April 21, 1959 B. HOPPE 2,883,248

HIGH-LOW EXTENSION TABLE CONSTRUCTION

Filed Aug. 23, 1955 8 Sheets-Sheet 1

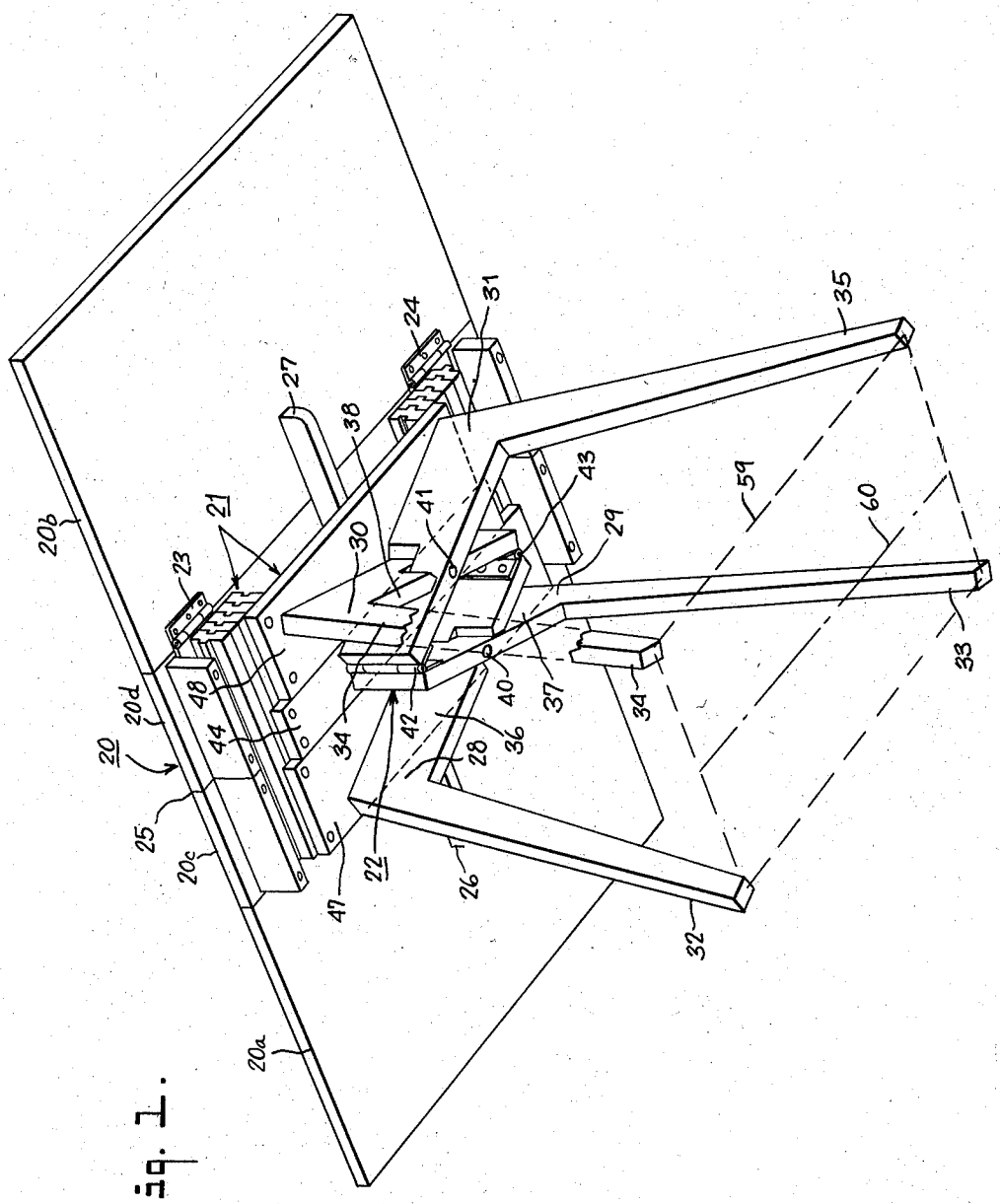


Fig. 1.

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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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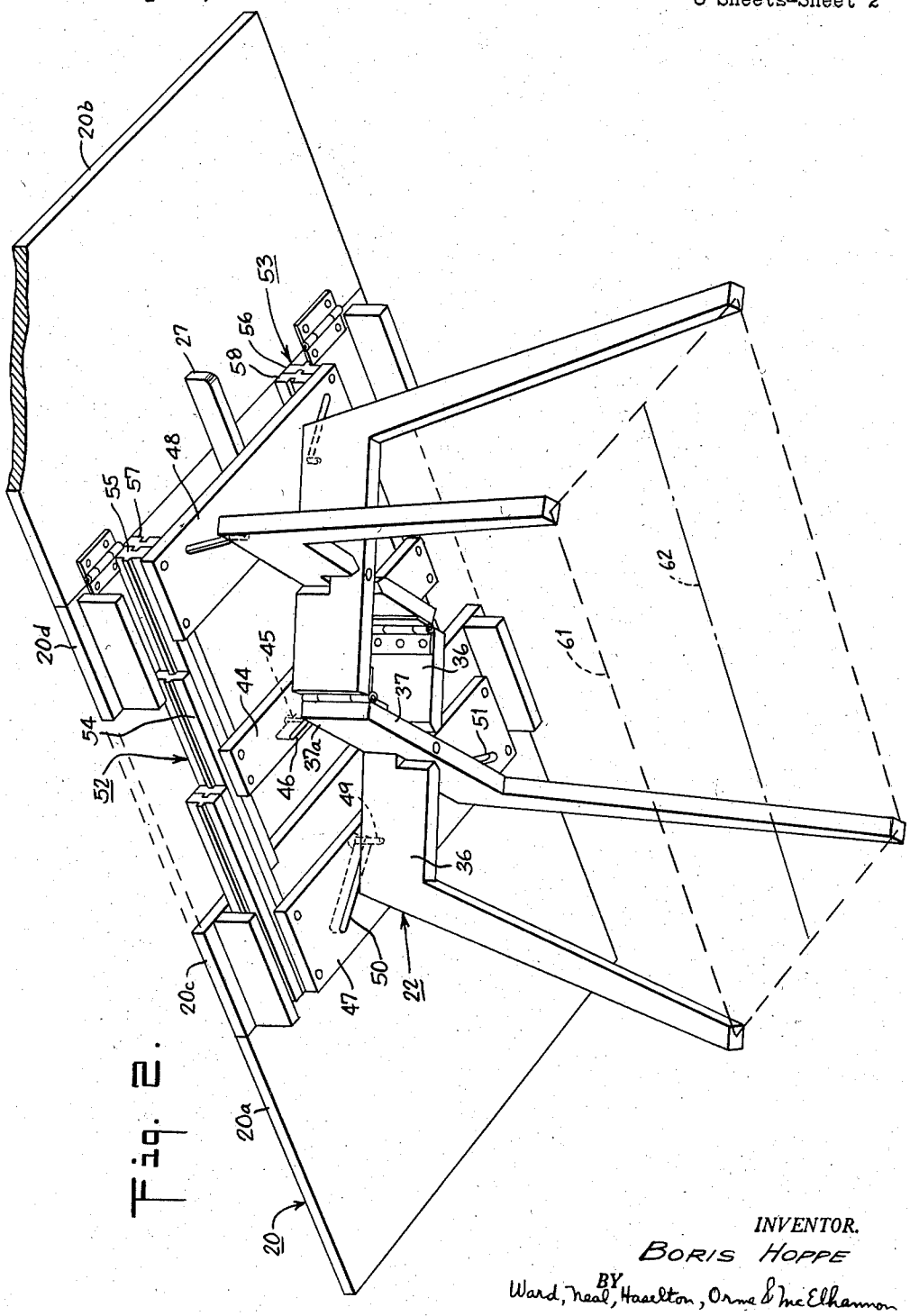


Fig. 2.

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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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Fig. 3.

