

March 24, 1959

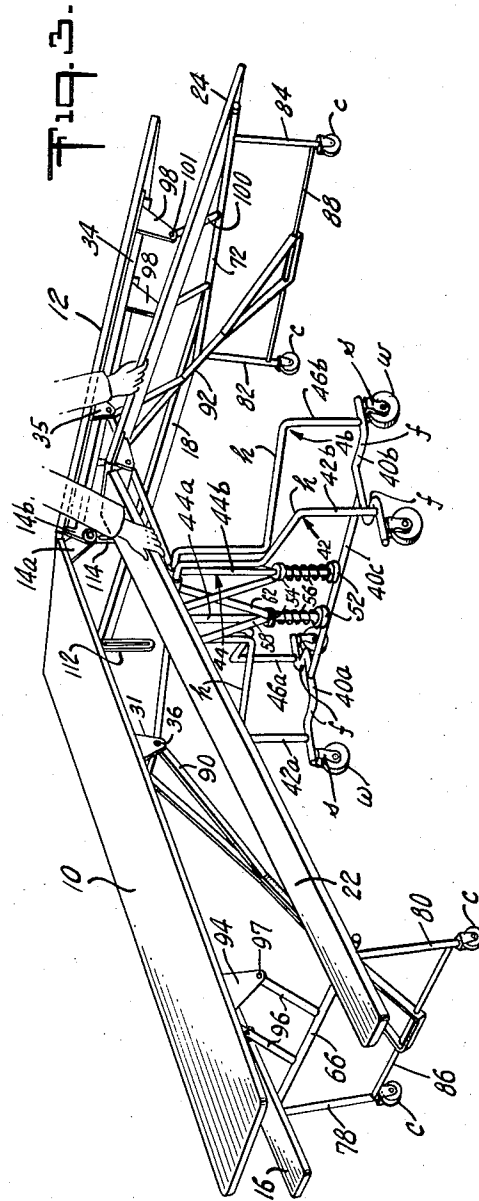
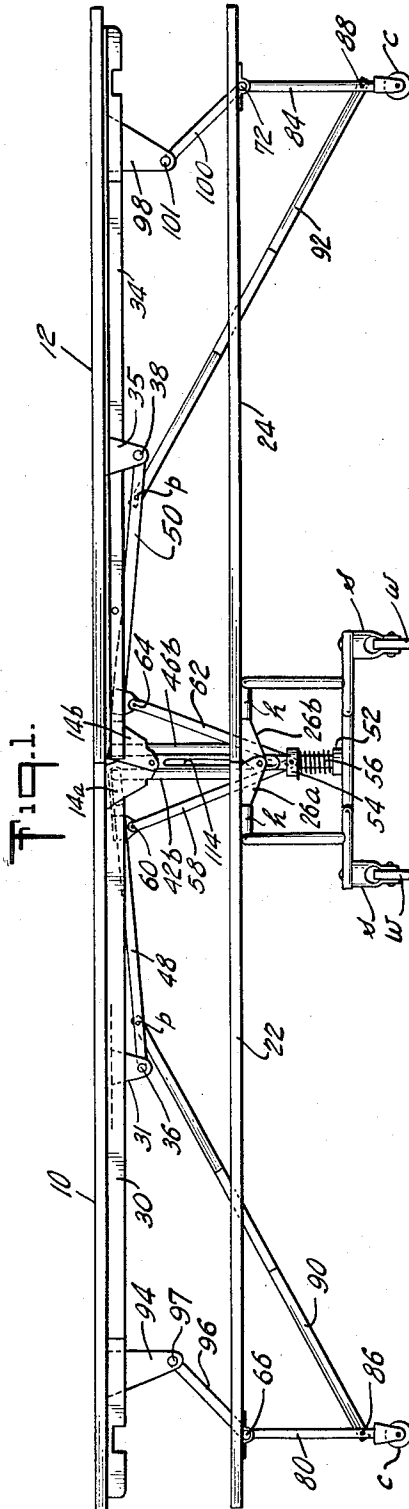
H. HOWE ET AL

