

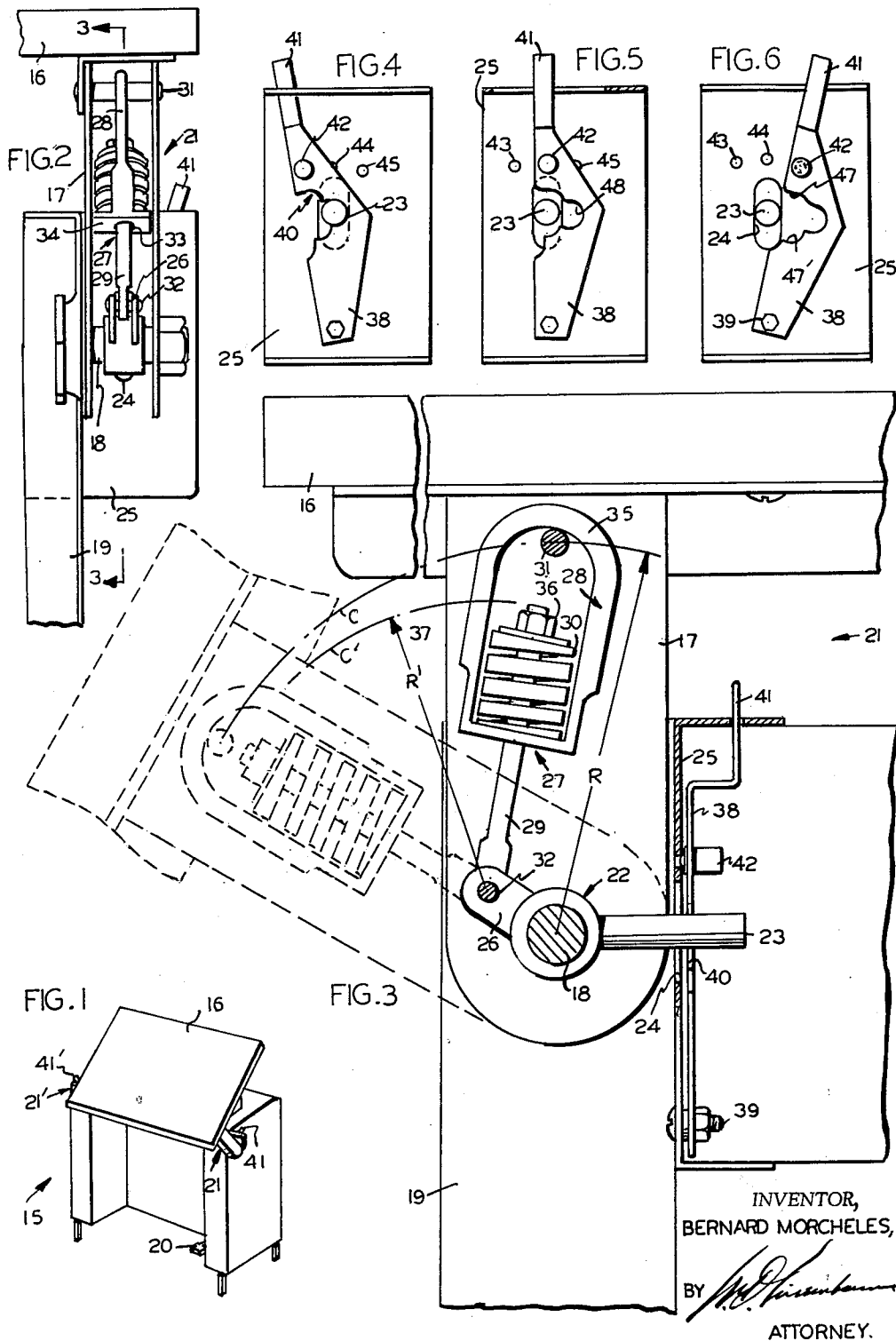
Feb. 26, 1963

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DRAWING BOARDS WITH COUNTER-BALANCING MECHANISM

Filed April 11, 1962



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3,078,613

DRAWING BOARDS WITH COUNTER-BALANCING MECHANISM

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Filed Apr. 11, 1962, Ser. No. 186,719
12 Claims. (Cl. 45—131)

The present invention relates to drafting desks and the like in which the drawing board is tiltably adjustable and more particularly to counter-balancing mechanism for the board while it is released to be swung to any desired position.