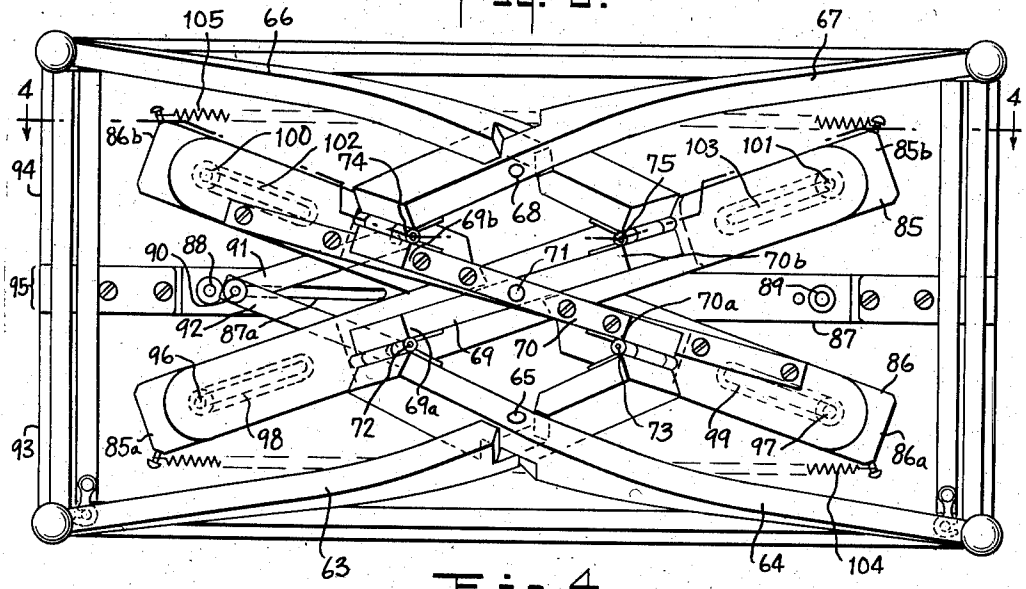
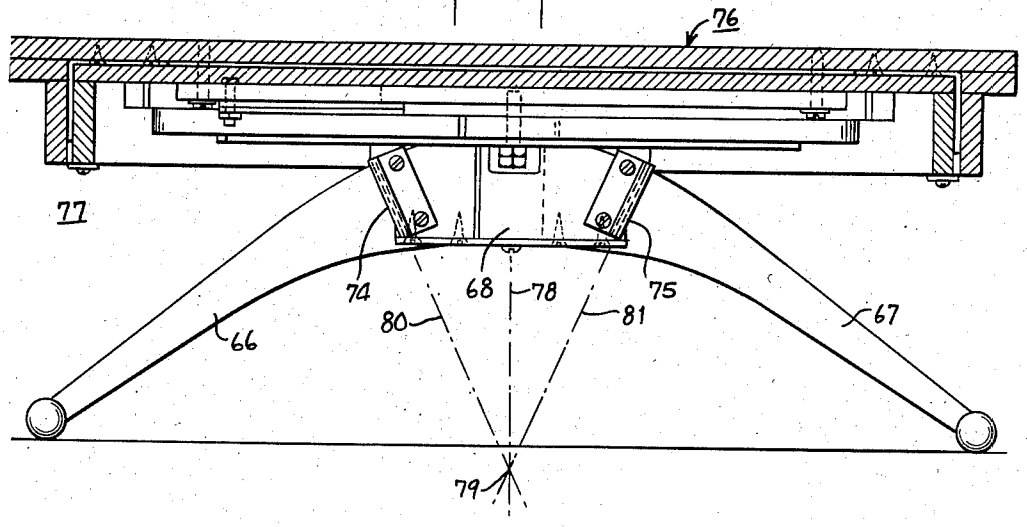


Fig. 4.



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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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Fig. 5.

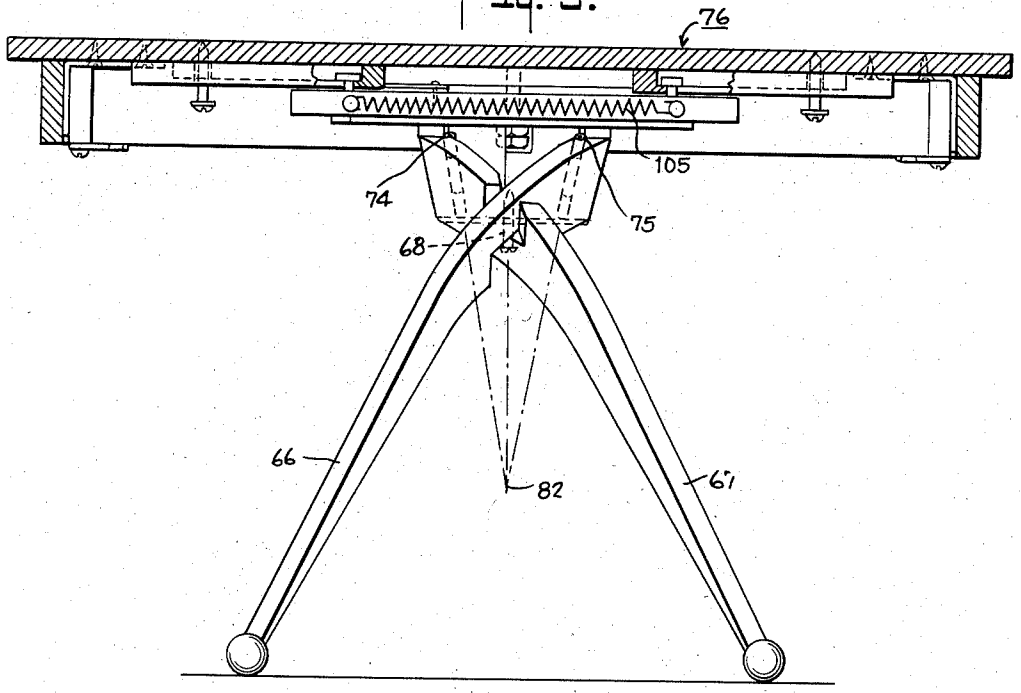
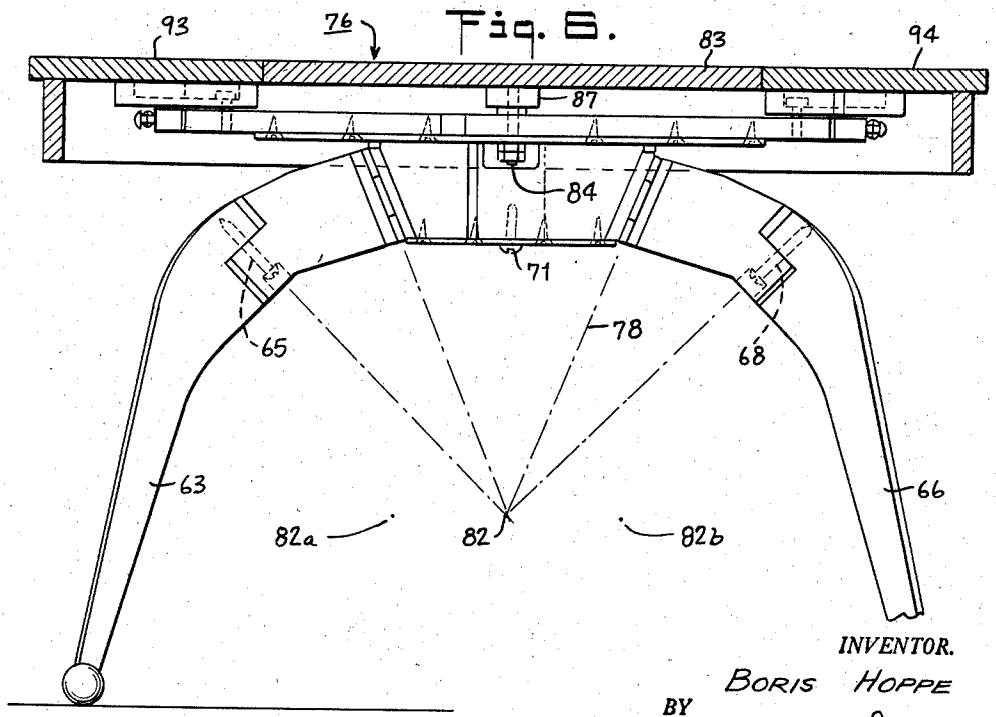


Fig. 6.