2,878,859

FOLDING TABLE AND BENCHES STRUCTURE

Filed July 5, 1957

3 Sheets-Sheet 1



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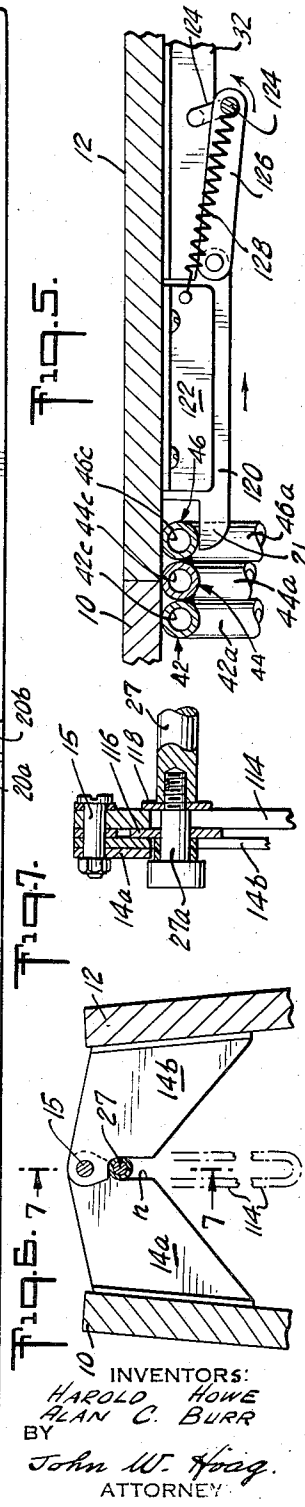
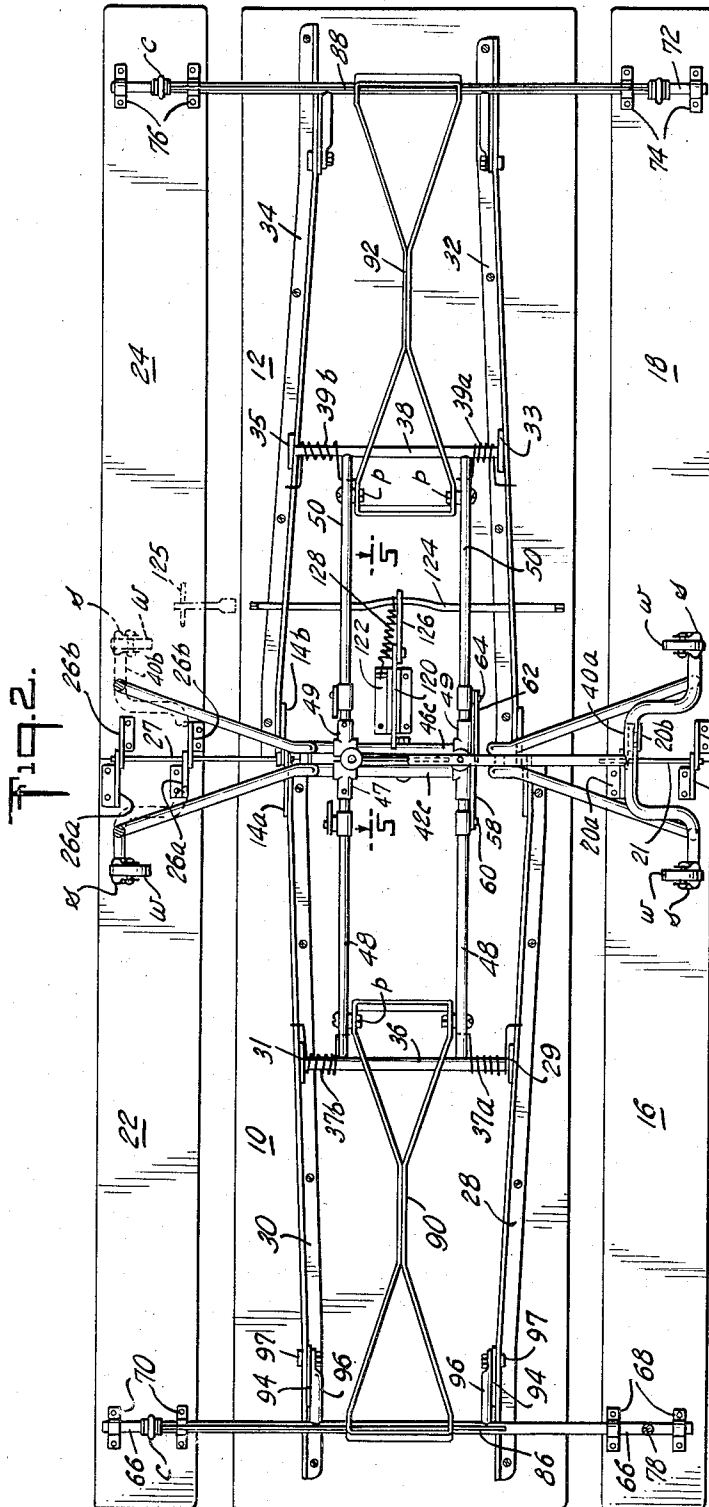
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3 Sheets-Sheet 3

Fig. 4.

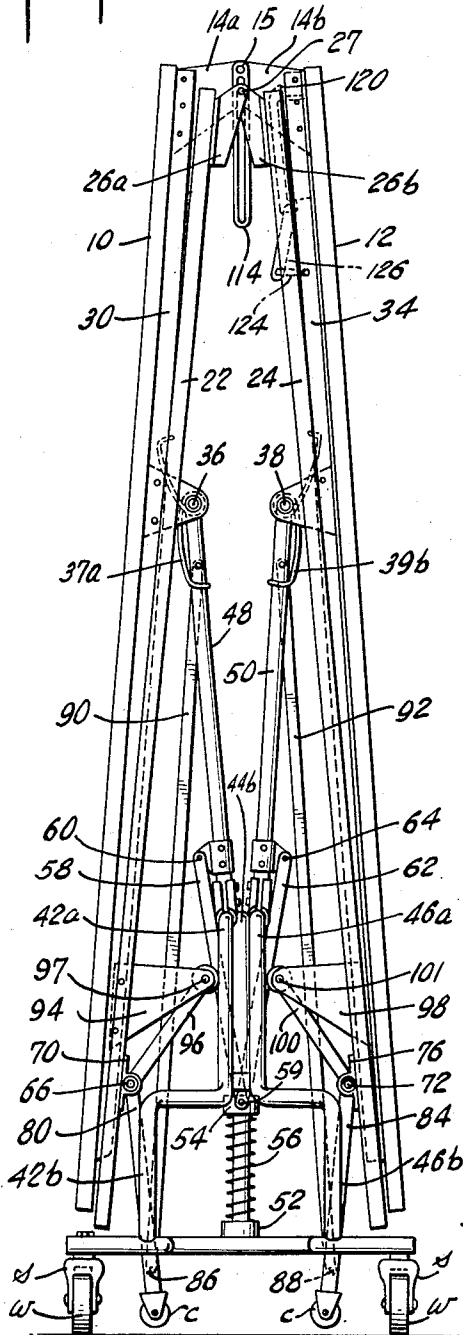


Fig. 5.