An object of this invention is to provide a novel and improved counter-balancing means to compensate for the weight of the drawing board so that its tilt may be changed with a minimum of effort and particularly when the board is near vertical position, it shall not over-balance and fall towards the draftsman.

Another object thereof is to provide a novel and improved counter-balancing means of the character mentioned, affording adjustment to account for the weight of any accessories, as for instance a drafting machine that may be attached to the board.

A further object of this invention is to provide a novel and improved counter-balancing means of the kind described, having the mentioned attributes and which is simple in construction, easy to adjust, reasonable in cost and efficient in carrying out the purposes for which it is designed.

Other objects and advantages will become apparent as this disclosure proceeds.

For the practice of this invention, one form it may assume is to have the drawing board with downwardly extending brackets, one at each forward corner. Near bottom end, each bracket is pivoted to a vertical, side post of the drafting desk or table frame; said posts being between the brackets. The pivotal connections have a common axis line, so the board is swingably mounted to allow change of its tilt. The board is associated with some suitable clutch means for example, adapted to releasably hold it in any set position and upon pressing down on a pedal or by a manipulation of some other form of control, the board is released for swinging.

As mentioned, this invention concerns itself with means to afford counter-balancing action while the board is free to be swung. I prefer to have one such means carried on each bracket and part on the related post.

Each counter-balancing mechanism comprises a bell-crank which is free to turn on the axis pin of the board's pivotal connection. One arm of said bell-crank extends rearwardly where means on the post determines the limits of its movement or holds it against movement; all this, being adjustable. The other arm of said bell-crank extends upwardly forwardly and is within the confines of the bracket. There are two members arranged in slidable relation to form an extensible and contractable unit. One end of this unit is swingably mounted near the upper end of the bracket and its other end is pivotally linked to the forwardly extending arm of the bell-crank. Spring means on said unit, biases it to contract and the spring stress is adjustable.

I will now give a detailed description of the particular embodiment illustrated and its mode of operation.

In the accompanying drawing forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

FIG. 1 is a perspective view of a drafting desk embodying the teachings of this invention. Part is in section.

FIG. 2 is an enlarged front view of the counter-balancing means which is at the right of the desk in FIG. 1.

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There is a similar means at the left side. Both such means are identical, except that one is right and the other left. In FIG. 1, said means are shown enclosed. In FIG. 2, the outer casing is omitted so the counter-balancing mechanism is exposed.

FIG. 3 is section taken at line 3—3 in FIG. 2, drawn to an enlarged scale. The mechanism is shown in full lines where the drawing board position is horizontal and in broken lines where the board is in a tilted position.

FIGS. 4-6, drawn to the scale of FIG. 2, are rear views of part of FIG. 2, shown differently set for adjustments which will be explained.

In the drawing, the numeral 15 designates generally a drafting desk whose separate drawing board 16 at each front corner, has a downwardly extending bracket as 17 which is pivotally mounted near its bottom end on the stud pin 18 extending from the desk frame post 19. Suitable mechanism well known in the art, but not shown because it is no part of this invention, includes some sort of clamping or clutch means to hold the board 16 releasably fixed in any set position, and for instance, by pressing down on a pedal 20, to release the board for swinging movement. The axis of swing of the board is provided by said pin 18 and its mate at the other side of the board; said pins being in alignment.

Since the counter-balancing means 21, 21' are of identical construction, except that one is right and the other left, a description of one and everything else said about it herein, will suffice for the other.

On the axis pin 18, there is the turnable bell-crank 22, having its arm 23 extending rearwardly through a vertically elongated opening 24 in a plate 25 which is fixed on the rear surface of the post 19. The other arm 26 of said bell-crank, extends forwardly upwardly. There is an extensible contractable unit denoted generally by the numeral 27 which extends along the bracket 17. It is made of two members 28 and 29 which are in slidable relation and spring-biased by 30 to contract. One end of this unit is swingably mounted on a pin 31 fixed to the bracket near its upper end, and the other end of said unit is pivotally linked by a pin 32 to the bell-crank arm 26.

In the particular construction illustrated, the member 29 is an eye-bolt which is through the hole 33 in a bridge piece 34 spanning and integral with the distal ends of an inverted U-piece 35, constituting the member 28. The compression coil spring 30 which is of chosen strength to do its required work, is on the member 29, between the legs of the U-piece 35 and resting on the bridge piece 34. At the end of the eye-bolt is the nut 36 resting against the washer 37 which in turn is against the end of said spring 30. It is evident that the initial stress in said spring can be regulated by turning said nut 36.