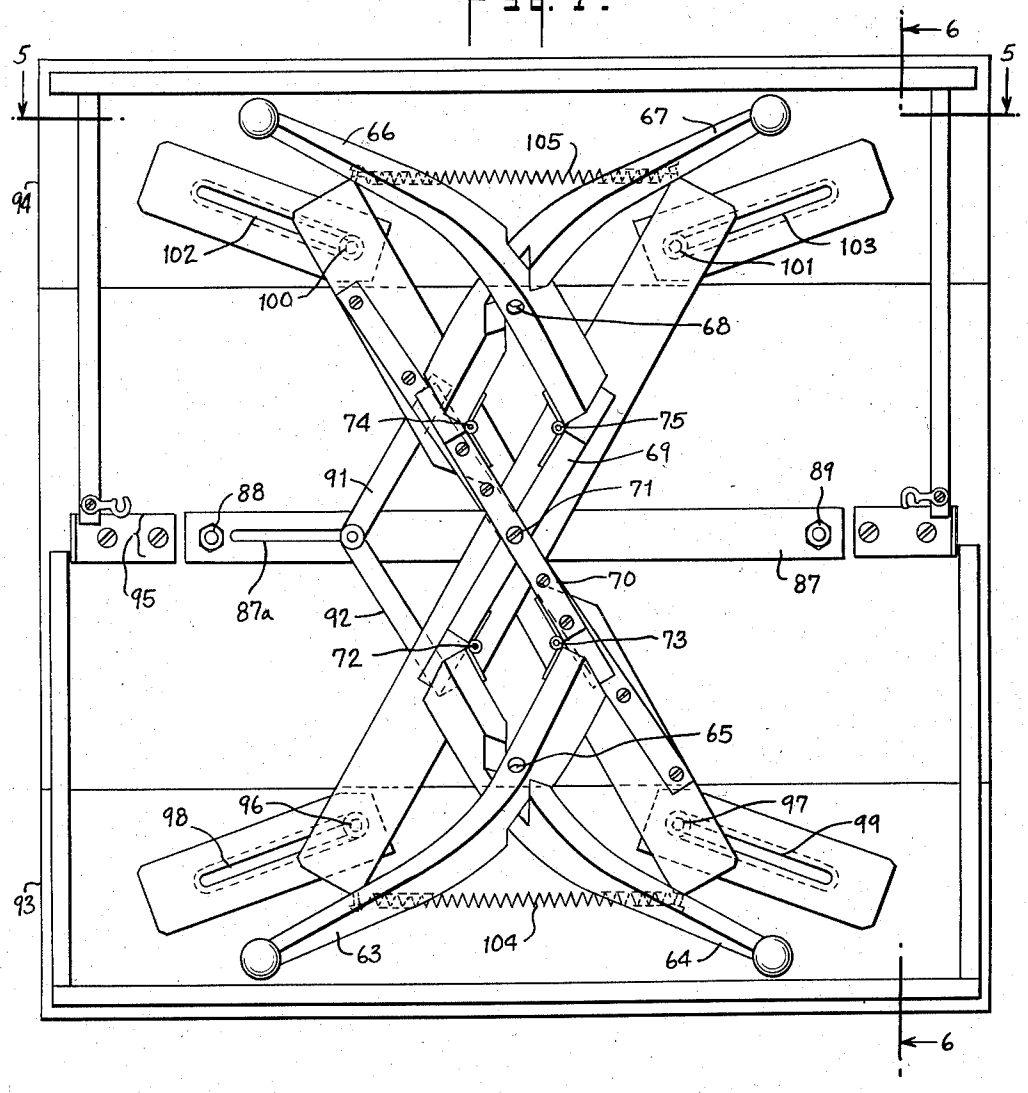
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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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Fig. 7.



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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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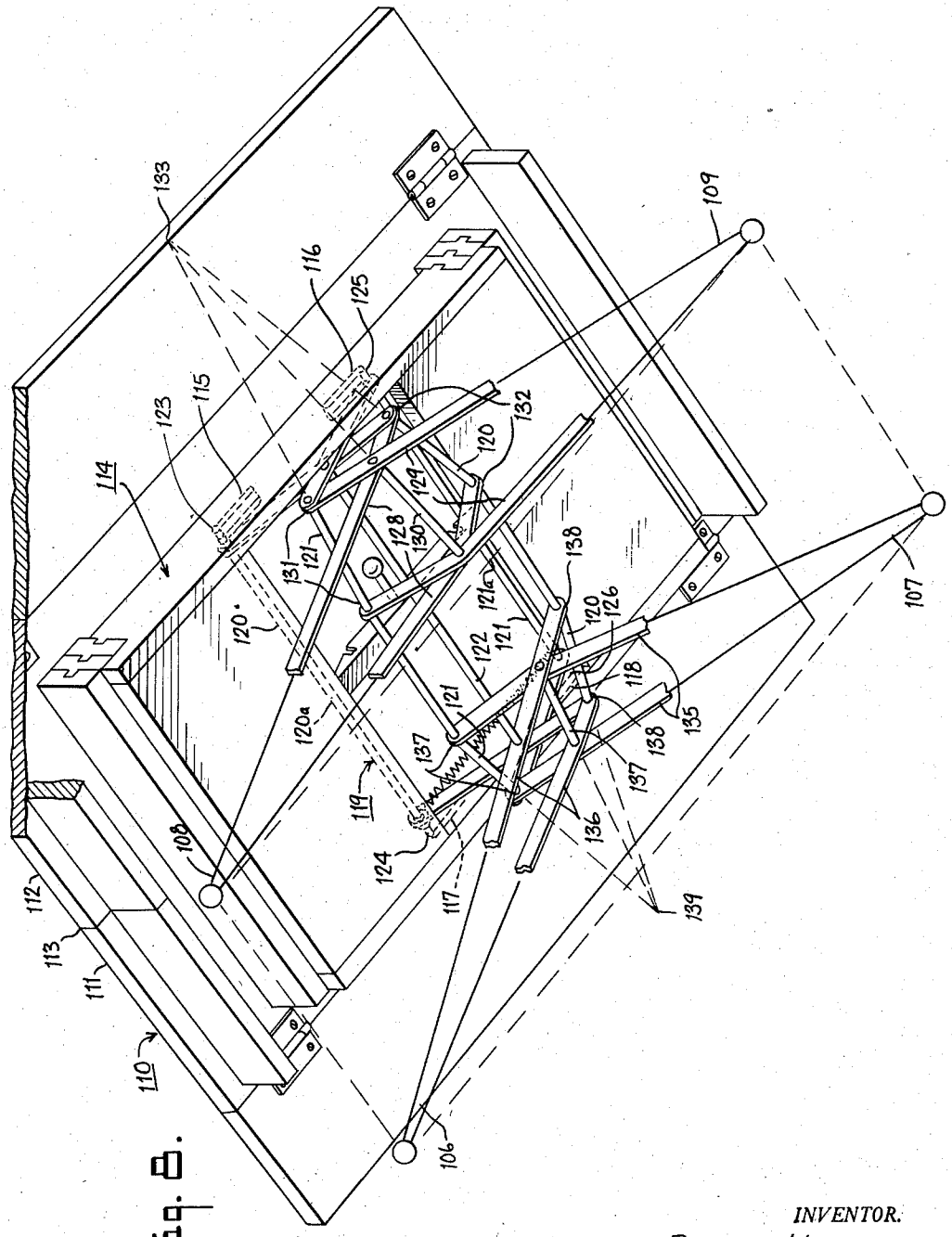


Fig. 6.