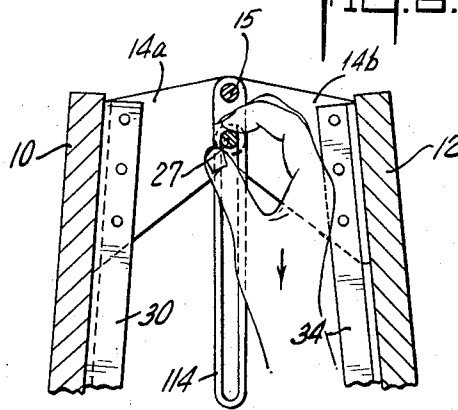


Fig. 9.

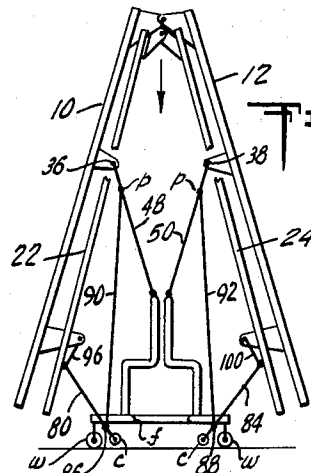
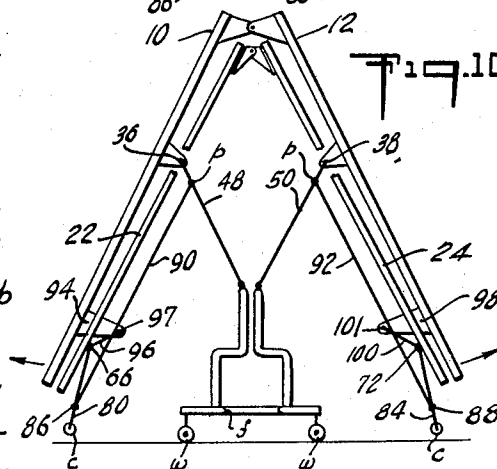


Fig. 10.



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## FOLDING TABLE AND BENCHES STRUCTURE

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Application July 5, 1957, Serial No. 670,215

21 Claims. (Cl. 155—124)

This invention relates to a folding table and benches combination characterized in that the whole structure is automatically foldable along hinged transverse lines of fold from a horizontal operative position to a folded vertical position.

Heretofore table and benches combinations have been provided in which the table top has been either tiltable for converting a table top into a backrest for a bench; or the benches have been swingingly related to the top so that they can be swung up over the lateral edges of the top; or the structure has been divided into several sections collapsible manually into several accordion-like folds, leaving some unexposed top surfaces when folded, making cleaning difficult. Previous attempts to provide a table and benches combination such that the whole structure may be automatically folded in unison along a transverse hinge line, elevating the said hinge line and drawing in the outer ends of the structure to a collapsed substantially vertical position, have failed.

An object of this invention is to overcome the deficiencies of the prior art and provide a fully automatic table and benches folding structure.

Another object of the invention is to provide support, brace and link means so interrelated that the height of the structure when folded exceeds by a minimum the length of one-half of the top, to facilitate moving the structure through doorways.

Another object of the invention is to provide support means and link means coacting to provide leverage lifting the bench parts as the structure approaches completely folded position and raising their lower ends.

Another object of the invention is to provide a table and benches combination, having a length on the order of 12' to 16' which is automatically foldable as a unit along the hinged transverse mid-line of the structure.

Another object of the invention is to provide such a structure in which the inner ends of the bench parts and the inner ends of the table top parts are interengaged when in elevated folded position and thereby steadied against lateral or rotary movement.

Another object of the invention is to provide a structure of the kind described which may be either folded upwardly along its hinged transverse mid-line or unfolded with ease, due to unique balancing and spring and lever arrangements.

Another object of the invention is to provide a structure of the kind described which when folded has a past center frictional type of lock resisting opening by a pull on a bench part, and thus preventing inadvertent and unauthorized unfolding, as by children.

Another object of the invention is to provide a structure of the kind described having center and end support means and interconnecting means such that the structure can be unfolded by a force exerted downwardly from the transverse hinged line of fold.

Another object of the invention is to provide a structure of the kind described in which the end support means share the weight of the structure during the early

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part of the folding operation and the latter part of the unfolding operation, thus facilitating these operations, and are raised from the floor during the latter part of the folding operation thus lifting their fixed castors clear of the floor and allowing the unit to be moved in any direction on the large swiveling center castors.

Another object of the invention is to provide a structure of the kind described in which the two halves are supported in folded position by single link means extending from a center support means to said halves respectively, and means are also provided in connection with the hinge means interconnecting the top parts, coacting with extensions of the hinge pins of the hinge means interconnecting the parts of the benches respectively to steady the structure in folded position.

Another object of the invention is to provide means operative near the end of a folding action to rotate the respective support means for the outer ends of the structure relative to the top parts to permit closer folding of the halves of the structure and to achieve a past center type of lock effective until the said support means are rotated relative to the top parts in the opposite direction.

Another object of the invention is to provide a structure of the above described type such that it may be completely folded or unfolded by an operator standing at one central point, on either side of the unit, without requiring him to go from end to end of the unit as in the case of all previous units of this general type.

Another object of the invention is to provide a folding structure of the kind described which is simple, durable and efficient and may be easily moved when in folded position, and which then occupies a minimum of floor space.