On the plate 25 is a plate arm 38, swingably mounted on an axis 39. This plate arm has a notch denoted generally by the numeral 40 which decreases in width so that in one position as shown in FIG. 4, the bell-crank arm 23 which may be a circular pin which is to be noted, passes through such notch, is held against movement, that is, the bell-crank 22 is held from turning. When said plate arm 38 is in the position shown in FIG. 5, the bell-crank is allowed a predetermined amount of turning movement and when said plate arm is in the position shown in FIG. 6, the bell-crank is allowed a greater amount of turn as determined by the slot 24 in the plate 25. In essence, the plate arm in its positions of FIGS. 4 and 5, closes portions of the slot 24, a different total amount at each such position. Said plate arm 38 has a finger piece 41 for its manipulation; the similar finger piece for the counter-balancing means 21', being shown at 41'. To hold the plate arm at its various positions, it may carry a spring-biased ball detent 42 for releasable

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co-operation in the respective holes 43, 44, 45 in the fixed plate 25.

We will assume that the plate arm 38 is in the position shown in FIG. 4, where the bell-crank 22 is held stationary. We will now note that the locus of movement of the pin 31 is along the circumference of the circle "C" whose radius is "R" and whose center is that of the axis offered by the pin 18, while the locus of movement of the free end of the eye-bolt 29 is along the circumference of the circle "C" whose radius is "R" and whose center is that of the axis offered by the pivotal connection at 32. It will be noted that as the board 16 is swung from horizontal position, said loci approach each other. This causes the spring 30 to lengthen and consequently the stress therein decreases. This occurs up to a certain point and as the board is then shifted further to approach vertical, said loci digress. This causes the spring 30 to shorten and its stress is thereby increased. The position of the axis 32 is so chosen that the minimum stress occurs in the spring 30 when the drawing board is at about a fifty degree angle from horizontal, which is the position at which the board is normally in balance. At this point, there may be no stress in the spring. It becomes evident that the mounting of the bell-crank 22 on the swing axis 18 of the board 16 is not mandatory, and when the use of the selector means shown in FIG. 4 is omitted, the pivotal connection of the member 29 may be at any suitable point on the fixed post 19, where the mentioned loci will have the relationship described.

The mechanism needs a factory-made adjustment of the nut 36 when the bell-crank 22 is held fixed by having its arm 23 completely restrained as in FIG. 4 to set the amount of initial compression of the spring 30, to account for the weight of the board 16, and also a consumer-made adjustment of the plate arm 38 to account for the weight of the accessories, as for instance a lamp or drafting machine (not shown) which have been attached by him to the board. This latter adjustment allows the bell-crank 22, varying degrees of free movement determined by the position of the plate arm 38 as shown in the FIGS. 5 and 6. It is evident that since there is a similar selector means including the plate arm manipulated by 41' as there is which is manipulated by movement of the finger-piece 41, many ranges of counter-balance can be attained by combinations of any one of the three conditions at 21 with any one of the conditions at 21', meaning the conditions respectively shown in the FIGS. 4-6.

The term "counter-balancing action" as herein employed, is the resistance offered by the counter-balancing means 21, 21' to the drawing board in its movement. When the drawing board 16 has no appurtenances, restraining action to its movement need only take place to avoid its falling down to horizontal and to avoid its flipping forward to hit the draftsman when the pedal 20 is pressed downward to release the clutch. In such instance the board may have a free movement for a determined angle intermediate horizontal and vertical and a less restrained movement elsewhere than would be required if the board carried a load. Such is offered by the setting shown in FIG. 6, where the bell-crank's arm 23 is afforded a measured free movement determined by the ends of the slot 24.

In instances where the board 16 carries what may be deemed a moderate load, control of board movement should occur during greater end portions of its swing. Hence, there will be a lesser angle where its free movement is to be permitted. This is afforded by the setting shown in FIG. 5 where the bell-crank's arm 23 is allowed a measured, comparatively smaller free swing movement as determined by the opposite notch edges 47, 47', the distance between such notch edges being less than the distance between the ends of the slot 24.

In installations where the board 16 is heavily laden, no movement should be allowed the said board, which

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is unrestrained. For such, we use the setting shown in FIG. 4, where the bell-crank's arm 23 is held stationary in the notch 48 in which said arm fits.

Adjustment of both counter-balancing means 21, 21' are made identical, but if desired where both means are employed, their settings may be made different, to change the maximum restraint to be offered board movement, as load conditions or the desire of the user, may dictate.