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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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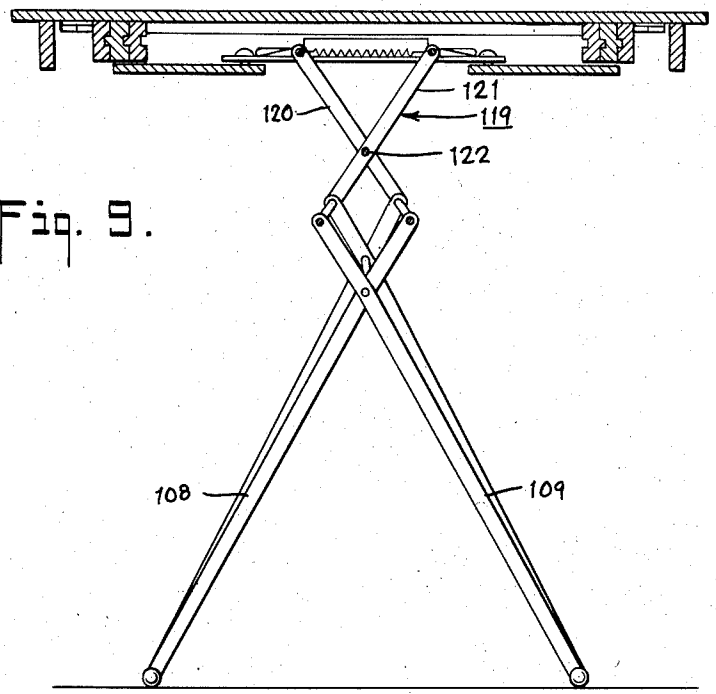


Fig. 9.

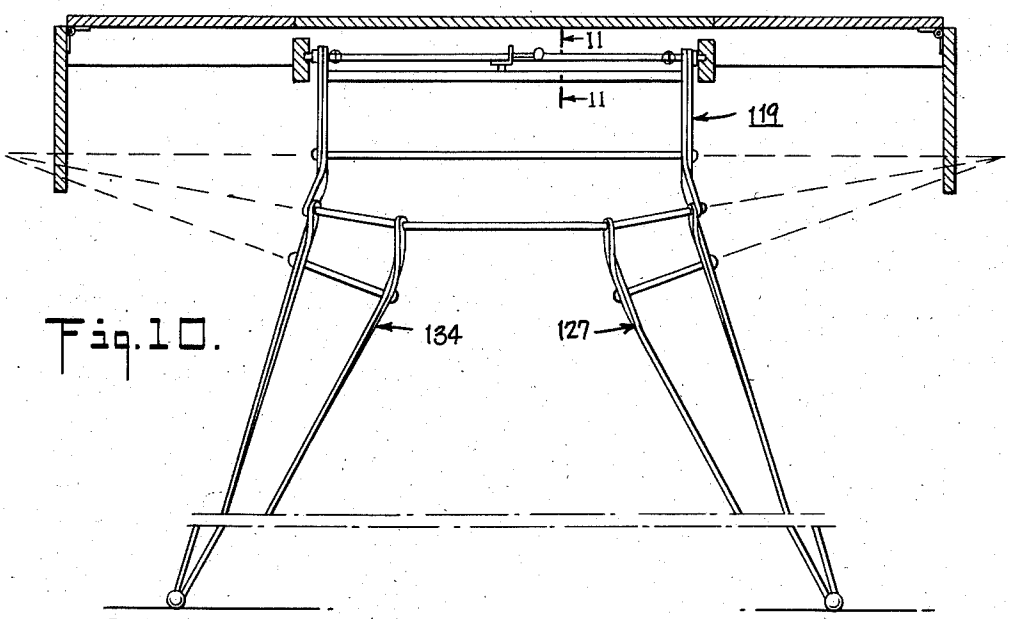


Fig. 10.

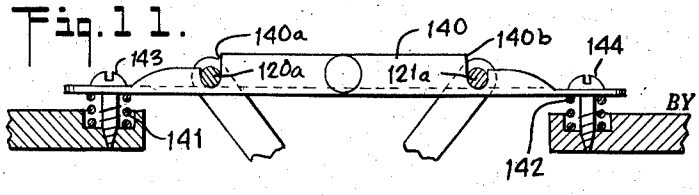


Fig. 11.

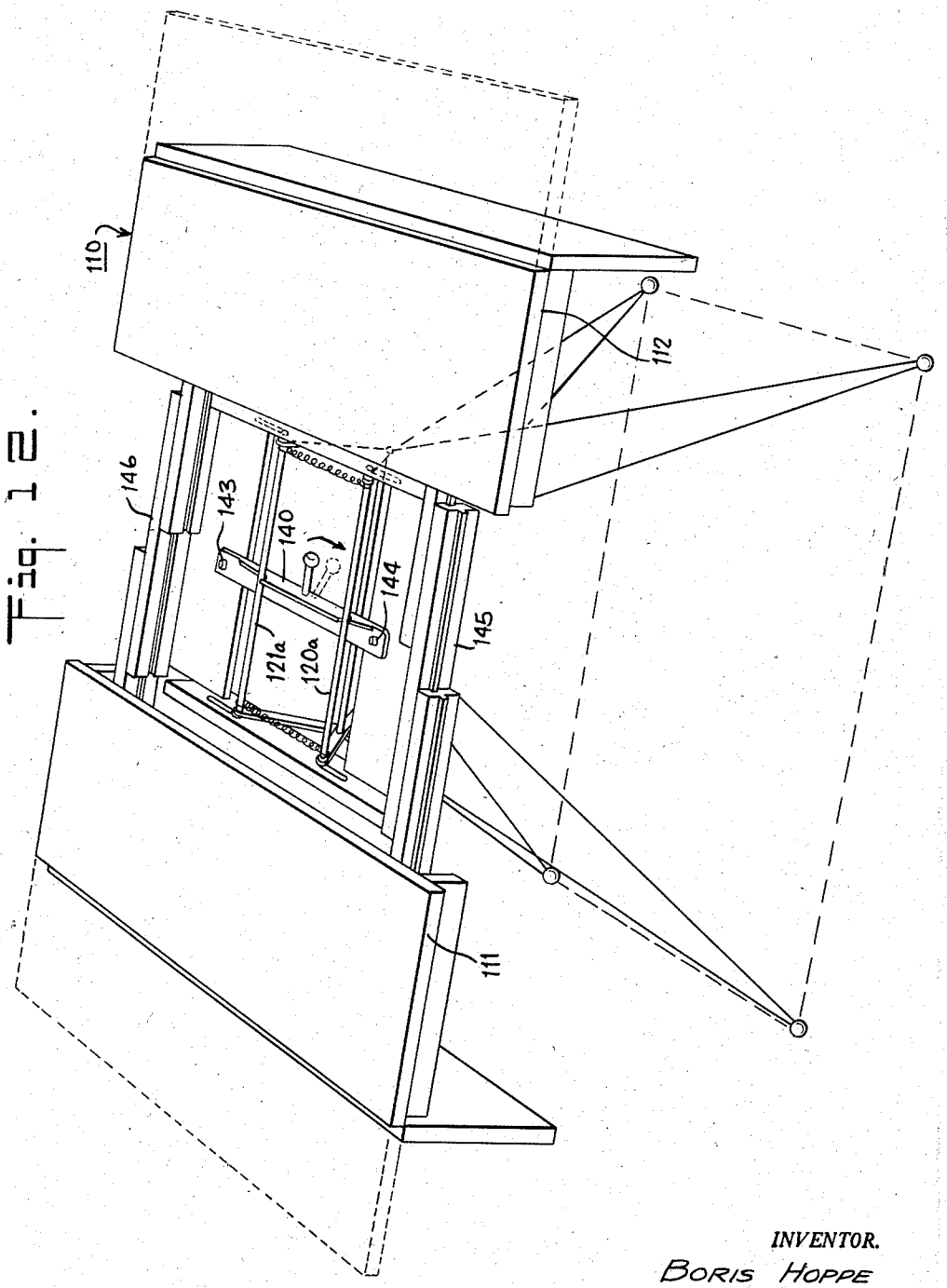
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HIGH-LOW EXTENSION TABLE CONSTRUCTION

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Fig. 12.



