July 14, 1964 H. N. GROW ETAL 3,140,559

DRAFTING TABLE

Filed July 31, 1961 6 Sheets-Sheet 1

Fig. 1.

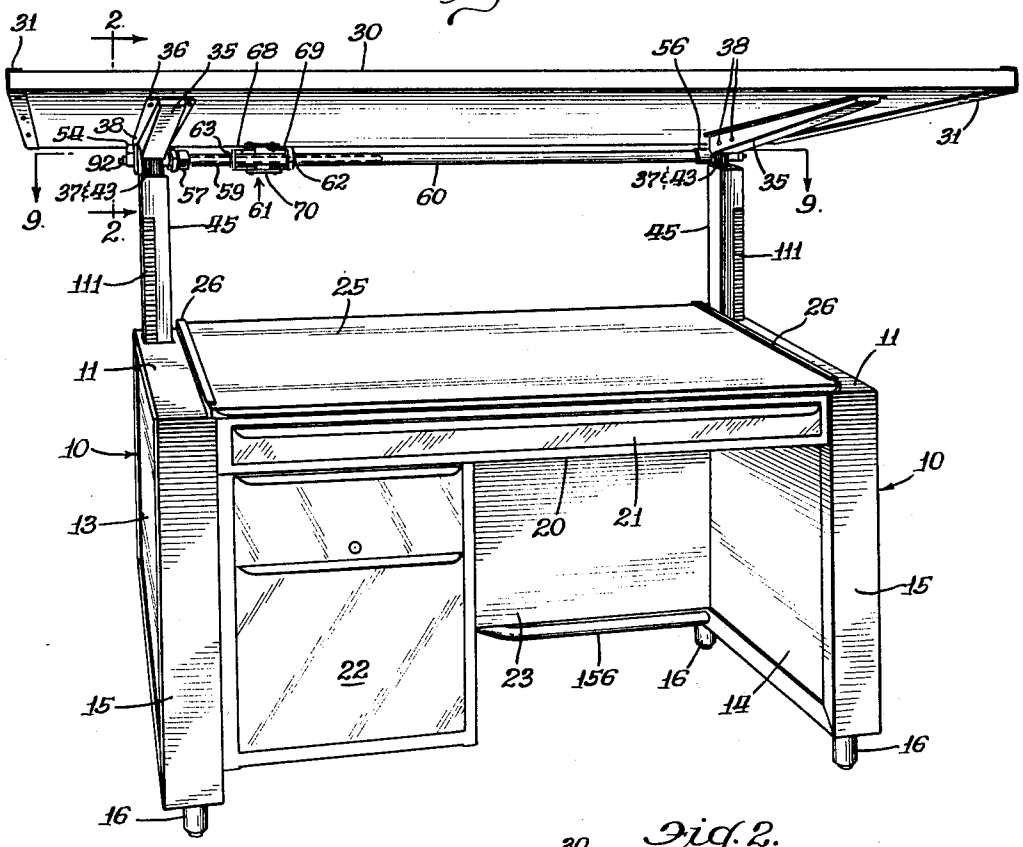
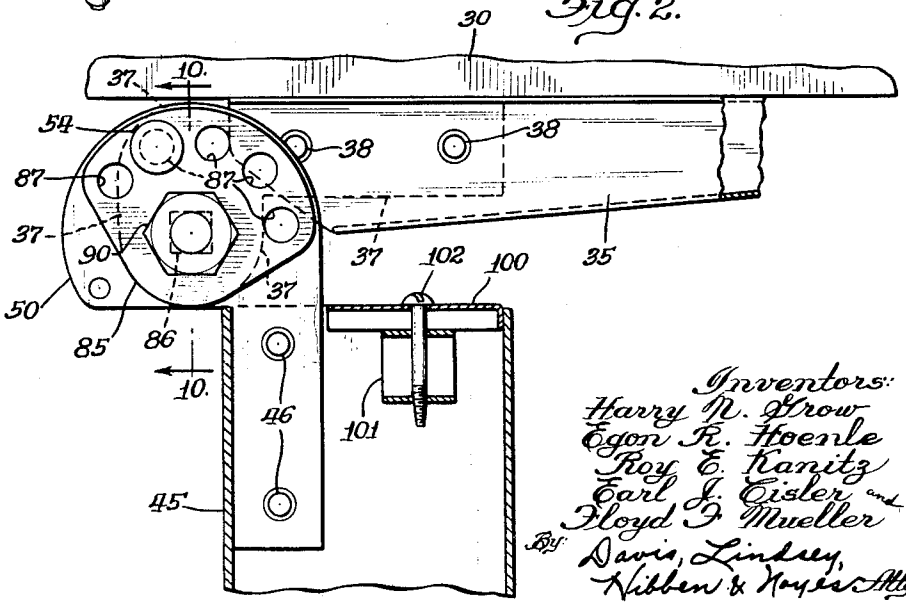


Fig. 2.



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DRAFTING TABLE

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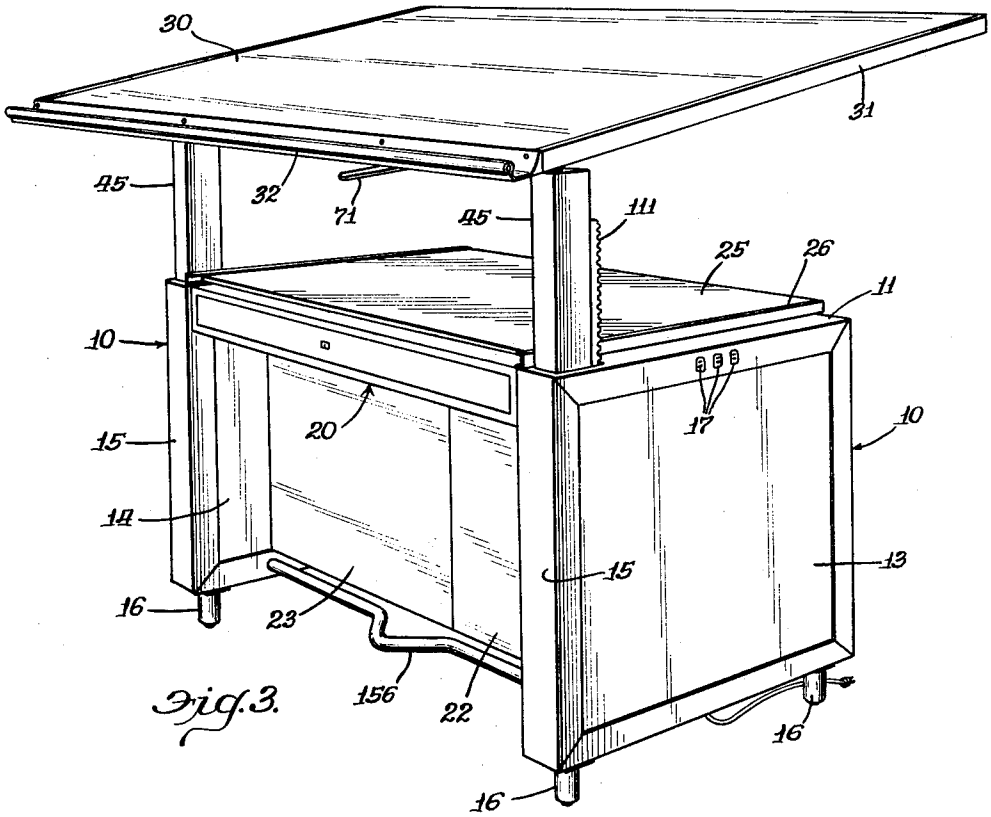


Fig. 3.