The invention will best be understood if the following description is read in connection with the drawings in which:

Fig. 1 is a side elevation of a structure embodying the invention, in unfolded position;

Fig. 2 is a bottom plan view of the said structure;

Fig. 3 is a perspective view showing the structure being folded;

Fig. 4 is a side elevation showing the structure in fully folded position;

Fig. 5 is a detail view partly in cross section of means by which the structure may be locked in unfolded position;

Fig. 6 is a detail view partly in cross section showing a pin extension of the bench hinge pin means received in a notch in hinge means joining the top parts thus interengaging and mutually steadying the ends of the top and bench parts which are most elevated when the structure is in folded position;

Fig. 7 is a detail side view partly in section taken on the line 7—7 of Fig. 6;

Fig. 8 is a detail view similar to Fig. 6 showing the hinge pin for the hinges joining the inner ends of a pair of benches, which in the folded position of the structure is elevated approximately six feet or more, being grasped at a point which is between the said bench hinges and a pair of table top hinges to initiate unfolding of the structure;

Fig. 9 is a schematic view indicating the correct way to unfold the structure by a force exerted downwardly from adjacent the elevated transverse hinge line of the structure, and showing unlocked position of the outer end support means achieved by rotating the outer end support means relative to the top and bench parts supported thereby, at the start of the unfolding action, and resulting from coaction between said force and means which limits rotary movement of the support means in one direction and forces them to swing in a manner to move the bench parts apart; and

Fig. 10 is a schematic view indicating the position of the outer end support means relative to the top and bench parts supported thereby which produce automatic past center locking and occurs, resisting further unfolding, when it is attempted to unfold the structure in the incorrect way by pulling outwardly on one or both halves of the benches.

As shown herein the structure comprises the table top parts 10, 12 and benches disposed on either side of the table top and spaced laterally from the table top and comprising the parts 16, 18 and 22, 24 respectively.

The table top parts 10 and 12 are joined together by hinge means each comprising leaves 14a and 14b and the pin 15. The bench parts 16 and 18 are joined together by hinge means each comprising leaves 20a and 20b and the pin 21. The bench parts 22 and 24 are joined together by hinge means each comprising leaves 26a and 26b and the pin 27.

On the under surface of table top 10 the angle members 28 and 30 are provided, spaced apart and slightly converging from their inner to their outer ends. On the under surface of table top 12 the angle members 32 and 34 are similarly disposed.

Depending from the angle members 28 and 30 in alignment transversely of the table top part 10, nearly half way from the inner end to the outer end of part 10, are the brackets 29 and 31 which serve as bearings for rotatably mounting the cross rod 36 spaced from the inner surface of table part 10. Depending from the angle members 32 and 34, in alignment transversely of the table top part 12, nearly half way from the inner end to the outer end of table top part 12, are the brackets 33 and 35 which serve as bearings for rotatably mounting the cross rod 38 spaced from the under surface of table top part 12.

From cross rods 36 and 38 link-levers 48 and 50 respectively extend to a central support on which they are pivotally mounted as will be described. The central support comprises an I base member having the end portions 40a and 40b disposed under, and parallel to, the outer lateral edges of the benches respectively, and the cross bar 40c extending transversely of the table top between the mid-points of and portions 40a and 40b. The I member is supported on wheels or casters W mounted on the ends of members 40a and 40b by swivel mounts s.

It will be noted that end portions 40a and 40b each include the inwardly extending offset portions f, against which the lower ends of support means for the outer ends of halves of the structure abut during the last part of folding the structure and the first part of unfolding the structure, effecting important results including a past center type of lock, as will be described.

Projecting up from the I member of the center support means are three inverted U-members 42, 44 and 46, the intermediate portions 42c, 44c and 46c of which are disposed in side by side relation in the same horizontal plane and provide a support surface on which the inner ends of the table top parts 10 and 12 rest when in unfolded position. The intermediate portions of the members 42, 44 and 46 may be bolted or welded together (Fig. 5).

The middle member 44 comprises the arms 44a and 44b rising vertically from the cross bar portion 40c of the I-shaped base member, and the intermediate portion 44c which is disposed directly under the interface of the abutting ends of the table top parts 10 and 12 when the latter are in unfolded position.

The members 42 and 46 are substantially U-shaped but have horizontal offset portions in their vertically extending arms. Their arms 42a and 46a and 42b and 46b rise from opposite ends of the end portions 40a and 40b respectively of the I-shaped base member and their intermediate portions 42c and 46c are disposed on opposite sides of 44c. Intermediate their ends the arms 42a, 42b

and 46a and 46b have the offset horizontal portions h, the portions h of 42a and 46a, and the portions h of 42b and 46b respectively being angled away from one another and providing support surfaces for the inner ends of the bench parts when they are unfolded. The offset portions h of portions 42a and 46a of the members 42 and 46 support the inner ends of bench parts 16 and 18 respectively, and the offset portions 42c and 46c of members 42 and 46 support the inner ends of bench parts 22 and 24 respectively. It will be noted that portions h are at a lower level than portions 42c and 46c.

Link-levers 48 and 59 are provided interconnecting the top parts respectively to the center support means. It will be understood that one link-lever 48 and one link-lever 50 may be used. As shown herein two similar members 48 and two similar members 50 are shown spaced apart laterally of the top parts respectively but the members of each pair are duplicates of one another and lie in the same plane and move together and connect the center support to the top part along the same transverse line. The duplicate link means 48 are each welded at one end to rotatable cross member 36, and at the other end are received in collars 47 which are mounted for rotation around the central support portion 42c.

Around the ends of cross member 36 the torsion springs 37a and 37b are wound. Spring 37a is wound around the portion of member 36 which is between angle member 28 and a link 48 and one end of said spring is anchored to angle member 28 and the other end is anchored to said link. Similarly spring 37b is wound around the portion of member 36 which is between angle member 30 and a link 48, and one end of said spring is anchored to angle member 30 and the other end is anchored to said link.

The duplicate link means 50 are welded at one end to rotatable cross member 38, and at the other end are received in collars 49 which are mounted for rotation around the central support portion 46c.