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United States Patent Office 2,883,248 Patented Apr. 21, 1959

2,883,248

HIGH-LOW EXTENSION TABLE CONSTRUCTION

Boris Hoppe, Kew Gardens, N.Y.

Application August 23, 1955, Serial No. 529,994

7 Claims. (Cl. 311—39)

This invention relates to tables, and more particularly to extension tables. The invention also relates to extension tables of the high-low type, that is, of the type which by manipulation of the legs can be raised or lowered.

The invention, in one aspect thereof, includes a table having a table top which can be contracted or expanded in area, for example, by separating the top halves thereof and inserting leaves between such separated halves. Such table top area has a major axis in a selected direction prior to being so extended (or prior to bringing up into coplanar relation therewith drop leaves which are hinged thereto) and after such table top has been extended, the major axis thereof is perpendicular to the one aforementioned. The major axis of the rectangle defined by the feet of the table legs, referred to as the axis of stability, preferably should be parallel to the major axis of the table top. Accordingly the present construction provides for changing the attitude of the legs for this purpose to permit such axis of stability to be shifted 90° when desired.

This is accomplished by mounting the table top upon a pantograph device having a plurality of crossed and hinged arms which is capable of extension in a horizontal direction, the axes of the hinges of which are all substantially parallel and to the four outermost arm extremities thereof are secured the four legs of the table. The movement of the pantograph to a contracted condition places the axis of stability in one direction, and the moving of the pantograph to an extended condition shifts by 90° such axis of stability thereby giving stability to the table in the needed direction, for example, in response to the raising of dropleaves. Such pantograph device is operatively associated in a novel manner with the aforementioned separable portions of the table top whereby extension of the pantograph causes separation of such table top portions. Alternatively, non-separable table top portions can be employed of the so-called flip-over variety. The latter type of table top comprises two hinged leaves which are capable of folding one upon the other in face-to-face relation. After the extension of the pantograph device the leaves can be moved into coplanar relation, that is, the top hinged leaf is angularly shifted 180°.

The invention in another form thereof is substantially similar to the one described above, with the exception that the pantograph device is constructed and arranged in such a way that concurrently with the change in the attitude of the table legs to change the direction of such axis of stability, such legs concurrently are changed in angle or attitude relative to the table top thereby to raise or lower the table top. This is accomplished by making the table legs in effect part of the pantograph device, that is, extensions of the arms of the pantograph device and by constructing certain of the hinges of such pantograph device in such a way that their axes converge in a particular relationship. Thus a primary pair of table legs is joined by a hinge at a point intermediate the extremities thereof whereby such legs can be spread or closed in response to relative movement about the axis of such

hinge. A secondary pair of table legs is similarly joined by a hinge, and the primary and secondary pairs of hinged table legs are operatively connected together to form such pantograph device through the intermediary of at least one pair of intermediate crossed pantograph arms which are pivotally associated intermediate the ends thereof. Such table legs, of course, are conformed to extend downwardly from such pantograph device, the table top being supported by the latter. One pair of outer extremities of such intermediate pantograph arms is connected respectively by a pair of hinges with the upper extremities of said primary pair of hinged table legs. Similarly, another pair of outer extremities of such intermediate pantograph arms respectively are connected by a pair of hinges with the respective upper extremities of the secondary pair of hinged table legs. The shifting of the pantograph from a contracted to an extended condition causes such axis of stability to shift 90° as aforementioned and concurrently to change the angle of the legs of the table top thereby lifting the latter by virtue of such special relationship of the hinge axes. That is, the axis of the hinge of each pair of hinged table legs converge at a common point with the axes of the hinges at the upper extremities of such pair of hinged table legs, such common point being beneath the pantograph device. Thus two such points of convergence occur, which points will be spaced apart where there is more than one pair of such intermediate pantograph arms. A line drawn through such two spaced points should be horizontal. However, such two points of convergence may in turn coincide where only a single pair of intermediate pantograph arms are employed. The degree to which the level of the table can change in response to the movement of the pantograph device between its extremes of motion is a function of the vertical distance of such points of convergence from the table top.

The invention in still another form is constituted by a table top having a pantograph device associated therewith which is extendable in a vertical instead of a horizontal direction and which is adapted for mounting the table legs and also achieving the aforementioned angular change of the axis of stability. Such pantograph device includes a primary pair of pantograph arms and a secondary pair which are held in substantially parallel spaced relationship with one another by rigidly interconnected spacer pins one of which is a pantograph hinge. The lowermost extremities of corresponding of said primary and secondary pantograph arms are rigidly interconnected by bowed cross-connectors to which are pivotally connected by cross-connector hinges to two pairs of additional hingedly joined pantographs arms, one pair near the primary pantograph arms and one near the secondary pair. Such additional arms comprise the table legs. The hinge axis of each of said additional arms due to the bowing of said cross-connectors converges at a selected point on its respective side of the pantograph with the axes of its respective pairs of cross-connector hinges.

The above and further objects and novel features of the invention will more fully appear from the description herebelow when considered in connection with the accompanying drawings although it is expressly understood that the drawings are for the purpose of illustration only and do not define the limits of the invention, reference for this latter purpose being had to the appended claims.

In the drawings:

Fig. 1 is a perspective view from below of a table construction embodying one form of the present invention and showing the table legs thereof in a relatively contracted condition;

Fig. 2 is a perspective view of the table construction of Fig. 1 showing such table legs in a relatively spread condition;

Fig. 3 is an inverted plan view of a table embodying a second form of the invention;

Fig. 4 is a side elevation of the table shown in Fig. 3, the table top being in its low position with the legs thereof in one attitude relative to the table top;

Fig. 5 is a side elevation partly in section and with parts broken away of the table construction shown in Fig. 4 but with the table legs at a different attitude relative to the table top, the table top being in its high position;

Fig. 6 is an end view of the table shown in Fig. 5;

Fig. 7 is an inverted plan view of the table of Fig. 3 but in an extended condition;

Fig. 8 is a perspective view from below (partly in section) of a table embodying a third form of the invention, the table top being in a low position;

Fig. 9 is an end view, partly in section and with parts broken away, of the table end shown in Fig. 8, the table top being in a high position;

Fig. 10 is a side elevation, partly in section and with parts broken away, of the table shown in Fig. 9;

Fig. 11 is a fragmentary view on an enlarged scale of a detent device employed for controlling the legs of the table of Fig. 8; and

Fig. 12 is a perspective view from above of the table construction shown in Fig. 8.

Referring to the drawings in greater detail with particular reference to the form of the invention shown in Figs. 1 and 2, the novel extension table construction comprises a table top **20** which is mounted upon a frame element **21**, the latter in turn being mounted upon a pantograph element **22** having table legs secured thereto as will appear below.

The table in the form shown is of the drop leaf variety including drop leaves **20***a* and **20***b* which are joined by hinges, one pair of which is shown as at **23** and **24**, to a central table top portion consisting of separable portions **20***c* and **20***d* which are divided by a line **25** indicating the demarcation therebetween when portions **20***c* and **20***d* are closed.

The drop leaves of the table may be raised and held in a horizontal attitude by any suitable means, such as fingers **26** and **27**, which are pivotally connected to the undersurface of the table top portions **20***c* and **20***d*, respectively.

When the leaves of the table are dropped and the only horizontal areas are the horizontal upper surfaces of the portions **20***c* and **20***d*, it will be seen that such surfaces, when unseparated as in Fig. 1, are of substantially rectangular shape, the major axis thereof comprising the line **25** separating same. Consequently it is desirable for the feet of the legs of the table to define a rectangle having a major axis which is parallel to the line **25** thereby providing a desired stability to the table.

However, when such drop leaves are raised to the horizontal position, as shown in Fig. 1, it is desired for the major axis of the rectangle defined by the feet of the table to be perpendicular to the first-mentioned major axis thereby to provide such desired stability to the table.

Novel means are provided for accomplishing this result which, in the form shown, comprises the aforementioned pantograph element **22** having four extremities **28**, **29** and **30**, **31** to which are respectively secured the table legs **32**, **33** and **34**, **35**.