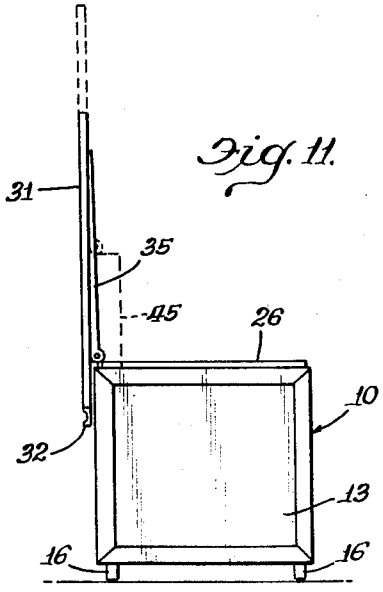
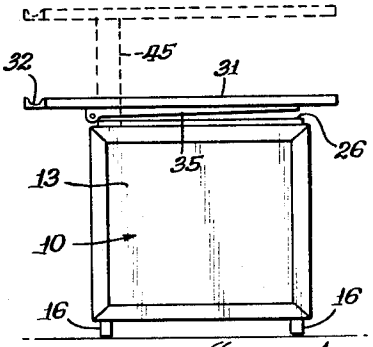


Fig. 11.

Fig. 12.



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DRAFTING TABLE

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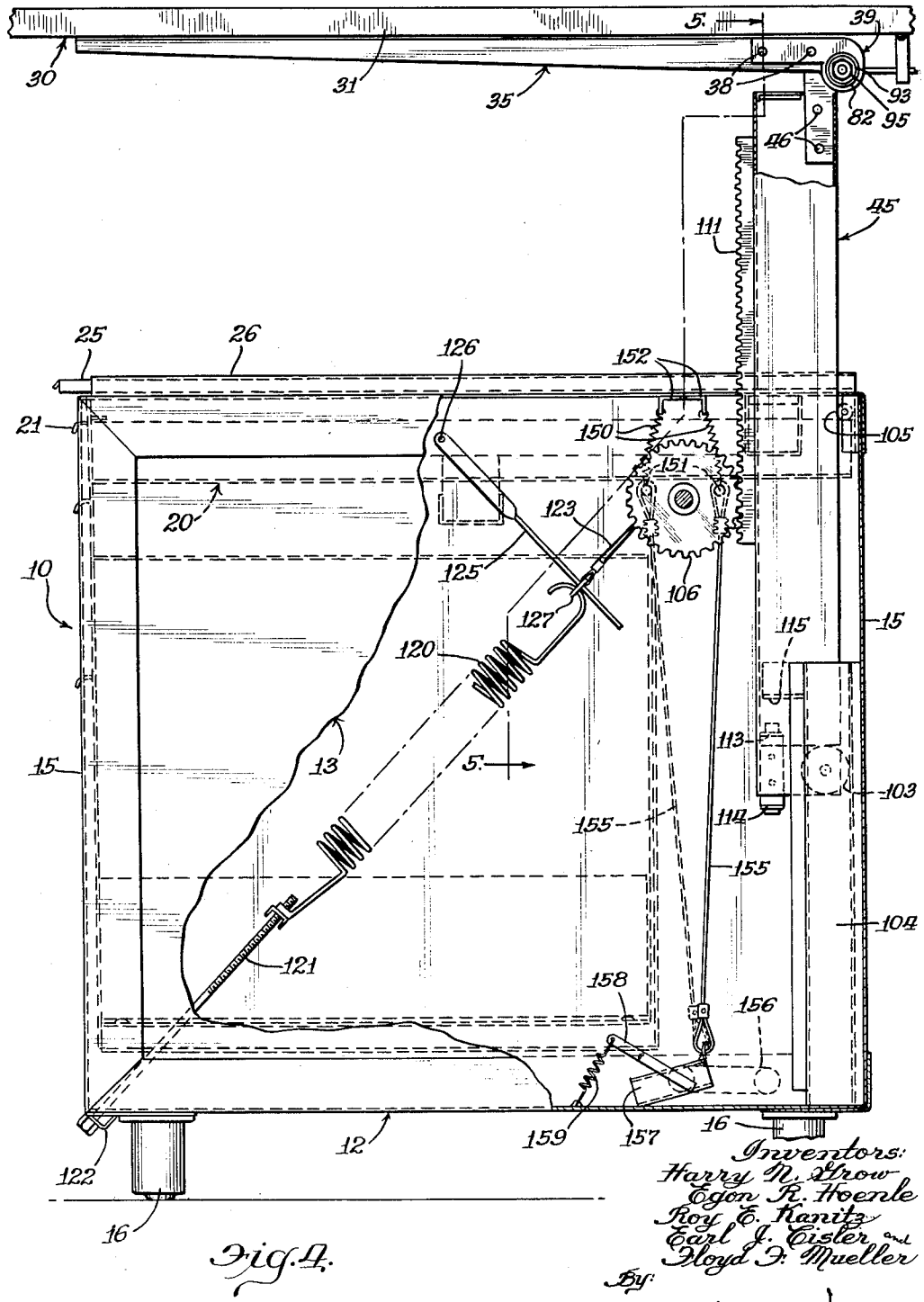


Fig. 4.

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DRAFTING TABLE

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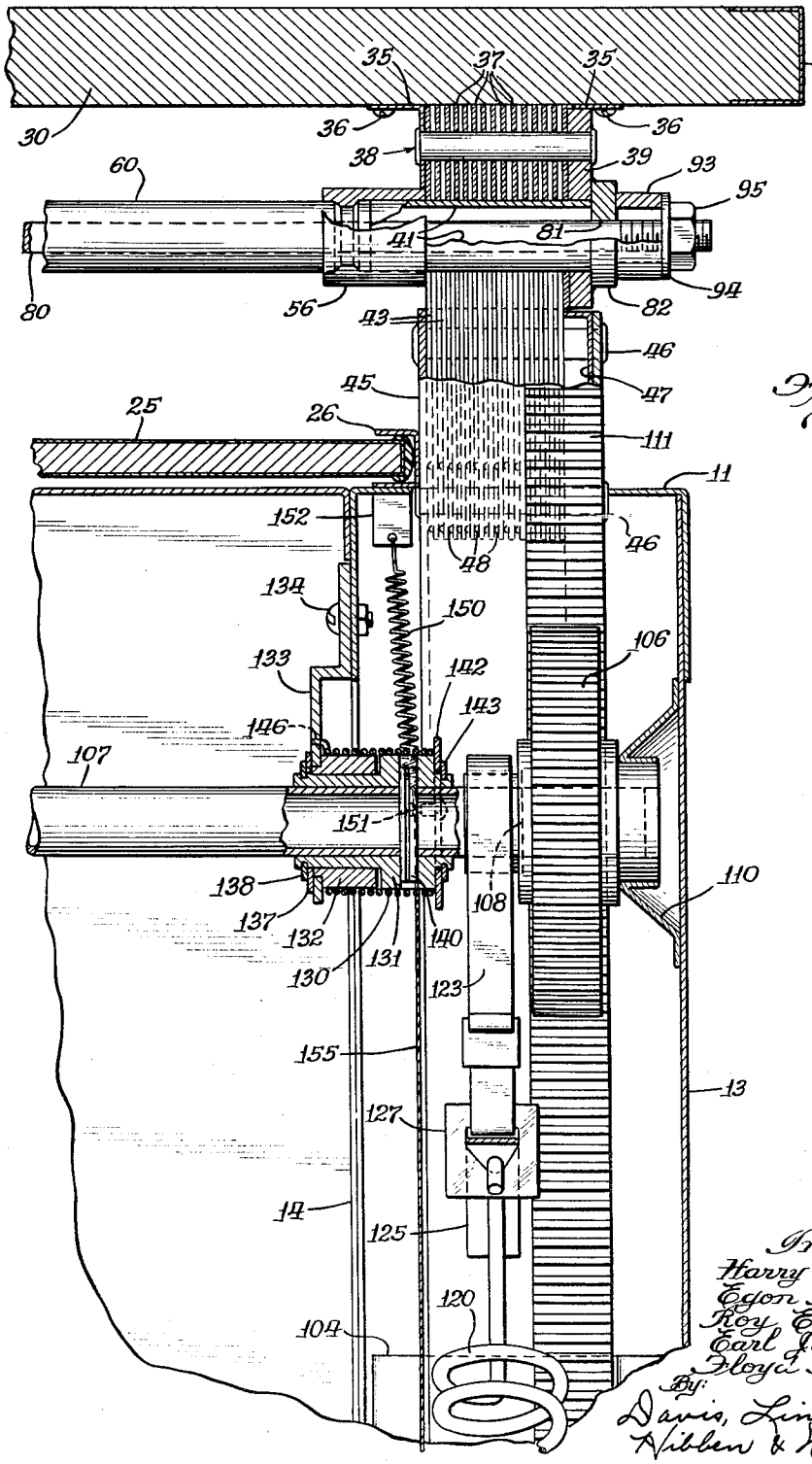