Around the ends of cross member 38 the torsion springs 39a and 39b are wound, the ends of spring 39a being anchored to angle member 32 and link 50 respectively and the ends of spring 39b being anchored to angle member 34 and a link 50 respectively.

The springs 37a, 37b and 39a and 39b exert force tending to rotate the top parts relative to link-levers 48 and 50 respectively and thus aid in folding the structure substantially throughout the folding step. These springs also coact with springs provided around the vertical arms 44a and 44b as will be described to initiate folding of the table top parts and the bench parts when the latch 120, by which the structure is locked in unfolded position, is moved to inoperative position.

Fixed collars 52 (Figs. 3 and 4) are provided at the lower ends of arms 44a and 44b of the center support and above said fixed collars are the sliding collars 54 spaced from the fixed collars by the compression coil springs 56. Between each sliding collar 54 and the link-levers 48 and 50 respectively the arms 58 and 62 are provided through which the force of said springs 56 is transmitted simultaneously to the table top parts 10 and 12 tending to raise the inner ends of said top parts from resting on the center support, and doing so whenever the latch means 120 is in inoperative position. Arm 58 is connected to collar 54 by pivot 59, and to link 48 by pivot 60. Arm 62 is connected to collar 54 by pivot 59 and to link 50 by pivot 64. When unfolding force is applied as illustrated in Figure 8, it is transmitted through the bench parts to the cross bars 66 and 72 causing the end support means to rotate (see Figure 9) and transmitting the unfolding action of the bench parts to the top parts through the arms 96 and 100, and the brace link members 90 and 92 and the link-lever means 48 and 50.

All six springs shown act to help fold the table and also act as shock absorbers when opening it.

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The support means for the outer ends of the structure halves comprise the cross bars 66 and 72 which extend transversely under table top parts 10 and 12 respectively, between the bench parts 16 and 22 and 18 and 24 respectively, and are mounted for rotation around their longitudinal axes, within brackets 68 and 70 on the under surface of bench parts 16 and 22 respectively, and brackets 74 and 76 on the under surface of bench parts 18 and 24 respectively. Depending from cross bar 66 are the legs 78 and 80 and depending from the cross bar 72 are the legs 82 and 84. Wheels or castors *c* are provided on the lower ends of said legs and are desirably each fixed in position on axes at right angles to the length of the structure to prevent inadvertent or unauthorized sidewise moving of the unfolded structure as by children, but allowing longitudinal movement.

Extending between legs 78 and 80 is the cross brace member 86 and extending between the legs 82 and 84 is the cross brace member 88. Cross brace member 86 is connected to the link-lever means 48 by the longitudinal brace-link member 90, and cross brace member 88 is connected to the link-lever means 50 by the longitudinal brace-link member 92. Members 90 and 92 are pivotally connected to cross members 86 and 88 for movement with said cross members and their leg means respectively. The connection of members 90 and 92 to link-lever means 48 and 50 respectively is by pivots *p* located a short distance from the ends of said links which are respectively connected to the rotatable cross rods 36 and 38. Since cross rods 36 and 38 are spaced from the under surface of table top parts 10 and 12 the pivots *p* are also spaced from the under surface of the table top parts respectively and this location contributes both to the provision of automatic past center frictional locking means, resisting unfolding of the structure from substantially folded position by a force applied as illustrated in Fig. 10 for unfolding the structure, but rendered ineffective when a force is applied as illustrated in Fig. 9 for unfolding the structure, and also to control of the folded height of the structure.

Depending from the angle members 28 and 30, and 32 and 34 near the outer ends of top parts 10 and 12 respectively, but spaced inwardly of the said top parts toward the center support means relative to the cross bars 66 and 72 of the end support means respectively, are the brackets 94, 98 to which the said cross bars are connected by arms 96 and 100 respectively which are angled outwardly from said brackets to said cross bars respectively. Arms 96 and 100 are fixed to cross bars 66 and 72 respectively for rotation with them and are pivotally connected to the brackets 94 and 98 respectively by pivots 97 and 101 respectively and their length and angular relationship to legs 78, 80 and 82, 84 together with the location of pivots *p* and pivots 97 and 101 determine the height of the structure in folded position, and together with the stops *f* provided by the center support means provide the folded structure with a safety lock resisting unfolding by pulls on the bench parts such as by children.

Arms 96 and end legs 78, 80 and arms 100 and legs 82, 84 are in effect bell cranks pivoted intermediate their ends respectively on the cross bars 86 and 88. When swung inwardly the bell cranks also swing inwardly the outer ends of brace-links 90 and 92 respectively.

In folded position, the end legs 80 and 84 (which are the lower portions of the bell cranks 96, 78, 80 and 100, 82, 84 which rotate around the axes 66 and 72 respectively) are suspended above the floor and abut against the offset portions *f* of the ends 40*a* and 40*b* of the I base member comprising part of the center support. When an unfolding force is exerted from the hinged ends of a pair of bench parts, or from the extension of the hinge pins for the hinges of these parts, as indicated in Figs. 8 and 9, force is transmitted downwardly through

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the bench parts to the cross bars 66 and 72 and thus to the legs 80 and 84 respectively. With the structure in fully folded position leg members 80 and 84 respectively are slightly inclined inwardly from top to bottom and adjacent their lower ends they abut against the inwardly extending offset portions *f* of said portions 40*a* and 40*b* of the I base member. These offset portions *f* thus act as stops preventing the lower ends of said legs from moving inward toward one another. Therefore the force exerted downwardly through the bench parts causes the lower ends of these bench parts and the top parts to move apart, with the cross bars 66 and 72 rotating in their bearings, with the result that the bell cranks 96—80 and 100—84 move from the position illustrated in Fig. 4 to the position illustrated schematically in Fig. 9.