Such pantograph element includes at least two pairs of arms **36**, **37** and **38**, **39**, the arms of each pair being interconnected by a hinge. That is, arms **36** and **37** intermediate their extremities are joined by a hinge **40** and the arms **38**, **39** also intermediate their extremities are joined by a hinge **41**. Both of said hinges are preferably substantially vertical when the table is in normal operating position.

The adjacent inner extremities of the two pairs of arms are in turn joined by hinges **42** and **43**, such hinges **42** and **43** being referred to as end hinges whereas hinges **40** and **41** are referred to as intermediate or center hinges.

The table top **20**, as aforementioned, rests upon the frame member **21** which in turn is supported by the upper surfaces of the pantograph element **22**.

Although many operative interconnections may be employed between the table top **20** and said pantograph element, the particular form shown in Figs. 1 and 2 comprises one wherein the separable portions of the table top may be spread apart to make room for the insertion of additional table leaves thereby to increase the area of the table top.

Accordingly, such frame member **21** includes a center cross-support member **44** which is slidably connected to the pantograph construction near such end hinges (Fig. 2), for example, by means of a pair of pins, one of which is shown at **45** which is secured to the upper surface of the arm **37** at the region **37***a* and which passes through a vertical slot **46** formed in the cross-support member **44**. Suitable retaining means, such as a washer or screw head, is at the upper extremity of the pin **45** for holding the cross-piece **44** to the arm **37** while at the same time permitting sliding engagement therebetween. The slot **46** is transversely disposed to the axis of extension of the pantograph element **22**. A similar slot and pin arrangement (not shown) is employed in connection with the arm **36** and the cross-support member **44** at the other end of the latter.

A pair of outermost cross-support members **47** and **48** are slidably secured to the opposite outermost arms of said pantograph element on opposite sides of said center cross-support member **44** and are adapted for moving away from and toward such center cross-support member **44** in response to extension and contraction of such pantograph element.

Thus the outermost portions of the arms **36** and **37** are slidably connected with the cross-support member **47** by pin and slot means, one of which is well shown in Fig. 2, including a pin **49** secured to the upper portion of the outer extremity of the arm **36** and which pin extends through a vertical slot **50** formed in the cross-support member **47**. A suitable head on the pin **49** holds the cross-support member **47** to the arm **36**. A similar pin and slot arrangement is employed for interconnecting the outer extremity of the arm **37** with the cross-support member **47**. The slot thereof is shown at **51** in Fig. 2.

The slots **50** and **51**, in the form shown, are not perpendicular to the axis of extension of the pantograph but rather are canted toward the center of the pantograph as shown, thereby to facilitate the opening and closing of such pantograph element.

The arms **38** and **39** are analogously connected with the cross-support member **48**.

The table top **20** is connected to the several cross-support members by means of a pair of parallel extension arms **52** and **53**, each of which consists of a plurality of slide elements. A pair of corresponding slide elements, one in each of such extension arms, is respectively secured parallel to one another and to opposite extremities of said center cross-support member **44**. One slide element of such pair is shown at **54** (Fig. 2). Another pair of slide elements, one in each of such extension arms, is secured to opposite extremities of one of the outer cross-support members, such as **48**, and, illustratively, such pair includes slide elements **55** and **56**, each of the latter being slidably associated with its slide element secured to the center cross-support member **44**. For example, the slide element **55** is associated with the slide element **54**.

The table top portion **20***d* in turn is secured to a pair of slide elements **57** and **58** which are respectively slidably associated with the slide elements **55** and **56**.

Referring to Fig. 1, the pantograph element is in a contracted condition and the feet of the legs **32**—**35** define a rectangle **59** having a major axis **60** which is substantially parallel to the line **25**. However, in Fig. 2, the

pantograph element 22 has been moved to an extended condition and such feet of the legs define a rectangle 61 having a major axis 62, the latter being perpendicular to the axis 60 and of substantially greater length thereby providing greater stability in a desired direction to the table when the latter is extended, as shown in Fig. 2. The axis 62 is parallel to the major axis of the top surface of the table top, as shown in Fig. 2.

Referring now to Figs. 3—6, a further form of the invention will now be described which has features somewhat similar to the form of Figs. 1 and 2 in that the major axis of the rectangle defined by the feet of the table legs can be shifted 90° in response to the expansion or contraction of a pantograph element. However, an additional feature is provided in the embodiment of Figs. 3–6, in that the level of the table is changed in response to the expansion or contraction of such pantograph element. Thus a relatively small table, such as a cocktail table, may be provided by this form of the invention which is relatively low in height. Such cocktail table can be converted to one having a relatively much larger table top surface at a higher level (such as a dining table) by the extension of such pantograph element. Suitable table top means are provided which are adapted for being increased in area, as will appear hereinafter.

The form of the invention shown in Figs. 3–6 includes a primary pair of table legs 63 and 64 which are joined by a hinge 65 at a point intermediate the extremities but near the tops thereof whereby such legs can be spread or closed in response to relative movement about the axis of such hinge 65. A secondary pair of table legs 66 and 67 are similarly joined by a hinge 68. Such primary and secondary pairs of hinged table legs are operatively connected together to form a pantograph element by means of at least one pair of intermediate pantograph arms 69 and 70 which are hingedly joined intermediate the ends thereof by means of a hinge 71.

The outer extremities of said intermediate pantograph arms are hingedly connected to the respective inner and upper extremities of the aforementioned table legs 63, 64 and 66, 67. Thus one pair of outer extremities 69*a*, 70*a* of said intermediate arms 69, 70 are respectively joined by hinges 72 and 73 with the inner upper extremities of the primary pair of legs 63, 64. The other pair of outer extremities 69*b* and 70*b* of such intermediate arms are joined by hinges 74 and 75 to the respective inner and upper extremities of the secondary pair of hinged table legs 66, 67.

As is well shown in Fig. 4, the table legs, such as 66 and 67, are generally angularly disposed with respect to a table top 76 of the table 77 of Figs. 3–6 and extend downwardly from the undersurface from the central region therebeneath occupied by the pantograph above described.

The ability of the aforementioned leg and pantograph construction to raise and lower the table top 76 and concurrently to change the direction of the major axis of the rectangle defined by the feet, as aforementioned, is dependent upon a particular dispostion of the hinges of the pantograph of this embodiment. The axis of the hinge of each pair of hinged legs converges at a common point with the axes of the hinges at the upper extremities of such pair of hinged legs, the table being in normal operaing position, namely on its feet, as shown in Fig. 4. Thus, as is well shown in such Fig. 4, the axis 78 of the hinge 68 converges at a point 79 (when the table is low) with the axes 80 and 81 respectively of the hinges 74 and 75. A similar relation exists between the axes of the hinges 65, 72 and 73, as is well shown in Fig. 6, wherein such axes all converge upon a common point 82 (when the table is high), although the invention is not limited to all of such axes so converging at a common point inasmuch as the pantograph element of this form of the invention may include more than one pair of intermediate pantograph arms whereupon the point of convergence (as at 82*a*) of the axes 78, 80 and 81 would be spaced from the point of convergence (as at 82*b*) of the axes of the hinges 67, 74 and 75. A line pressing through such spaced points of convergence must be horizontal. The point 82 is somewhat lower than point 79. The change in level of the table top responsive to movements of the pantograph is a function of the vertical distance to the table top from a point midway between points 79 and 82.

The change in height of the table which occurs in response to extending the pantograph 22 is well shown by a comparison of Figs. 4 and 5, both being side elevations.