Fig. 5.

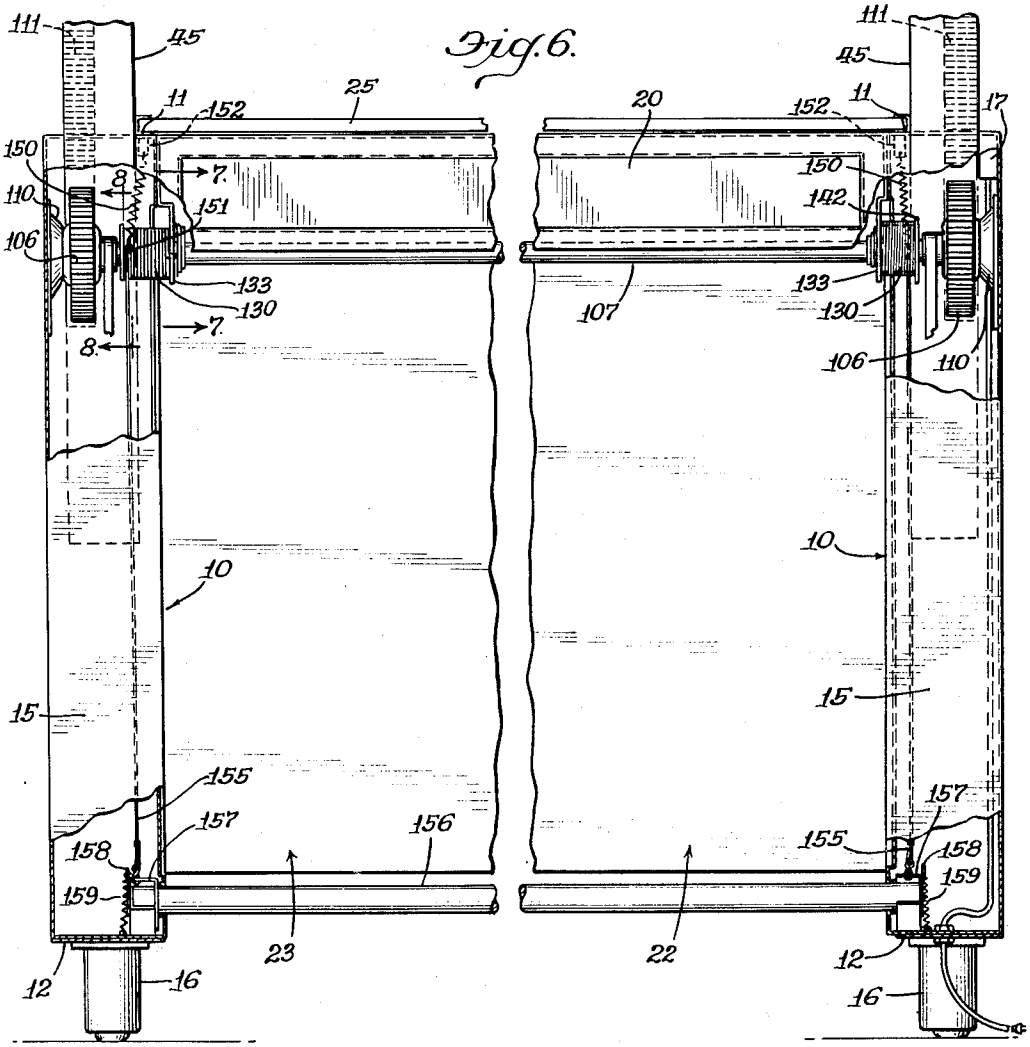
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DRAFTING TABLE

Filed July 31, 1961 6 Sheets-Sheet 5

Fig. 6.



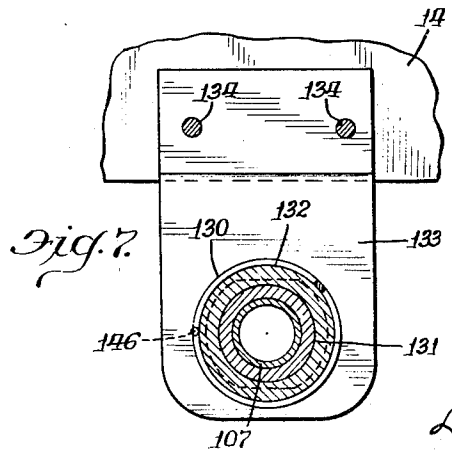


Fig. 7.

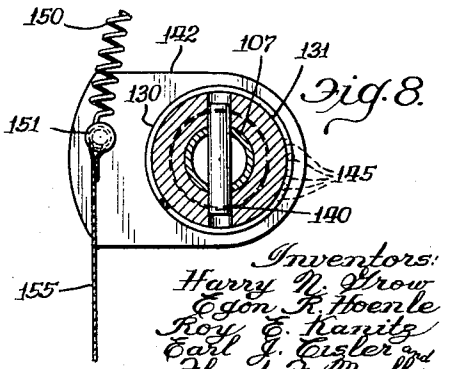


Fig. 8.

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DRAFTING TABLE

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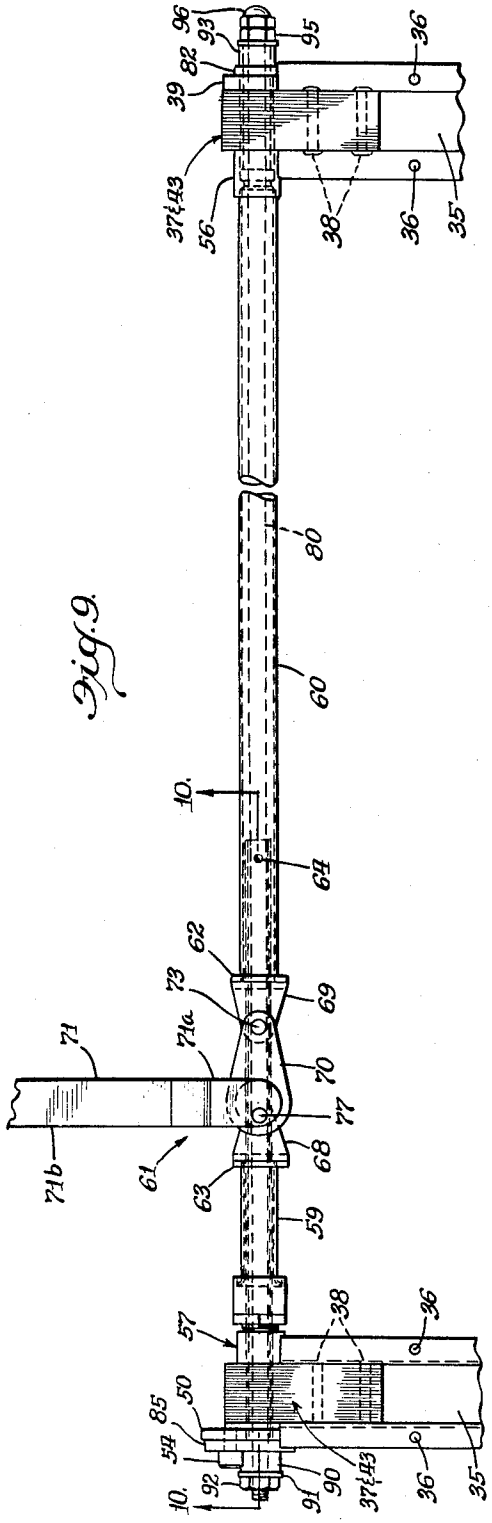


Fig. 9.