It will be noted from reference to these two figures that in this initial unfolding movement the brace members 90 and 92 have moved inwardly across the pivots 97 and 101 respectively, which are the "centers" beyond which the braces 90 and 92 must move in order to prevent the locking effect which is obtained as illustrated schematically in Fig. 10 when it is attempted to unfold the structure as by pulling out on one or more bench parts. Force applied in that manner does not effect initial rotation of the bell cranks 96—78, 80 and 100—82, 84 to cause the brace-links 90 and 92 to move inwardly across the "centers" 97 and 101 respectively. This folded position locking action is brought about in part by providing an angular relation between arms 96 and legs 80 and between arms 100 and legs 84 and the fact that brace links 90 and 92 rotate around centers other than the centers around which the link levers 48 and 50 rotate. This results in a situation requiring the stretching of members 90, 92, or the bending of the cross bars 86 or 88 respectively, in order for the braces to move inwardly across the pivots 97 or 101 respectively from the completely folded position illustrated in Fig. 4 or the position illustrated in Fig. 10 which results from attempting to unfold the structure improperly by pulling outwardly on one or more bench parts.

The angular relation between arms 96 and legs 78, 80 and between arms 100 and legs 82, 84 together with the provision of the stops formed by the inwardly offset portions of members 40*a* and 40*b* provide leverage, causing the bench parts to be elevated as they approach fully folded position, thereby bringing the outer ends of the bench parts substantially up to the outer ends of the table part when the structure is fully folded and limiting and substantially avoiding longitudinal overlapping of the table and bench parts of each half, which would have the effect of increasing the length of each half, and thus keeping the height of the structure in folded position to a minimum, only slightly greater than the length of one-half of the table top.

Another important feature of the invention is the provision of slotted guides 112 and 114, depending respectively from the hinge pins 15 of the two pairs of hinge means 14*a*—14*b* joining the table top parts. The hinge pins 21 and 27 respectively for the two sets of bench part hinges, 20*a*—20*b* and 26*a*—26*b* are extended inwardly, across the spaces between the lateral edges of the table and the nearer lateral edges of the benches respectively, and through the slots in the respective guides 112 and 114. As folding of the structure is commenced by lifting force exerted on a pair of bench parts near the line of fold between their abutting ends, as illustrated in Fig. 3, the hinge pin of the bench parts travels upwardly in its related slot guide and when it reaches the top of its movement it transmits a lifting and folding force to the table top parts adjacent their abutting ends. Folding of the structure has already been initiated by retracting the latch plunger 120, thus allowing spring 56 and 37*a*—37*b* and 39*a*—39*b* to act, and is completed remarkably easily by continuing to

apply lifting force to a pair of bench parts, as illustrated in Fig. 3.

When unfolding force is applied as illustrated in Figure 8 it is transmitted through the bench parts to the cross bars 66 and 72 causing the end support means to rotate (see Figure 9) and the resulting unfolding action of the bench parts is transmitted to the top parts through the arms 96 and 100.

Preferably the pairs of table top hinge leaves 14a and 14b are shaped to form between them a slot or notch *n* open at the bottom to receive the extended inner ends of the bench hinge pins 21 and 27 respectively as they move upwardly in the slotted guides 112 and 114 (see Fig. 6).

The headed screws 21a and 27a are screwed into the inner ends of pins 21 and 27 respectively and members 21a and 27a extend through the slotted guides 112 and 114 respectively and the washers 116 and 118, provided on opposite sides of each of said slotted guides, and through the notches *n* provided by the two pair of table top hinges 14a—14b respectively. Thus the elevated inner ends of the top parts and the pairs of bench parts are inter-engaged when the structure is in folded position by means interconnecting their hinge means respectively, and lateral or rotative oscillatory movement of the elevated ends of said parts is inhibited.

To prevent the spring means from initiating folding of the unfolded structure, latch means is provided which comprises angle members 122 depending from the underside of top part 12, adjacent and at right angles to the cross portions 42c, 44c and 46c of the center support means. Mounted for rotation under the top part, in bearing apertures provided in the vertical arms of angle members 32 and 34, is a control rod 124, the outer end of which extends to a convenient location near a lateral edge of the top part and may terminate in a handle or an outer end fitted to receive and be rotated by a control key 125 (Fig. 2). The portion of the control rod between angle members 32 and 34 is bowed so that as it is rotated it will, through pivoted link 126, reciprocate the latch plunger 120 which is reciprocable between the angle members 122. The spring 128, between control rod 124 and one of the angle members 122, biases plunger 120 to move inward so that its inner end 121 is projected under one or more of the cross members of the center portion. Thus the structure is automatically locked in unfolded position until the latch plunger 120 is retracted by rotation of control rod 124, and when this occurs springs means 37a, 37b and 39a, 39b and springs 56 co-act to spring upwardly the inner ends of the top parts 10 and 12 from their abutting relation, after which the structure may readily be folded by folding force applied as illustrated in Fig. 3.

The "past center" means described above for resisting unfolding of the structure due to pulls on the folded bench parts provides an important safety feature which is of particular usefulness in a school, or wherever there are children, to prevent the inadvertent or undesired unfolding of the table. It is natural for children playing where there are one or more folded structures of this kind to grasp the ends of the bench parts or the ends of the top parts and pull outwardly. The table and benches structure described above is usefully embodied in a large structure of considerable weight and the provision of means resisting unfolding of the structure by children is both a convenience and a valuable safety feature.

It will be understood that although the whole structure is divided in two parts, these parts do not necessarily have to be of equal length.