The means for associating the table top 76 with the pantograph will now be described. Such table top 76 comprises a central rectangular portion 83 which, by means of a pin 84, is secured to a pair of cross-support arms 85 and 86 (Fig. 3). The latter cross-support arms 85 and 86 are crossed and held in pivotal engagement by suitable means including said pin 84, the latter being of sufficient length to engage a slotted guide member 87 which is secured to the undersurface of the center table portion 83 and is perpendicular to the axis of extension of the pantograph element (Fig. 3). Such slotted member 87 may be connected to the undersurface of the table top portion 83 by means of bolts 88 and 89 which hold such slotted guide member in the attitude aforementioned but which permit said guide member 87 to shift toward and away from the undersurface of the table top portion 83 and thereby provide some freedom of movement in a vertical direction for the table top portion 83 with respect to the pantograph element. Such guide element 87 is provided with a slot 87*a* which guides a pin 90, the latter being pivotally connected to a pair of pantograph guide arms 91 and 92. Such pantograph guide arms are in the form shown respectively secured to the top surfaces of the cross-support arms 85, 86 and respectively are in alignment with the upper portions of the table legs 67 and 64 for the purpose of insuring that the central table top portion 83 remains perpendicular to the axis of extension of the pantograph element.

The table top 76 also includes a pair of table top side portions 93 and 94 (Fig. 6) which are respectively operatively connected to extremities 85*a*, 86*a* (Fig. 3) of the arms 85, 86, respectively, and to the extremities 86*b*, 85*b* also of such arms.

The table top side portions 93, 94 can be brought together into substantially adjacent coplanar relationship but with the inner side edges thereof separated by the dimension 95 (Fig. 3) comprising substantially the width of the slotted guide arm 87. Such table top side portions 93, 94, in the relative position shown in Figs. 3 and 4, are beneath the table top central portion 83 which, as in Fig. 4, has been shifted upwardly to permit the sliding therebeneath of such portions 93, 94. However, in Fig. 6 such table top side portions 93 and 94 are spread to their full extent and are held in such spread condition by the center table top portion 83 which thus acts as a spacer element therebetween and holds the table top in steady condition.

The extremities 85*a*, 86*a* of the arms 85, 86, by means of pins 96 and 97, engage slots 98 and 99, respectively, which are formed in the undersurface of the table top side portion 93. Such slots are canted in such a way to facilitate the spreading and contraction of the pantograph element. Analogously the extremities 85*b* and 86*b* of such arms are operatively associated with side element 94 by means of pins 100 and 101 which engage slots 102 and 103 respectively formed in the undersurface of side element 94.

Thus extension of the pantograph from its contracted condition of Fig. 3 causes the table top side portions 93, 94 to spread apart and eventually to be spaced sufficiently to permit the central table top portion 83 to drop therebetween thereby holding same in spaced relationship until such portion 83 is suitably lifted to permit the bring-

ing together or contraction of the side portions 93, 94 in response to the contraction of the pantograph element.

The extremities 85*a*, 86*a* preferably are resiliently urged together by means of a spring 104. Similarly the extremities 85*b*, 86*b* of arms 85, 86 are resiliently urged together by a spring 105.

Alternative table top means can be employed of the so-called flip-over variety in lieu of that above described wherein one half portion of a table top element is associated with the pantograph element and the other one half portion is hingedly connected to such first half portion and adapted to be moved into face-to-face relation therewith, or flipped over coplanar with the first half portion thereby doubling the area of the table top when the pantograph element is suitably extended for supporting the flipped-over portion.

The form of the invention shown in Figs. 8–12 will now be described which is similar to the form of Figs. 3–7 in that the axis of stability of the legs can be shifted 90° concurrently with raising or lowering the table and also such axis of stability can be made longer in response to the raising of the table.

Such form of the invention shown in Figs. 8–12 includes a table top which is constructed and arranged to present a small or relatively contracted top surface in one operative position thereof (Fig. 8) and alternatively to present a relatively expanded or larger top surface in another operative position (Fig. 12), the major axes of such areas being perpendicular. Two pairs of table legs **106**, **107** and **108**, **109** are employed comprising portions of a pantograph mechanism which is vertically expansible and which, when contracted, permits the table top to be at a low level but when expanded raises the table top substantially. Such table top is indicated at **110** and includes separable portions **111** and **112** having a line of demarcation **113** therebetween when closed (Fig. 8).

Novel means are provided for operatively interconnecting said legs **106**—**109** to said table top **110** whereby in a first position of the legs the table top is at a low level and the axis of stability is in a given direction parallel and beneath the aforementioned line **113**, the table in such low position being designed for use with the table top portions **111** and **112** pressed together along a side edge as shown in Fig. 8. In a second position of such legs, the table top **110** is at a higher level and said feet of the legs are changed in attitude to define an axis of stability which is perpendicular to that first mentioned and thus is substantially parallel to and beneath the major axis of the table top, the latter being in an expanded condition. The expansion of the table top surface in this form of the invention (Figs. 8–12), however, does not occur in response to the extending of the pantograph mechanism as is the case in the embodiment of Figs. 3–7 although it is possible operatively to interconnect the pantograph mechanism of such embodiment of Figs. 8–12 to the table top surface to produce such expansion of the latter surface.

The means for operatively associating the table top **110** with the legs **106**—**109** includes the following: A base frame member **114** is provided having two pairs of spaced slots **115**, **116** and **117**, **118** formed therein. The slots of each pair, such as **115** and **116**, are in alignment with one another and are parallel to and spaced from the slots of the other pair **117**, **118**. A primary pantograph element **119** (Fig. 9) is provided which includes two subelements **120** and **121** connected by a first hinge **122** to one another for relative angular movement along a horizontal axis (when the table is on its feet), such axis being intermediate the extremities thereof. The upper extremities of each of such subelements is provided with a pair of coaxial fingers at opposite corners thereof for engaging two corresponding slots of said pairs of slots **115**, **116** and **117**, **118**. That is, fingers **123** and **124** are provided for engaging the slots **115** and **117**, and the fingers **125** and **126** are provided for engaging the slots **116** and **118**. Such slots are horizontally disposed. By virtue of such finger and slot engagements aforementioned, the two upper extremities of the subelements can be spread apart or relatively closed without tipping the table top.

A secondary pantograph element **127** is provided including two subelements **128** and **129** which are joined by a second hinge **130** to one another intermediate their extremities. The upper extremities of said secondary subelements are hingedly connected to the lower extremities of corresponding of said primary subelements **120** and **121**, respectively, by third and fourth hinges **131** and **132**. The axes of said second, third and fourth hinges **130**, **131** and **132** converge to a common point **133** situated below said table top and at one side of said primary pantograph element.

A tertiary pantograph element **134** is provided spaced from and on the other side of the primary pantograph element and includes two subelements **135** and **136** which also are hingedly interconnected by a fifth hinge **137** intermediate the extremities thereof. The upper extremities of said secondary subelements **135** and **136** are hingedly connected to the lower extremities of corresponding of said primary subelements **120** and **121**, respectively, by sixth and seventh hinges **137** and **138**, respectively.

The axes of said fith, sixth and seventh hinges converge at a common point **139** below the table top but on the opposite side thereof with respect to the point **133**.

Because of the special attitude of the hinges aforementioned, wherein the axes thereof converge at the points **133** and **139**, the aforementioned shifting of the axis of stability of the legs **106**—**109** occurs in response to the moving of the above-described pantograph mechanism to an extended or contracted condition, such axis of stability being greater when the table is raised than when the table is lowered.

A detent mechanism for holding the pantograph mechanism in its extended condition will now be described, reference being had to Fig. 11 wherein a manually controllable detent **140** is shown mounted upon the frame member **114** for resilient movement about its longitudinal axis by virtue of springs **141** and **142** which coact respectively with mounting screws **143** and **144**. The detent member **140** is provided with slots **140***a* and **140***b* for engaging and holding rods **120***a* and **121***a* in their closest position. The rods **120***a* and **121***a* are, illustratively, respectively coaxial with the pairs of fingers **123**, **124** and **125**, **126**.

Thus when the pantograph mechanism of Fig. 8 is fully extended and the rods **120***a* and **121***a* are close together, the detent **140** will hold same in such condition thereby making the table top steady. When it is desired to lower the table, the detent is shifted angularly along its longitudinal axis thereby releasing the rods **120***a*, **121***a* from such slots and permitting the rods to spread to the relative positions shown in Fig. 8 wherein the pair of fingers **123**, **124** and **125**, **126** move to the outermost extremities of their respective horizontal slots in which condition the table top is in its lowermost position.