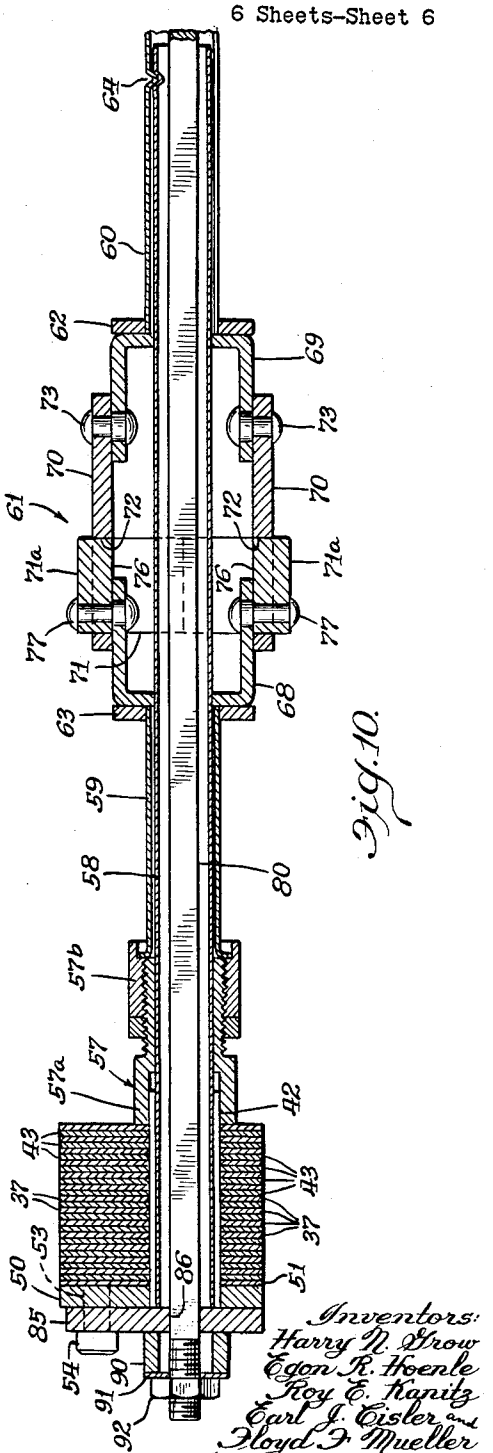


Fig. 10.

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United States Patent Office 3,140,559 Patented July 14, 1964

3,140,559

DRAFTING TABLE

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28 Claims. (Cl. 45—131)

This invention relates generally to drafting tables, and more particularly to a drafting table having an adjustable drafting board.

The primary object of the present invention is to provide a novel drafting table having a drafting board which may be easily raised, lowered and tilted.

It is a further object to provide a drafting table having a novel counterbalancing arrangement permitting the drafting board to be easily manually elevated or lowered.

Another object is to provide a novel drafting table construction having means for effectively holding the drafting board in any desired position of vertical adjustment.

Still another object is to provide a novel drafting table assembly wherein the drafting board is tiltable and is provided with means for holding the drafting board in any desired tilted position.

A still further object is to provide a novel drafting table having a tiltable drafting board and means for counterbalancing the tilting movement.

Still another object is to provide a novel drafting table having a counterbalanced tiltable drafting board and means for adjusting the counterbalancing to compensate for loading of the drafting board with such objects as lamps or drafting machines.

Further objects and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the drawings, in which:

FIGURE 1 is a perspective view of a drafting table embodying the invention;

FIGURE 2 is an enlarged partial view of the structure shown in FIGURE 1 and taken substantially along the line 2—2 of FIGURE 1;

FIGURE 3 is a perspective view similar to FIGURE 1 but taken from the other side of the drafting table;

FIGURE 4 is an enlarged end elevational view of the right end of the structure as shown in FIGURE 1 and the left end as shown in FIGURE 3;

FIGURE 5 is an enlarged sectional view of a portion of the structure shown in FIGURE 4 and taken substantially along the line 5—5 of FIGURE 4;

FIGURE 6 is an enlarged elevational view partially in section of the rear side of the structure as shown in FIGURE 1 and the left side as shown in FIGURE 3;

FIGURE 7 is an enlarged fragmentary sectional view taken along the line 7—7 of FIGURE 6;

FIGURE 8 is an enlarged fragmentary sectional view taken along the line 8—8 of FIGURE 6;

FIGURE 9 is an enlarged fragmentary sectional view taken subsbtantially along the line 9—9 of FIGURE 1;

FIGURE 10 is an enlarged fragmentary sectional view taken substantially along the lines 10—10 of FIGURES 2 and 9;

FIGURE 11 is a somewhat reduced end elevational view of the structure shown in FIGURES 1 and 3 with the drafting board in an upright position; and

FIGURE 12 is a view similar to FIGURE 11, but with the drafting board in the completely lowered and horizontal position.

Generally, a drafting table embodying the invention comprises a supporting structure, which may be in the form of a table, and a drafting board. The drafting board is mounted over the table and is vertically adjustable. For this purpose, the drafting board is mounted on the upper ends of a pair of columns which are carried for vertical movement in end portions of the table. Cooperating with the columns and mounted in the end portions of the table are adjustable counterbalancing means so that the entire weight of the drafting board and columns may be effectively counterbalanced to permit easy raising and lowering of the drafting board by raising and lowering the columns relative to the table. The columns, and consequently the drafting board, may be locked in any position to which they are adjusted by brake means, and the latter may be released by pressure on a brake pedal to permit adjustment.

The drafting board is pivotally mounted on the columns so that it may be readily adjusted to any angle convenient for the draftsman, and the pivotal mounting includes counterbalancing means to permit easy adjustment of the angle of the board. The counterbalancing means is adjustable to compensate for the weight of various objects which may be carried on the drafting board, such as a drafting machine or lamp. The pivotal mounting further includes locking means so that the drafting board may be firmly locked in any position of angular adjustment.

In the embodiment shown in the drawings (see FIGURES 1 and 3), the table comprises a pair of boxlike end portions or pedestals **10**. Each pedestal **10** comprises a top wall **11**, a bottom wall **12**, an outer wall **13**, an inner wall **14** and side walls **15**. Legs **16** may be secured to the bottom walls **12**. The upper portion of one pedestal **10** may be provided with an electrical outlet **17** as a convenient connection for any electrical apparatus to be used in conjunction with the drafting table. A relatively wide upper drawer assembly **20** having a drawer **21** slidably carried therein connects the upper ends of the inner walls **14** of the pedestals **10**. A side drawer assembly **22** may be provided, secured between the underside of supports for the upper drawer **20** and the inner wall **14** of one pedestal **10**. The space between the side drawer assembly **22** and the pedestal at the opposite end of the table is open at one side of the table to provide leg room for a person sitting at the table, and a panel **23** is provided on the opposite side of the table. The table further includes a table top **25** which is slidably carried in a pair of U-shaped channel members **26** secured to the upper walls **11** of the pedestals **10** and to upper drawer assembly **20**, to permit the table top **25** to be moved outwardly from either side of the table.