There has thus been provided a structure in which the above mentioned objects are embodied together with many practical advantages.

What we claim is:

1. A folding table and benches structure comprising,

two top parts hinged together along a transverse line of fold, and two bench parts parallel with the top parts and hinged together along a transverse line of fold which is aligned with the line of fold of the top parts, a center support means having portions on which the hinged together ends of the top parts and the hinged together ends of the bench parts respectively rest when the structure is unfolded, swing arms pivoted at one end to the center support means and at their other ends to said top parts respectively, leg means for supporting the outer ends of the structure in its unfolded position including support means pivotally mounted on said bench parts adjacent their outer ends respectively, link means rigidly connected at one end to the said support means and pivotally connected at their other ends to the top parts adjacent their outer ends respectively, and brace-links pivotally connected at one end to said support means respectively and pivotally connected at the other end to said swing arms respectively.

2. The structure claimed in claim 1 including balancing arms pivotally connected at their upper ends to the swing arms respectively, a guide member disposed vertically under the hinge line of the structure, and collar means mounted for sliding movement on said guide means, the lower ends of said arms being pivotally connected to said sliding collar means.

3. The structure claimed in claim 1 in which the pivot points for the brace-links are selected to cause the end support means to swing somewhat inwardly upon the initiation of folding movement, and stop means are provided by the center support limiting the inward swinging movement of said support means and modifying their angular disposition relative to the bench parts respectively, whereby a past center type of lock is achieved resisting unfolding of the structure.

4. The structure claimed in claim 1 including means acting through the support means and brace-links for moving the bench parts respectively from a plane spaced vertically from the plane of the top parts in unfolded position into substantially the same planes as the top parts in folded position.

5. A folding table and bench structure comprising, two top parts hinged together along a transverse line of fold, and two pair of bench parts disposed on opposite sides of the top parts with the parts of each pair hinged together along a transverse line of fold which is aligned with the line of fold of the top parts, so that each top part has a bench part extending along each of its lateral edges, a center support means having portions on which the hinged together ends of the top parts and the hinged together ends of both pair of bench parts respectively rest when the structure is unfolded, link-lever arms pivoted at one end to the center support means and pivotally connected at the other end to the top parts respectively position including end support means co-acting with the link-lever arms to support the structure in its unfolded means extending under each top part adjacent its outer end and pivotally mounted on the bench parts which are disposed on opposite sides of the top part, link means rigidly connected at one end to the end support means respectively and pivotally connected at their other ends to the top parts respectively, and brace-links pivotally connected at one end to said support means respectively and pivotally connected at the other end to said link-lever arms respectively.

6. The structure claimed in claim 5 including lost motion means inter-connecting the top parts and the pairs of bench parts respectively along their lines of fold.

7. The structure claimed in claim 5 including means extending from the pairs of bench parts respectively and coacting with means carried by the top parts providing an inter-connection between the bench and top parts acting to prevent relative movement between the top parts and the bench parts when the structure is in folded position.



8. The structure claimed in claim 5 characterized by the fact that the link-lever arms, the support means for the outer ends of the parts of the structure, and said link-brace means, are so related as to move the bench parts upwardly during folding relative to the top parts, and means, co-acting with the said means by which the bench parts are elevated, to guide and steady the upper ends of the bench parts during their motion relative to the top parts.

9. The structure claimed in claim 5 in which said end support means comprise upper portions which are angularly related to lower portions respectively and said upper portions are pivotally spaced from the top halves respectively by brackets which project from the top halves a distance such that in folded position the lower portions of said end support means lie substantially parallel with, said top halves respectively.

10. A folding table and benches structure comprising, a top and two benches disposed on opposite sides of the top, the structure being divided transversely into two hinged together parts, each part comprising a top part and a part of each of the benches, said bench parts being disposed on opposite sides of the top part, a center pedestal, link-lever means pivotally connected between the center pedestal and the top parts respectively on which the two parts of the structure are swung from an abutting relation in a horizontal plane into a plurality of substantially vertical planes, said center pedestal including a vertical member, means slidable vertically on said member spring means resisting downward movement of the slidable means, and arms pivotally interconnected between said means and the link-lever means for each top part respectively, said arms serving to balance the structure in folded position and during folding, and to prevent teetering of the top and bench parts on said center pedestal, leg means pivotally connected to the top parts adjacent their outer ends respectively and to the bench parts which are on opposite sides of said top parts respectively, and means interconnecting the leg means to the link-lever means.

11. The structure claimed in claim 10 in which abutment means are provided against which said arms abut when the structure is in fully folded position, said abutment means co-acting with said arms to position and aid them in preventing teetering of the top and bench parts while the structure is in folded position.

12. A folding table and benches structure comprising, a table top divided transversely into two parts hinged together along their abutting inner ends and two benches disposed on opposite sides of the table top, each bench being divided transversely into two parts hinged together along their abutting inner ends, the hinge lines of the top and of the benches being aligned transversely of the structure, a pedestal for supporting the top and bench parts both in folded and in unfolded position, swing arms pivotally mounted at one end to the pedestal and at their other ends to said top parts respectively, and adapted to elevate the hinged together inner ends of the top parts as the table is folded and to lower the inner ends of the top parts as the table is unfolded, slotted guide means supported by the top adjacent the line of fold of the top and extending down below the level of the benches in their unfolded position, pin means carried by each bench and extending through the slot in said guideway, whereby the hinged together ends of either pair of benches may be elevated freely until the pin means carried by the bench reaches the upper end of the guideway slot in which said pin means travels, whereupon further folding force exerted on the bench parts will be transmitted to the hinged together inner ends of the top parts, leg means pivotally connected to the top and bench parts adjacent their outer ends respectively, and link-brace means pivotally interconnected respectively between said leg means and said swing arms intermediate their ends.

