjustable as regards level as well as inclination and is balanced by means of counter weights. In practice, these drawing tables are usually constructed with

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some kind of parallel suspension for the drawing board. It is, however, when these suspension systems are used, extremely difficult at the same time to attain in part a so comprehensive adjustability as stated under the above points (1)–(4), and in part to comply with the condition regarding full balancing stated under point (6). To this must be added that drawing tables of this type must necessarily occupy much space and furthermore become heavy. Therefore, generally, one reduces one's demands in order to obtain a drawing table of reasonable dimensions in spite of the fact that this must necessarily entail a poorer adjustability of the drawing board. The limitations with regard to the adjustability of the drawing board may for example cause that in his standing position the draftsman can only work on the upper half of the board with the latter in a vertical or almost vertical position, while work on the lower half of the board presupposes that the latter is swung down into a horizontal or almost horizontal position. The limitations of the adjustability of the drawing board may furthermore entail that the board cannot be placed horizontally at a level enabling the draftsman to work in a normal sitting working position.

The principal aim of the present invention is to provide a drawing table fulfilling all the requirements mentioned under the above points (1)–(6) without this entailing that the drawing table becomes heavy and takes up much space.

According to the invention this is attained by the said balancing spring being arranged for providing a balancing moment around said first axis corresponding to the sum of the moment of gravity of the arm around this axis and the product of the weight of the drawing board and the horizontal distance between the two axes, at least one further balancing spring being provided which is arranged so as to balance the drawing board around the said second axis and at the same time to exert between the support and the arm a balancing moment which as regards its order of magnitude and direction corresponds to the moment exerted by the same spring around the second axis. A special advantage of this construction is that the said balancing springs may be placed completely within the support of the drawing table so that they will present no hindrance during the use of the drawing table, and these balancing springs furthermore in practice make possible a fully sufficient balancing of the drawing board in any position without limiting the adjustability of the board.

In a preferred embodiment, which in particular is distinguished by a very simple design, the drawing table is characterized in that the drawing board is rigidly connected to a wheel which is concentric with and rotatable around the said second axis and which through a chain or similar transmission means is in connection with a similar wheel which is concentric with and rotatable around the said first axis and which is loaded by said further balancing spring or springs.

The invention will in the following be further explained with reference to the accompanying drawing in which

FIG. 1 illustrates a diagrammatical side elevation of an embodiment of the drawing table according to the invention with the four extreme positions of the drawing board indicated,

FIG. 2 a side elevation, partly in section, of the drawing table in an intermediate position,

FIG. 3 a rear view, partly in section, of the drawing table in the same position, and

FIG. 4 a diagrammatical side elevation of the drawing table with indication of the values necessary for determining the balancing forces.

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The drawing table shown in the drawing comprises a main support or base 1 arranged for being placed on a floor, and an arm 2 which is tiltable in relation to the base 1 around an axis 3. At its free end this arm 2 carries the drawing board 4 so that the latter can turn around an axis 5 parallel to the axis 3. The two axes 3 and 5 are horizontal, and, as appears from FIG. 1, the drawing board 4 may by being tilted around the axis 5 be adjusted with regard to inclination within two extreme positions, one of which is approximately horizontal, while the other is almost vertical. Further, a turning or tilting of the arm 2 around the axis 3 makes possible an adjustment as to level of the drawing board as appears direct from FIG. 1. From this figure it furthermore appears that in no position of the drawing board will the drawing table occupy more floor space than what corresponds to the area of the drawing board proper.

According to FIGS. 2 and 3, the support 1 at its upper end carries a pair of bearings 6 for a shaft 7 which in turn carries the arm 2. At the free end of the latter a pair of bearings 8 are provided, FIG. 3, for a shaft 9 which is rigidly connected to the drawing board 4. At a point 10, which lies on the side of the shaft 7 facing away from the drawing board 4, the arm 2 is connected with one end of one or more tension springs 11, the other ends of which are secured in the lower portion of the support 1.

The shaft 7 carries a rotatable sleeve 12, FIG. 3, with a fixed sprocket wheel 13 which through a chain is connected with a similar sprocket wheel 15 secured to the shaft 9, and to the sleeve 12 is furthermore secured one end of one or more tension springs 17, the other ends of which are secured in the lower portion of the support 1. With the arrangement shown in the drawing it is evident that the spring or springs 11 tend to turn or tilt the arm 2 clockwise around the axis 3, while the spring or springs 17 in part actuate the drawing board 4 for an anti-clockwise turning around the axis 5, in part actuate the arm 2 for a turning or tilting in the same (anti-clockwise) direction around the axis 3.

From FIG. 4 it appears that for the balancing of the drawing board 4 proper in relation to the arm 2 around the axis 5 a moment of the order of magnitude

$$M_1 = P(a \cos u - b \sin u)$$

is required, where P designates the weight of the drawing board with accessories, if any, e.g. a drawing machine, while a and b are the distances from the centre of gravity of the drawing table to the axis 5 measured in a plane parallel to the drawing board and in a direction at right angles thereto, respectively, and u is the angle which the drawing board forms with a horizontal plane.