The drafting or drawing board, shown at **30**, is rectangularly shaped and is provided with a molding **31** at each end thereof. The side of the drafting board **30** occupied by the draftsman when using the board is preferably provided with a trough or rack **32** for holding pencils and various drafting instruments. The drafting board **30** is mounted on a pair of support channels **35** which are preferably tapered as shown in FIGURES 1, 2 and 9 and which are secured to the underside of the drafting board **30** as by screws **36**.

The drafting board **30** is mounted for pivotal ad-

justment so that the draftsman may place the board at any angle convenient to him for the particular work he may be doing. In fact, the board may be adjusted at any angle between a horizontal position, as shown in FIGURE 12, and a vertical position, as shown in FIGURE 11. The mounting for the board also includes means for locking the board in any adjusted position to rigidly hold the board in such position. The board is preferably pivoted on a horizontal axis parallel to and adjacent the side occupied by the draftsman when using the board, that is, the side at which the trough **32** is located. Since the major portion of the weight of the board is located at the opposite side of the pivotal axis, counterbalancing means is provided to permit the draftsman to adjust the board with a minimum of effort. A draftsman often places objects of substantial weight, such as a drafting machine or lamp, on his board and for that reason the counterbalancing means is adjustable to compensate for the additional weight.

To accomplish the foregoing, a plurality of brake plates or leaves **37** are mounted within each of the support channels **35** as shown in FIGURES 2 and 5. Each of the brake plates **37** is somewhat L-shaped and has a leg or shank portion provided with a pair of spaced holes through which extend tubular rivets **38** secured in the side portions of the support channel **35**. The other leg of each brake plate **37** is circular and depends from the drafting board **30** at the end of the support channel **35**. At one side of the support channel **35**, as shown in FIGURE 5, an anchor plate **39** is mounted on the tubular rivets **38**, the anchor plate **39** having a shape substantially the same as the brake plates **37**.

The depending leg of each brake plate **37** and the anchor plate **39** have holes therethrough all of which are aligned on the same axis to receive a relatively short tubular shaft **41**. A short tubular shaft **42** axially aligned with the shaft **41** is mounted in the holes in the brake plates **37** at the other end of the table as shown in FIGURE 10.

Two more sets of brake plates **43** are also mounted on the respective tubular shafts **41** and **42**, the brake plates **43** being identical to the brake plates **37**. The shank portions of the brake plates **43** are positioned to extend downwardly into the upper ends of hollow columns **45** as shown in FIGURES 2 and 5, and are secured between opposite walls thereof by tubular rivets **46**. Because the plates **43** of the column **45** shown in FIGURE 5 do not occupy the entire space between the opposite walls carrying the rivets **46**, a spacer member **47** is provided to fill out the space. The plates **43** are positioned in an alternate arrangement with the disks **37** as is shown in FIGURES 5 and 10. The shank portions of the brake plates **37** and **43** are provided with dimples **48** to compensate for the lack of the alternate disks in the area of the shank portions, the dimples **48** on each plate being offset from those on the two adjacent plates so that the dimples on the one plate will rest against a flat portion of the adjacent plate. On the end of the table shown in FIGURES 2 and 10, instead of a spacer **47**, an anchor plate **50** is provided to fill out the space in the column **45** at that end, the anchor plate being mounted on the tubular rivets **46** and thus secured to the column. Between the anchor plate **50** and the outermost disk **43** as shown in FIGURE 10 is a washer **51**. The anchor plate **50** has a hole therethrough for the tubular shaft **42** and a further threaded hole **53** for a cap screw **54**.

From the foregoing it may be evident that the drafting board **30** is pivotally connected to the columns **45** for pivotal movement about the axis of the tubular shafts **41** and **42**. To hold or lock the drafting board **30** in any tilted position relative to the columns **45**, it should be noted that, since the anchor plate **39** is secured to the drafting board **30** outwardly of the brake plates **37** and **43**, and since the other anchor plate **50** is secured to one of the columns **45** outwardly of the associated brake plates **37** and **43**, an outwardly directed force applied to the innermost plates **37** and **43** at each end of the board will cause the brake plates **37** and **43** at the respective ends to be pressed together against the anchor plates **39** and **50** in frictional contact with each other to hold the drawing board **30** in any tilted position.

The anchor plates **39** and **50** are held against outward movement relative to each other by a bar **80** extending through the brake plates and anchor plates at both of its ends. At the end shown in FIGURE 10, the anchor plate **50** abuts against an adjusting plate **85** provided with a hexagonal hub **90**, and a washer **91** and nut **92** threaded on the end of bar **80** to hold the anchor plate **50** against outward movement. At the end shown in FIGURE 5, the anchor plate **39** is provided with a hub **82** and abuts against a sleeve **93**, the latter being held against outward movement by a washer **94** and a nut **95** threaded on the other end of the bar **80**. Cap nuts, such as the nut **96** shown in FIGURE 9, may be applied to the ends of the bar **80** to cover the threads thereon.

The force for pressing the brake plates **37** and **43** into frictional contact is applied to a pressure pad **56** at the end shown in FIGURE 5 and a pressure pad **57** at the end shown in FIGURE 10. Interposed between the pressure pads **56** and **57** are three tubular shafts **58**, **59** and **60** and a toggle assembly **61**. The pressure pad **56** is tubular and extends over and is slidable on the inwardly projecting end of the tubular shaft **41** as shown in FIGURE 5. The pressure pad **56** also extends beyond the side wall of the support channel **35** and engages the innermost brake plate **37**. The pressure pad **56** is provided with an internal shoulder and one end of the shaft **60** extends into the pressure pad **56** in engagement with the annular shoulder so that force applied to the shaft **60** longitudinally thereof will be applied through the pressure pad **56** to the brake plates **37** and **43**. The tubular shaft **58** is positioned with one end thereof projecting into shaft **60**, and with the other end thereof projecting through the pressure pad **57** and the tubular shaft **42** to the anchor plate **50**. The telescoping portion of shaft **60** is staked as at **64** to prevent relative endwise movement of the shaft **58**.

The pressure pad **57** is adjustable in length and comprises two members **57***a* and **57***b* threaded together to permit the effective length of the pressure pad **57** to be varied. One end of the adjustable pressure pad **57** engages the innermost brake plate **37** on the end of the drafting board opposite from the pressure pad **56**. The other end of the adjustable pressure pad **57** is formed with an annular recess to receive a flange on the end of tubular shaft **59**. Thus, any force applied to shaft **59** longitudinally thereof will be transmitted to and through the adjustable pressure pad **57** to the brake plates **37** and **43**. The shaft **59** encloses the shaft **58**.