Suitable extension arms **145** and **146** (Fig. 12) are operatively connected with the table top portions **111**, **112** for enabling the spreading thereof in a well known manner. Each of such extension arms, in the form shown, comprises three elements, one of which is rigidly secured to the frame member **114**. Corresponding pairs of slide elements of each extension arm are respectively connected to the table top portions **111**, **112**.

What is claimed is:

1. In a high-low extension table construction, a primary pair of table legs joined by a hinge at a point intermediate the extremities thereof whereby said legs can be spread or closed in response to relative movement about the axis of said hinge, a secondary pair of table legs similarly joined by a hinge, said primary and secondary

pairs of hinged table legs being operatively connected together to form a pantograph element through the intermediary of at least one pair of intermediate pantograph arms pivotally associated intermediate the ends thereof, one pair of outer extremities of said intermediate arms being connected by a pair of hinges with the upper extremities of said primary pair of hinged legs, and the other pair of outer extremities of said intermediate arms being connected by a pair of hinges with the respective upper extremities of the secondary pair of hinged table legs, the axis of the hinge of each pair of hinged legs converging at a common point with the axes of the hinges at the upper extremities of such pair of hinged legs, the table being in operating position, whereby in response to the moving of said pantograph element to a contracted condition the height of the top surface thereof is at a primary level and the feet of said legs form a rectangle the major axis of which extends in a selected direction, and in response to moving said pantograph element to an extended condition the height of the latter is raised to a secondary level above said primary level and said legs are reoriented whereby the feet thereof form a rectangle, the major axis of which is substantially perpendicular to said first-mentioned major axis; and table top means connected to said pantograph element, said table top means including a pair of table top side subelements respectively slidably connected to said pantograph on opposite sides of the center thereof and in a horizontal attitude and thereby adapted to be spread apart in response to the expanding of said pantograph element, said table top means also including a central table top subelement connected to said pantograph element and held substantially in a central horizontal position relative thereto by connecting means which permits relative vertical movement with respect thereto whereby in response to the spreading of said side subelements to a selected degree equal at least to the width of said central table top element, the latter is movable from a superposed position above said side subelements into a position between said side subelements thereby to restrain the latter from movement toward the center of the pantograph element.

2. A primary pair of legs joined by a hinge at a point intermediate the extremities but near the tops thereof whereby said legs can be spread or closed in response to relative movement about the axis of said hinge, a secondary pair of legs similarly joined by a hinge, said primary and secondary pairs of hinged legs being operatively connected together to form a pantograph element by means of at least one pair of intermediate pantograph arms hingedly connected intermediate the ends thereof, one pair of outer extremities of said intermediate arms being connected by a pair of hinges with the upper extremities of said primary pair of legs, and the other pair of outer extremities of such intermediate arms being connected by a hinge with the respective upper extremities of the secondary pair of hinged legs, the axis of the hinge of each pair of hinged legs converging substantially at a common point with the axes of such hinges at such upper extremities of such pair of hinged legs, whereby in response to the moving of said pantograph element to a contracted condition the height thereof is at a primary level and the feet of said legs form a quadrangle, and in response to moving said pantograph element to an extended condition the height of the latter is raised to a secondary level above said primary level and said legs are repositioned whereby the feet thereof form another quadrangle one of said quadrangles being a rectangle.

3. In a table, a primary pair of table legs hingedly connected at a point intermediate the extremities but near the tops thereof to permit said legs to be spread or closed in response to relative movement about the axis of said hinge, a secondary pair of table legs similarly connected to one another, said primary and secondary pairs of hinged table legs being operatively connected together to form a pantograph element through the intermediary of at least one pair of intermediate crossed pantograph arms hingedly connected intermediate the ends thereof, one pair of outer extremities of said intermediate arms being hingedly connected with the upper extremities of said primary pair of table legs, and the other pair of outer extremities of such intermediate arms being hingedly connected with the respective upper extremities of the secondary pair of hinged table legs, the axis of said hinges substantially converging at a common point beneath said table, the height of the top surface of said table being at a selected level and the feet of said legs form a rectangle the major axis of which extend in a selected direction in response to contraction of said pantograph element, and in response to extending said pantograph element, the height of the latter is raised to a level above said first-mentioned level and said legs are reoriented the feet thereof forming a rectangle, the major axis of which is substantially perpendicular to said first-mentioned major axis; and table top means connected to said pantograph element.

4. In a high-low table, a table top, four table legs, and means for mounting said legs and interconnecting same to said table top comprising: a pantograph having a plurality of hingedly connected arms including a center pair of arms hingedly connected by hinge means intermediate their extremities and also including two pairs of outermost arms, the arms of each latter pair being hingedly connected intermediate their extremities, the two pairs of outer ends of said center pair of arms being hingedly connected to respective inner ends of said two pairs of outermost arms, said four legs being respectively connected to said outermost arms and comprising downwardly protruding extensions thereof, the axes of the hinges at the inner ends of each pair of such outermost arms substantially converging at a common point with the axis of said hinge means interconnecting such center pair of arms.

5. In a high-low table, a table top, four table legs, a pantograph element, means for connecting said pantograph element beneath said table top to permit lengthening and shortening of said element along a primary path which is parallel to said table top, said pantograph element being constructed and arranged for expanding and contracting along a secondary path perpendicular to said primary path in response to extension and contraction of said pantograph element along said primary path thereby to raise and lower the table top, said pantograph element having a plurality of pairs of hinged arms in pantograph-like interconnection, the two arms of each such pair being connected by a main hinge means intermediate the extremities thereof, the adjacent extremities of successive pairs of arms being interconnected by a pair of end hinge means, said four legs of said table comprising extensions of the two outermost pairs of arms of such pantograph element, the construction and arrangement of said pantograph element to accomplish such raising and lowering of said table top comprising the following: the hinge axis of the main hinge means of each such outermost pair of arms substantially converges with the axes of its two end hinge means at a region beneath said table top.

6. In an extension table, a primary pair of table legs connected by a hinge at a point intermediate the extremities thereof to permit said legs to be spread or closed in response to relative movement about the axis of said hinge, a secondary pair of table legs similarly connected by a hinge, said primary and secondary pairs of hinged table legs being operatively connected together to form a pantograph element through the intermediary of at least one pair of intermediate pantograph arms hingedly associated between the ends thereof, one pair of outer extremities of said intermediate arms being connected by a hinge with the upper extremities of said primary pair of legs, and the other pair of outer extremities of said intermediate arms being connected by a hinge with the

respective upper extremities of the secondary pair of hinged table legs, the axes of said hinges substantially converging at a common point beneath said table, the height of the top surface of said table being at a primary level and the feet of said legs form a quadrangle, in response to the movement of said pantograph element to a contracted condition, and in response to movement of said pantograph element to an extended condition, the height of the latter is changed to a secondary level and said legs are reoriented whereby the feet thereof form another quadrangle one of said quadrangles being a rectangle.

7. In a table construction, a primary pair of table legs hingedly connected at a point intermediate the extremities thereof to permit said legs to be spread or closed in response to relative movement about the axis of said hinge, a secondary pair of table legs similarly connected with one another, said primary and secondary pairs of hinged table legs being operatively connected together to form a pantograph element through the intermediary of a pair of central pantograph arms hingedly connected near the centers thereof, one pair of outer extremities of said central arms being hingedly connected with the upper extremities of said primary pair of legs, and the other outer extremities of said central arms being hingedly connected with the respective upper extremities of the secondary pair of hinged table legs, the axis of said hinges converging at a common point beneath said pantograph element when the table legs are in operating position, the height of the top surface of said pantograph element being at a primary level and the feet of said legs form a rectangle in response to the contracting of said pantograph element, the major axis of which rectangle extends in a selected direction, and in response to extending said pantograph element, the height of the latter is raised to a secondary level above said primary level and said legs are reoriented, the feet thereof forming a rectangle the major axis of which is substantially perpendicular to said first-mentioned major axis and table top means mounted on said pantograph element.

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