13. A folding table and benches structure comprising,

a top and two benches disposed on opposite sides of the top, the structure being divided transversely into two hinged together parts, each part comprising a top part and a part of each of the benches, said bench parts being disposed on opposite sides of the top part, a pedestal, link-lever means pivotally connected between the pedestal and the top parts respectively on which the two parts of the structure are swung from an abutting relation in a horizontal plane into a plurality of substantially vertical planes, said pedestal including a vertical member, means slidable vertically on said member, spring means resisting downward movement of said slidable means, and arms pivotally interconnected between said slidable means and the link-lever means for each top part respectively, said arms serving to balance the structure in folded position and during folding and to prevent teetering of the top and bench parts on said pedestal, leg means pivotally connected to the top parts adjacent their outer ends respectively and to the bench parts which are on opposite sides of said top parts respectively, and means interconnecting the leg means to the link-lever means, whereby folding and unfolding action of the top parts is communicated to said leg means respectively.

14. A folding table and benches structure comprising two top parts hinged together along a transverse line of fold, and two bench parts parallel with the top parts and hinged together along a transverse line of fold which is aligned with the line of fold of the top parts, a pedestal, swing arms pivoted at one end to the pedestal and at their other ends to said top parts respectively and adapted to elevate the hinged together inner ends of the top parts as the table is folded and to lower the inner ends of the top parts as the table is unfolded, means interconnecting the top parts and the bench parts and adapted to transmit folding action from the benches to the top parts after the inner ends of the benches have been elevated a predetermined amount and to transmit unfolding action from the top parts to the bench parts respectively after the top parts have been unfolded a predetermined amount, leg means pivotally connected to the top parts and to the bench parts parallel therewith respectively, and means interconnecting said leg means and said swing arms respectively whereby folding and unfolding action of the top parts is communicated to said leg means respectively.

15. The structure claimed in claim 14 including means slidable vertically on the pedestal, and arms pivotally interconnected between said means and link-lever means for the top parts respectively.

16. The structure claimed in claim 14, including means slidable vertically on the pedestal a pair of arms connected between said means and said swing arms, said pedestal including means against which said arms abut when the structure is in fully folded position, the abutment means co-acting with said arms in preventing teetering of the top parts while the structure is in folded position.

17. The structure claimed in claim 14, including spring means tending to initiate folding of the structure by elevating the inner ends of the top parts, and means carried by one of the top parts and engageable under a portion of said pedestal for overcoming the force of said spring means and maintaining the structure in fully unfolded position.

18. The structure claimed in claim 14, in which the pedestal comprises a plurality of inverted U-shaped members on the intermediate portions of which the inner ends of said top parts respectively rest when the structure is in unfolded position.

19. The structure claimed in claim 14, in which the pedestal comprises an inverted U-shaped member, collars are slidably mounted on the respective upright outer portions of said member, a pair of arms are pivotally connected between each collar and the respective members of a pair of link-levers, and means are provided against which the arms independently abut when the structure is completely folded.



20. A folding table and benches structure comprising, a table top divided transversely into two parts hinged together along their abutting inner ends, and two benches disposed on opposite sides of the table top each bench being divided transversely into two parts hinged together along their abutting inner ends, the hinge lines of the top and the benches being aligned transversely of the structure, means for supporting the structure including, a pedestal having portions at different levels on which the inner ends of the top and bench parts respectively rest when the structure is unfolded, swing arms mounted for rotation on the upper level of the pedestal and pivotally connected to the top parts respectively nearer the inner ends than the outer ends of the top parts, end support means pivoted to the top and bench parts respectively adjacent their outer ends, and means interrelating the end support means, the swing arms, the top parts, and the bench parts for simultaneous movement of the structure from unfolded position, in which the top parts lie in one horizontal plane and the bench parts lie in a lower plane parallel to the plane of the top, to a folded position in which the hinged together parts of the structure lie in substantially parallel vertical planes with two bench parts disposed on opposite sides of each top part and substantially in the same vertical plane as the top part.

21. A foldable table and benches structure comprising, a table top divided transversely into two parts hinged together along their abutting inner ends and two benches disposed on opposite sides of the table top, each bench being divided transversely into two parts hinged together along their abutting inner ends, the hinge lines of the top and of the benches being aligned transversely of the structure, means for supporting the structure including, a

center support having portions on which the top and bench parts respectively rest when the structure is unfolded, end support means pivoted to the top and bench parts respectively, and means inter-relating the top and bench parts for movement of the benches from unfolded position, in which the top parts lie in one horizontal plane and the bench parts lie in a lower plane parallel to the plane of the top, to a folded position in which the hinged together inner ends of the top and bench parts are elevated and each top part and the bench parts which are disposed on either side of a top part lie in substantially the same vertical plane, the end support means each comprising a bell crank rigidly mounted on a cross rod which is pivotally mounted on, and extends between, the bench parts which are disposed on opposite sides of a top part, each bell crank assembly comprising leg means extending downwardly from the cross rod to the floor and arm means extending from the cross rod at an angle inwardly and upwardly to the top part, link-lever means pivotally connected to the top parts respectively and rotatable on said center support means for controlling the movement of the top parts between folded and unfolded position, and brace-link means pivotally connecting the end support means to the link-lever means respectively.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 2,878,859

March 24, 1959

Harold Howe et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 43, for "and portions" read -- end portions --; column 4, line 12, for the numeral "59" read -- 50 --; column 8, line 54, after "respectively" insert a comma; line 55, strike out "position including" and insert the same after "unfolded" in line 56, same column.

Signed and sealed this 28th day of July 1959.

(SEAL)

Attest:

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