The toggle assembly **61** is carried by the shaft **58** between the ends of the respective shafts **60** and **59** and constitutes manually operable means for exerting force on the shafts **59** and **60** to apply pressure on the brake plates at both ends of the board. The toggle assembly **61** comprises two toggle brackets **68** and **69**, a pair of toggle links **70**, and a toggle handle assembly **71**, as shown in FIGURES 9 and 10. Each of the toggle brackets **68** and **69** in U-shaped and has a hole through the base of the U for sliding movement on the shaft **58**. The bases of the brackets **68** and **69** abut against the ends of shafts **60** and **59** and have collars **62** and **63** fixed thereto for locating the ends of the shafts **60** and **59**. The arms of the toggle brackets **68** and **69** extend toward each other. Each of the toggle links **70** is formed at one end thereof with a widened portion having a hole **72** therethrough. The other or narrowed end of each of the toggle links **70** is pivotally connected to one of the extending arms of the toggle bracket **69** by pins **73**. The toggle handle **71** comprises a pair of bars in face-to-face relation to provide a handle portion **71***b* and offset end portions **71***a* extending

from the handle portion 71*b*. The handle portions 71*b* are secured together as by welding and the offset portions 71*a* are spaced from each other to fit over the outer faces of the toggle links 70. The inner sides of the offset portions 71*a* are provided with circular portions 76 of a diameter to fit within the holes 72 in the toggle links 70. The circular portions 76 are positioned in the holes 72 of the toggle links 70 and are pivotally connected to the arms of the toggle bracket 68 by pins 77 positioned eccentrically of the circular portions 76. Thus, on swinging movement of the handle 71*b*, the brackets 68 and 69 are caused to move away from each other to apply pressure on the brake plates at both ends or toward each other to release such pressure.

The adjustable pressure pad 57 is preferably adjusted so that, when the toggle handle 71 is positioned perpendicular to the axis of the shafts 58, 59 and 60, the toggle brackets 68 and 69 are held to a maximum spacing therebetween by the above described eccentric arrangement, and the pressure pads 56 and 57 apply sufficient pressure to the brake plates 37 and 43 at each end of the drafting board 30 to hold the drafting board 30 in any tilted position thereof. Thus, it is evident that, to tilt the drafting board 30 relative to the columns 45, the toggle handle 71 may be pivoted in either direction toward the axis of the shafts 58, 59 and 60, and then the drafting board 30 may be manually tilted to the desired tilted position, and by returning the toggle handle 71 to the position shown in FIGURE 9, the board is locked in such tilted position.

The counterbalancing of the drafting board 30 is provided by the bar 80 which constitutes a torsion bar. The torsion bar 80 is substantially square or rectangular in cross section throughout the major portion of its length, and one end of the bar extends through a correspondingly shaped opening 81 in the hub 82 of the anchor plate 39. The torsion bar 80 at its other end extends through the adjusting plate 85, as heretofore mentioned, and the adjusting plate 85 has an opening 86 therethrough of the same shape as the bar 80 so that the bar is nonrotatable therein, and the adjusting plate 86 is secured to the anchor plate 50 by a screw 54 which extends through any one of a series of holes 87 in the adjusting plate 85 into a threaded hole 53 of the anchor plate 50. As illustrated in FIGURE 2, the holes 87 are disposed near the periphery thereof on the arc of a circle having its center at the center of the hole 86. The anchor plate 39, as previously described, is secured to the drafting board 30, and the anchor plate 50 is secured to one of the columns 45. It is therefore apparent that any force tending to pivot the drafting board downwardly is opposed by the torsional force produced in the torsion bar 80. If the drafting board 30 is raised to a position such as shown in FIGURE 11, and if the cap screw 54 is then inserted through the hole 87 in the torsion bar adjusting plate 85 which is at the extreme clockwise position thereof as shown in FIGURE 2, it may be seen that the counterbalancing force of the torsion bar 80 will be a maximum. It may further be seen that for any one position of the torsion bar adjustment plate 85, the counterbalancing force produced by the torsion bar 80 is a maximum for the lowered position of the drafting board 30 such as shown in FIGURE 12 and is a minimum for the upright position of the drafting board 30 such as shown in FIGURE 11. The adjustment of the torsion bar 80 by the torsion bar adjusting plate 85 provides for a matching of the counterbalancing force of the torsion bar 80 to the load upon the drafting board 30. For example, should some relatively heavy object such as a lamp or a drafting machine be placed upon the drafting board 30, the counterbalancing force of the torsion bar 80 may be increased by moving the adjusting plate 85 in a counterclockwise direction as viewed in FIGURE 2 so that the cap screw 54 is positioned through one of the holes 87 in a more clockwise direction as viewed in FIGURE 2. The adjusting plate 85 may be readily turned since its hub 90 is hexagonal.

As heretofore mentioned, the drafting board 30 may be raised and lowered to suit the convenience of the draftsman. To this end, the columns 45 are substantially rectangular in cross section and are carried for upward and downward movement through suitable openings in the top walls 11 of the pedestals 10. As shown in FIGURE 2, the upper end of each column 45 is partially closed by a plate 100 which is secured as by a screw 102 to a bracket 101 extending between opposite walls of the column 45.

The lower end of each column 45 carries a roller 103 (see FIGURE 4) which projects outwardly therefrom to engage a guide 104. Each guide 104 is secured within the lower portion and at one side of each pedestal 10. Each column 45 is further guided by a small roller 105 and a pinion gear 106. Each small roller 105 is carried in a U-shaped support bracket which is secured to one side wall 15 of the pedestal at the upper end thereof as shown in FIGURE 4 and engages one edge of the column. The pinion gears 106 are carried at the respective ends of a tubular shaft 107. The pinion gears 106 are each keyed to the tubular shaft 107 by pins 108 inserted through holes in hub portions of the pinion gears 106, as shown in FIGURE 5. The pinion gears 106 and the tubular shaft 107 are carried in the pedestals 10 by a pair of bearing plates 110. Each bearing plate 110 is secured to the inner side of one of the end walls 13 of the pedestals 10 as by welding. The pinion gears 106 mesh with a pair of gear racks 111 which are secured to the edge of the columns 45 opposite from that engaged by the small rollers 105. Thus, it may be seen that the columns 45 on being elevated and lowered will move between the pinion gears 106 on one edge and the small rollers 105 on the opposite edge, the lower ends of the columns being guided by the roller 103 and the roller guide 104.

The extreme elevated and lowered positions of the columns 45 are respectively determined by an upper stop 113 and a lower stop 114 carried by each column 45 substantially at the lower end thereof as may be seen in FIGURE 4. In the extreme elevated position of the columns 45, the upper stop 113 engages a stop bracket 115 carried at the upper end of the roller guide 104. In the extreme lowered position of the columns 45, the lower stop 114 engages the bottom wall 12 of the pedestal 10. The stops 113 and 114 include resilient members to cushion shock at the extreme elevated and lowered positions thereof.

The load of the drafting board 30 and the columns 45 is effectively counterbalanced by a pair of coiled springs 120. Each coiled spring 120 is located within one of the pedestals 10 and at one end thereof is connected to an adjusting screw 121. Each adjusting screw 121 is anchored by a bracket 122 through the bottom wall 12 of one of the pedestals 10, as shown in FIGURE 4. The other end of each coiled spring 120 is connected to one end of a strap 123. Each strap 123 is anchored to and wound about the inwardly extending hub portion of the pinion gear 106. From FIGURE 4 it will be apparent that, if the drafting board 30 is moved upwardly, the pinion gears 106 will be caused to rotate in a counterclockwise direction as viewed in FIGURE 4 and the straps 123 will be unwound and the tension in the spring 120 decreased. Conversely, it is clear that, if the drafting board 30 is pushed downwardly to move the columns 45 downwardly into the end table assemblies 10, the pinion gears 106 will be caused to rotate in a clockwise direction as viewed in FIGURE 4 and the straps 123 will be wound onto the hub portion of the pinion gears 106 with a consequent elongation of and increase in tension in the coiled springs 120. Because of the larger diameter of the pinion gears 106 relative to the hub portions thereof carrying the straps 123, the change in length of the coiled springs 120 between the extreme raised and lowered positions of the table is relatively small. It may be clearly seen from FIGURE 4 that the counterbalancing force of the coiled springs 120 on the columns 45 and the draft-

ing board **30** is easily adjusted by rotation of the exposed head of the adjusting screws **121** at the lower corner of the pedestals **10**.