If the arm 2 is supposed to have the weight Q and the centre of gravity of the arm is supposed to be located halfway between the two axes 3 and 5, there will for the balancing around the axis 3 be required a moment

$$M_{II} = -P(r_1 \cos v - (a \cos u - b \sin u)) - Q \frac{r_1}{2} \cos v$$

$$= -\left(P + \frac{Q}{2}\right)r_1 \cos v + P(a \cos u - b \sin u)$$

where P, a, b, u, and Q have the meaning stated above, while r_1 is the distance between the axes 3 and 5, and v is the angle which the arm 2 forms with a horizontal plane.

The balancing moment M_1 is provided by means of the spring or springs 17, the tensile force being transmitted to the drawing board through the transmission 12, 13, 14, 15, 9, so that this tensile force will at the same time exert a moment of the order of magnitude M_1 on the arm 2 in relation to the support 1. For the complete balancing of the drawing table is therefore required

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that the spring or springs 11 exert a moment of the order of magnitude

$$-\left(P + \frac{Q}{2}\right)r_1 \cos v$$

on the arm 2 which can be attained by the choice of a suitable characteristic for the spring or springs 11 and a suitable distance r_2 between the axis 3 and the point of attack for this spring or springs 11.

It appears from the above explanation that the variations in the moment around the axis 3 due to variations in the inclination of the drawing board without any variation in the position of the arm 2 are compensated for solely by means of the spring or springs 17 and therefore do not necessitate any variation of the force in the spring or springs 11.

FIG. 3 shows that for the locking of the drawing board 4 in any position a braking mechanism can be used which comprises a braking disc 18 secured to the support 1, two braking discs 19 secured to the arm 2, and a braking disc 20 fixed on the sleeve 12. By the braking discs being pressed together the locking of the drawing board is obtained after the adjustment has been made. The motion of the braking discs may in a known manner be performed manually or by the operation of a pedal.

For the sake of completeness it should be pointed out that the invention is not bound to the very embodiment shown in the drawing. Solely by way of example it should be mentioned that instead of the sprocket wheels 13 and 15 and the associated chain 14 other transmission means with a corresponding effect may be used, e.g. a pair of wire pulleys and an associated steel wire.

I claim:

1. In a drawing table comprising a supporting frame, an arm having opposed ends, one of said ends being connected to said frame so as to be pivotal thereto on a first horizontal axis, a drawing board connected to the other end of said arm and pivotal thereto on a second axis parallel to said first axis and spaced from the horizontal gravity center line of said drawing board, a first balancing spring connected between said frame and said arm and subjecting the latter to a moment around said first axis of a magnitude counterbalancing the sum of, firstly, the moment of gravity of said arm around said first axis and, secondly, the product of the weight of the drawing board and the horizontal distance between said first axis and said second axis, and a second balancing spring counterbalancing the moment of gravity of said drawing board around said second axis and further exerting upon said arm a supplementary balancing moment relative to said frame of a magnitude and direction similar to that of the balancing moment exerted by said second spring upon said drawing board.

2. In a drawing table comprising a supporting frame, a first horizontal shaft carried by said frame, an arm having opposing ends, one of said ends being pivotally mounted on said shaft, a second shaft carried by the other end of the arm and disposed parallel to said first shaft, a drawing board carried by said second shaft with its center of gravity spaced therefrom, a wheel concentric with and free to rotate on said second shaft, the drawing board being rigidly secured to said wheel, a wheel concentric with and free to rotate on said first shaft, an endless transmission element coupling said wheels, a first balancing spring connected between said frame and said arm and subjecting the latter to a moment around said first shaft of a magnitude counterbalancing the sum of, firstly, the moment of gravity of said arm around said first shaft and, secondly, the product of the weight of the drawing board and the horizontal distance between said first shaft and said second shaft, and a second balancing spring connected between said frame and said endless transmission element and subjecting said element to a force sufficient to counterbalance the moment of gravity of said drawing board around said second shaft.

3. A drawing table comprising in combination a hollow supporting pedestal, a first horizontal shaft rotatably mounted adjacent the top of said pedestal, an arm having opposing ends, one of said ends being pivotally mounted on said shaft, a second shaft carried by the other of said ends and disposed parallel to said first shaft, a drawing board carried by said second shaft with its center of gravity spaced therefrom, a wheel rigidly secured to said drawing board, said wheel being concentric with and free to rotate on said second shaft, a similar wheel concentric with and free to rotate on said first shaft, an endless transmission element connecting said wheels, a first balancing spring connected between said pedestal and said arm and subjecting the latter to a moment around said first shaft of a magnitude counterbalancing the sum of, firstly, the moment of gravity of said arm around said first shaft and, secondly, the product of the weight of the drawing board and the horizontal distance between said first shaft and said second shaft, and a second balancing

spring connected between said pedestal and said endless transmission element and subjecting said element to a force sufficient to counterbalance the moment of gravity of said drawing board around said second shaft, both of said balancing springs being accommodated within said hollow pedestal.

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