The manufacturer will choose the length of the slot 24 and the lesser distance between the notch edges 47, 47', to accomplish the respective extents of free swing movement desired, that is, to act as suitable stops.

This invention is capable of numerous forms and various applications without departing from the essential features herein set forth. It is therefore intended and desired that the embodiment shown herein shall be deemed merely illustrative and not restrictive and that the patent shall cover all patentable novelty herein disclosed; reference being had to the following claims rather than to the specific description herein to indicate the scope of this invention.

I claim:

1. In a counter-balanced drawing board construction of the character described, a frame, a drawing board, and a counter-balancing unit comprising a bracket extending downwardly from said board; said bracket, near its bottom end, being swingably mounted on the frame for movement about a horizontal axis which is nearer to the front edge of said board than to the rear edge thereof, an extensible and contractable structure including a spring biasing said structure to contract, a first pin carried on said frame, in front of, relatively near and in fixed relation to said axis, and a second pin carried by said bracket above said axis; the ends of said extensible and contractable structure being pivotally linked to said pins respectively; the respective locations of said pins being such that the stress in the spring is decreased as the board is swung from a horizontal position to one where the said board is at a predetermined slope, and increased when the slope of said board is greater than such predetermined slope.

2. A counter-balanced drawing board construction as defined in claim 1, including means on said extensible and contractable structure, for adjusting the stress in said spring.

3. A counter-balanced drawing board construction as defined in claim 1, including a member swingably mounted on the frame for movement about a horizontal axis; the first pin being carried on said member, and a stop means on the frame allowing said member a predetermined scope of swinging movement.

4. A counter-balanced drawing board construction as defined in claim 1, including a member swingably mounted on the frame for movement about a horizontal axis; the first pin being carried on said member, and stop means movably mounted on the frame; said stop means at one position, holding said member stationary, and at another position, allowing said member a predetermined scope of swinging movement.

5. A counter-balanced drawing board construction as defined in claim 1, including a bell-crank swingably mounted on the frame for movement about a horizontal axis; the first pin being carried on one arm of said bell-crank and a stop means on the frame allowing said bell-crank a predetermined scope of swinging movement; the other arm of said bell-crank, contacting said stop means at the limits of travel of said bell-crank.

6. A counter-balanced drawing board construction as defined in claim 1, including a bell-crank swingably mounted on the frame for movement about a horizontal axis; the first pin being carried on one arm of said bell-crank and stop means movably mounted on the frame; said stop means at one position, holding the other arm of the bell-crank stationary and at another position, allowing said bell-crank a predetermined scope of swinging

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movement in which instance the other arm of said bell-crank contacts said stop means at the limits of travel of said bell-crank, respectively.

7. A counter-balanced drawing board construction as defined in claim 1, including a second similarly composed counter-balancing unit, similarly associated with the drawing board; the axes of swing of the brackets of said units, being colinear; each of said units including a member swingably mounted on the frame for movement about a horizontal axis; the first pin of each said unit being carried on said members respectively, and stop means for each of said units, movably mounted on the frame; each said stop means at one position, respectively holding said member which is associated therewith, stationary, and at another position respectively, each of said members are allowed a predetermined scope of movement respectively.

8. A counterbalanced drawing board construction as defined in claim 7, wherein each of said stop means is independently movable.

9. A counter-balanced drawing board construction as defined in claim 7, including means on each of the extensible, contractable structures of said units, for independently adjusting the stress in the respective springs.

10. A counter-balanced drawing board construction as defined in claim 1, including a second similarly composed counter-balancing unit, similarly associated with the drawing board; the axes of swing of the brackets of said units, being colinear; each of said units including a

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bell-crank swingably mounted on the frame for movement about a horizontal axis; the first pin of each said units being carried on one arm of said bell-cranks respectively, and stop means for each of said units, movably mounted on the frame; each said stop means at one position respectively, holding the other arms of said bell-cranks respectively, stationary, and at another position respectively, allowing said bell-cranks a predetermined scope of swinging movement respectively, in which instances at said second positions respectively, said other arms of said bell-cranks respectively, contact the stop means related therewith, at the limits of travel of said bell-cranks respectively.

11. A counter-balanced drawing board construction as defined in claim 10, wherein each of said stop means is independently movable.

12. A counter-balanced drawing board construction as defined in claim 10, including means on each of the extensible, contractable structures of said units, for independently adjusting the stress in the respective springs.

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