In order that the straps **123** may be accurately guided onto the hub portions of the pinion gears **106**, a pair of spring guides **125** are provided. Each spring guide **125** is pivotally carried by a pin **126** on an axis parallel to the axis of rotation of the pinion gears **106**. The free end of each spring guide **125** extends slidably through an opening in a link **127** which interconnects coiled spring **120** and strap **123** as shown in FIGURES 4 and 5.

The columns **45** may be locked in any elevated position by means comprising in the present instance a pair of spring brakes **130** each cooperating with a pair of spring brake hubs **131** and **132**. Each of the spring brakes **130** is in the form of a spring coiled about the hubs **131** and **132**, and when the spring brakes **130** are energized or tightly wound, the brake hub **131** is locked against rotation relative to the stationary hub **132**. The hubs **132** are stationary and each is carried in a brake support plate **133** secured to the inner wall **14** of one of the pedestals **10**, as by screws **134**, as shown in FIGURE 5. Each brake support plate **133** has an opening therethrough to receive one end of the stationary hub **132**. The opening and the end of the hub **132** therein are non-circular in form, in this instance having two straight sides so that each hub **132** is prevented from rotating. Each stationary hub **132** is centrally bored to receive a portion of reduced diameter on the brake hub **131**, the reduced diameter portion extending through the stationary hub **132** and beyond the brake plate **133** and provided with a washer **137** and a snap ring **138** to retain the hubs **131** and **132** against relative endwise movement. Each rotating hub **131** is mounted on the tubular shaft **107** and is keyed thereto by a pin **140**, as shown in FIGURES 5 and 8. The outer diameters of the stationary hub **132** and the rotating hub **131** are substantially equal and contiguously disposed as shown in FIGURE 5, and each spring brake **130** extends over the outer surfaces of both the rotating hub **131** and the stationary hub **132**.

To energize each spring brake **130**, a brake plate **142** is provided, having the shape illustrated in FIGURE 8. Each brake plate **142** has a circular opening therethrough and is carried on a reduced portion of the end of the rotating brake hub **131** opposite from the end extending through the stationary hub **132**. The brake plate **142** is rotatably mounted on the rotating brake hub **131** but is prevented from endwise movement relative thereto by a snap ring **143**. Each of the brake plates **142** is provided with an arcuate series of holes **145** arranged for selective insertion of one axially turned end of the spring brake **130**. The other end of each spring brake **130** is also axially turned and inserted in a hole **146** in the brake support plate **133**. If the brake plate **142** is rotated in one direction, the turns of the spring brake **130** will be tightened to frictionally engage the outer surfaces of both the rotating hub **131** and the stationary hub **132** and thereby prevent relative rotation of the hubs. If the brake plate **142** is rotated in the other direction, the turns of the spring brake **130** will be loosened to permit relative rotation of the hubs.

The spring brakes **130** are self-energizing and are normally maintained in the energized or brake-applied position by means including a pair of coiled springs **150**. One end of each of the coil springs **150** is connected to a pin **151** mounted eccentrically on one of the brake plates **142** as shown in FIGURE 8. The coiled spring **150** extends upwardly from the pin **151**, and the upper end thereof is connected to a bracket **152** secured to the underside of the top wall **11** of one pedestal **10**. The spring brakes **130** are wound in such a direction that the tension of the coiled springs **150** tends to bias the brake plates **142** in a direction to maintain the spring brakes energized. When the spring brakes are energized, the rotating hubs **131** are held against rotation relative to the stationary hubs **132**. The rotating hubs **131** are held against rotation, and the tubular shaft **107** and the pinion gears **106** are held stationary. Thus, the columns **45** and the drafting board **30** may be locked in any position.

To permit raising or lowering of the drafting board **30**, a spring brake release means is provided, comprising a pair of cables **155** and a brake pedal **156**. The brake pedal **156** by the application of a person's foot to the bent extending between the two pedestals **10** and has a bent central portion to provide a lever arm for rotating the brake pedal **156** by the application of a person's foot to the bent central portion. The ends of the brake pedal **156** are journaled in the inner walls **14** of the pedestals **10** as shown in FIGURE 6. Within one pedestal **10**, a bell crank member **157** is secured on the end of the brake pedal **156** and **158** is rigidly secured at one end to each plate **157** to extend generally radially of the end of the brake pedal **156** in a direction generally opposite from the direction of the bent central portion. A coiled spring **159** is connected between the outer end of each arm **158** and the bottom wall **12** of the pedestal **10** to bias the bent central portion of the brake pedal **156** upwardly or in a counterclockwise direction as viewed in FIGURE 4.

Each end of each of the cables **155** is formed with a closed loop, and one end of each cable **155** is connected to one of the plates **157** on the same side of the axis of the brake pedal **156** as the bent central portion thereof. The other looped end of each cable **155** is hooked over one of the pins **151** of the brake plates **142**. The cables **155** have a length such that when the brake pedal **156** and the plates **157** are positioned as shown in FIGURE 4, the coiled springs **150** maintain the spring brakes **130** in the energized or brake-on position. When the bent center portion of the brake pedal **156** is depressed, the cables **155** are pulled downwardly to rotate the brake plates **142** against the bias of the coiled springs **150** to loosen or slightly unwind the spring brakes **130**, so that the spring brakes are operated to the de-energized or brake-off position. In the de-energized position of the spring brakes, the rotating hubs **131** are free to rotate relative to the stationary hubs **132**. Thus, the drafting board **30** and the columns **45** may be manually raised or lowered to any desired position merely by depressing the brake pedal **156**. When the spring brakes **130** are deenergized, the previously described counterbalancing means including the coiled springs **120** is effective to counterbalance the weight of the drafting board **30** and the columns **45**.

From the foregoing description, it will be apparent that the drawing board **30** may be raised and lowered as well as tilted to various angles. In moving the board vertically or in changing its angle of tilt, the respective counterbalancing means permit easy manipulation of the board by the draftsman. When the board is adjusted vertically or angularly, the locking means for the respective adjustments hold the board in adjusted position.

We claim:

1. A drafting table comprising a table structure having a pair of openings in the upper surface thereof in a spaced apart relationship to each other, a pair of vertically adjustable columns mounted in said table structure and extending vertically through the respective openings, roller means carried on the lower end of each of said columns, a pair of vertically extending roller guides mounted in said table and cooperating with said roller means of said columns to vertically guide the lower ends of said columns, second roller means mounted in said table adjacent said openings and positioned to engage each of said columns on one edge thereof, and means engaging the opposite edges of said columns and controlling vertical movement of said columns, whereby said columns are held in a vertical position during adjustment.

2. A drafting table according to claim 1, in which said controlling means comprises gear racks mounted on said columns, and pinion gears meshing with said racks.

3. A drafting table according to claim 2, in which the

pinion gears for the respective columns are both mounted on a shaft and are rotatable therewith, whereby vertical adjustment of the columns is equalized.

4. A drafting table as defined in claim 2, and counterbalancing spring means connected to said pinion gears for biasing said pinion gears to counterbalance the weight of said columns and said drafting board.

5. A drafting table as defined in claim 4, wherein said counterbalancing spring means comprises a pair of coiled springs secured at one end thereof in said table, a pair of straps secured to the other end of said coiled springs, said pinion gears having hub portions and the other ends of said straps being secured to and wound about said hub portions, whereby said coiled springs bias said pinion gears in a direction opposing the weight of said columns and said drafting board.

6. A drafting table as defined in claim 5, wherein said coiled springs are secured to said table by screws to adjust the tension of said coiled springs.

7. A drafting table as defined in claim 5, wherein guides are mounted in said table for holding said straps against twisting under the influence of said coiled springs.

8. A drafting table comprising a table, a pair of columns guided in said table and extending through the upper surface of said table for vertical adjustment, a pair of vertically extending gear racks mounted on said columns, a shaft rotatably mounted in said table, a pair of pinion gears secured on the respective ends of said shaft and meshing with said gear racks, and brake means cooperating with said shaft to hold said shaft against rotation and thereby hold said columns in selected positions of adjustment.

9. A drafting table as defined in claim 8, in which said brake means comprises a pair of brakes mounted on and adjacent the respective ends of said shaft, each brake comprising a hub rotatable with said shaft, a hub secured to said table and held stationary, a coiled spring wound around said hubs and adapted to be tightened on and grip said hubs to hold said shaft against rotation.

10. A drafting table as defined in claim 9, wherein a plate is secured to said stationary hub and to said table, one end of said spring is secured to said plate, a second plate is rotatably mounted on said shaft adjacent said rotatable hub, and the other end of said spring is secured to said second plate, whereby said spring may be loosened and tightened on said hubs by rotation of said second plate in opposite directions.

11. A drafting table as defined in claim 8, wherein said brake means normally is operable to hold said shaft against rotation, and means adapted to be operated by the draftsman is provided for releasing said brake means.

12. A drafting table as defined in claim 10, wherein a spring is connected to said second plate and to said table tending to rotate said second plate in a direction to tighten said coiled spring on said hubs to hold said shaft against rotation, and a brake pedal is pivotally carried by said table, and means is provided connecting said brake pedal to said second plates to rotate said second plates in a direction to loosen said coiled springs on operation of said brake pedal.

13. A drafting table as defined in claim 12, wherein said brake pedal is adapted to be depressed to loosen said coiled spring, and a pair of springs is provided tending to raise said pedal.

14. A drafting table comprising a table structure, a pair of columns extending upwardly from said table structure, a drafting board, means pivotally mounting said drafting board on the upper ends of said columns, means for counterbalancing the weight of said drafting board against pivotal movement, and means operable to hold said drafting board in selected pivoted positions relative to said columns.

15. A drafting table comprising a table structure, a pair of columns extending upwardly from said table structure, a drafting board, and a pair of means pivotally mounting said drafting board on the upper ends of the respective columns, each of said pivotal mounting means comprising two interleaved groups of brake plates, one of said groups being secured to said drafting board, the other group being secured to the upper end of one of said columns, a pivot shaft extending through said groups, and means for pressing the brake plates of both groups together in tight frictional engagement to hold said drafting board in selected pivoted positions relative to said columns, and a pair of supporting channel members secured to said board, said one of said groups of plates having portions mounted in said channels and secured therein, and said other group of plates having portions extending into said columns and secured therein.

16. A drafting board according to claim 15, in which the portions of the brake plates mounted in said channels and extending into said columns are provided with spacing means to hold the brake plates of each group spaced from each other a distance substantially equal to the thickness of the associated brake plates.

17. A drafting table according to claim 15, in which the outermost brake plates of both pivotal mounting means are held against movement away from each other, and each of said pressing means presses the brake plates associated therewith outwardly toward the outermost brake plate, a bar being provided extending from one pivotal mounting means to the other through the pivot shafts thereof and carries abutments on its ends for holding said outermost brake plates against movement away from each other.

18. A drafting table according to claim 17, in which each of said pressing means includes a pressure pad slidably mounted on the pivot shaft associated therewith, said pressure pad being movable outwardly to force the innermost brake plate of the associated groups outwardly and thereby press the brake plates of said associated groups together, a pair of tubes enclosing said bar between said pair of pivotal mounting means and bearing against the respective pressure pads, and manually operable means interposed between said pair of tubes for forcing them away from each other, said manually operable means comprising a toggle device movable to one position to force said tubes away from each other and movable to another position to release the pressure on said tubes, said toggle device comprising a pair of U-shaped members with the base of each U bearing against the end of one of said tubes, a pair of toggle members pivotally connected to the arms of one of said members, and a hand lever having spaced ends pivotally connected to the arms of the other U-shaped member and having circular portions eccentric to the pivotal axis of the lever and rotatably mounted in said toggle members.

19. A drafting table comprising a table structure, a pair of columns extending upwardly from said columns, a drafting board, means pivotally mounting said drafting board on the upper end of said columns on an axis adjacent one edge of said board for movement between a substantially horizontal and a substantially vertical position, and means for counterbalancing the weight of said drafting board comprising a torsion bar disposed on said axis, a first anchor plate secured to said drafting board and to one end of said torsion bar to prevent rotation of said one end of said torsion bar relative to said drafting board, and a second anchor plate secured to one of said columns and to the other end of said torsion bar to prevent rotation of said other end of said torsion bar relative to said column, said torsion bar being adapted to be rotatively twisted on movement of said drafting board toward horizontal position.

20. A drafting table according to claim 19, in which said second anchor plate is adjustably secured to said other end of said torsion bar for rotatively adjusting said torsion bar to increase the torsional resistance thereof and thereby compensate for the weight of objects placed on the drafting board.

21. A drafting table according to claim 19, in which an adjusting plate is secured to said other end of said torsion bar and is adjustably secured to said second anchor plate to secure the latter to said other end of said torsion bar.

22. A drafting table according to claim 21, in which said second anchor plate has a threaded hole therein radially spaced from the pivotal axis, said adjusting plate has arcuate series of holes radially spaced from the pivotal axis the same distance as said threaded hole, and a screw extending through a selected one of said series of holes and threaded into said threaded hole.

23. A drafting table according to claim 22, in which said adjusting plate has a non-circular hub whereby said adjusting plate may be readily rotated when said screw is removed from said threaded hole for inserting said screw through a different one of said series of holes.

24. A drafting table comprising a table structure, a pair of columns extending upwardly from said table structure, a drafting board, a pair of means pivotally mounting said drafting board on the upper ends of the respective columns on an axis adjacent one edge of said board for movement between a substantially horizontal position and a substantially vertical position, each of said pivotal mounting means comprising two interleaved groups of brake plates, one of said groups being secured to said drafting board, the other group being secured to the upper end of one of said columns, and a pivot shaft extending through said groups, a torsion bar extending from one pivotal mounting means to the other and through said pivot shafts, a first anchor plate secured to one end of said torsion bar and providing an abutment for the outermost brake plate of the two groups of one pivotal mounting means, a second anchor plate secured to the other end of said torsion bar providing an abutment for the outermost brake plate of the two groups of the other pivotal mounting means, and releasable means for pressing the two groups of brake plates of each pivotal mounting means outwardly toward the outermost brake plate in tight frictional engagement to hold the drafting board against pivotal movement, said first anchor plate also being secured to said drafting board and said second anchor plate also being secured to one of said columns, whereby when said pressing means is released and said drafting board is moved toward horizontal position said torsion bar is rotatively twisted to counterbalance the weight of said drafting board.

25. A drafting table comprising a supporting structure, board support means mounted on said structure for vertical movement, a drafting board attached to said board support means, means for holding said board support means in selected vertical positions, and means secured to said supporting structure and said board support means for counterbalancing the weight of said drafting board and said board support means, said counterbalancing means being adjustable to compensate for different loads positioned on the drafting board.

26. A drafting table as in claim 24, wherein said counterbalancing means comprises a tension spring, and said adjustment is made by varying the force of said spring.

27. A drafting table comprising a supporting structure, a drafting board mounted for pivotal movement on said supporting structure, and means secured to said supporting structure and to said drafting board for counterbalancing the weight of said board, said counterbalancing means being adjustable to compensate for different loads placed on said board.

28. A drafting table as in claim 27, wherein said counterbalancing means comprises a torsion bar having one end secured to said drafting board and its other end secured to said supporting structure, and said adjustment is made by varying the angular position of one end of said torsion bar relative to its other end.

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