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(54) **SAFETY INTERLOCK BRAKING SYSTEM FOR HEIGHT ADJUSTABLE TABLE**

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(52) **U.S. Cl.** **108/147**; 248/188.2
(58) **Field of Search** 108/147, 144.11, 108/146, 148, 10; 248/188.5, 162.1, 188.2

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,976,016	A	*	8/1976	Longbottom	
4,747,353	A	*	5/1988	Watt	108/147 X
4,981,085	A		1/1991	Watt	108/147
5,289,782	A	*	3/1994	Rizzi et al.	108/147
5,311,827	A	*	5/1994	Greene	108/147
5,438,939	A	*	8/1995	Clarke	108/144.11
5,456,191	A	*	10/1995	Hall	108/147
5,598,788	A	*	2/1997	Jonker	108/147
5,598,789	A		2/1997	Jonker	108/147
5,682,825	A	*	11/1997	Manner	108/147 X
5,687,655	A	*	11/1997	Weinschenk, Jr. et al.	108/147
5,778,799	A	*	7/1998	Eyre	108/147 X
5,778,803	A	*	7/1998	Machael	108/147
5,797,331	A		8/1998	Watt	108/146
5,941,182	A	*	8/1999	Greene	108/147
6,026,755	A	*	2/2000	Long	108/147
6,038,986	A	*	3/2000	Ransil et al.	108/147 X
6,152,049	A	*	11/2000	Schmidt	108/147

* cited by examiner

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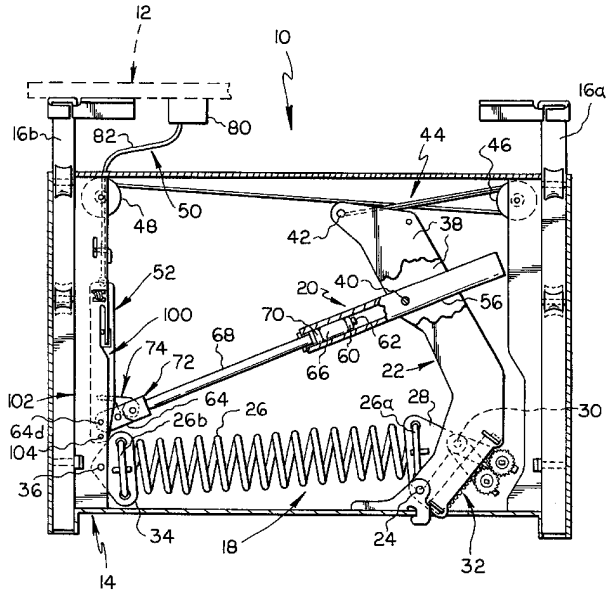
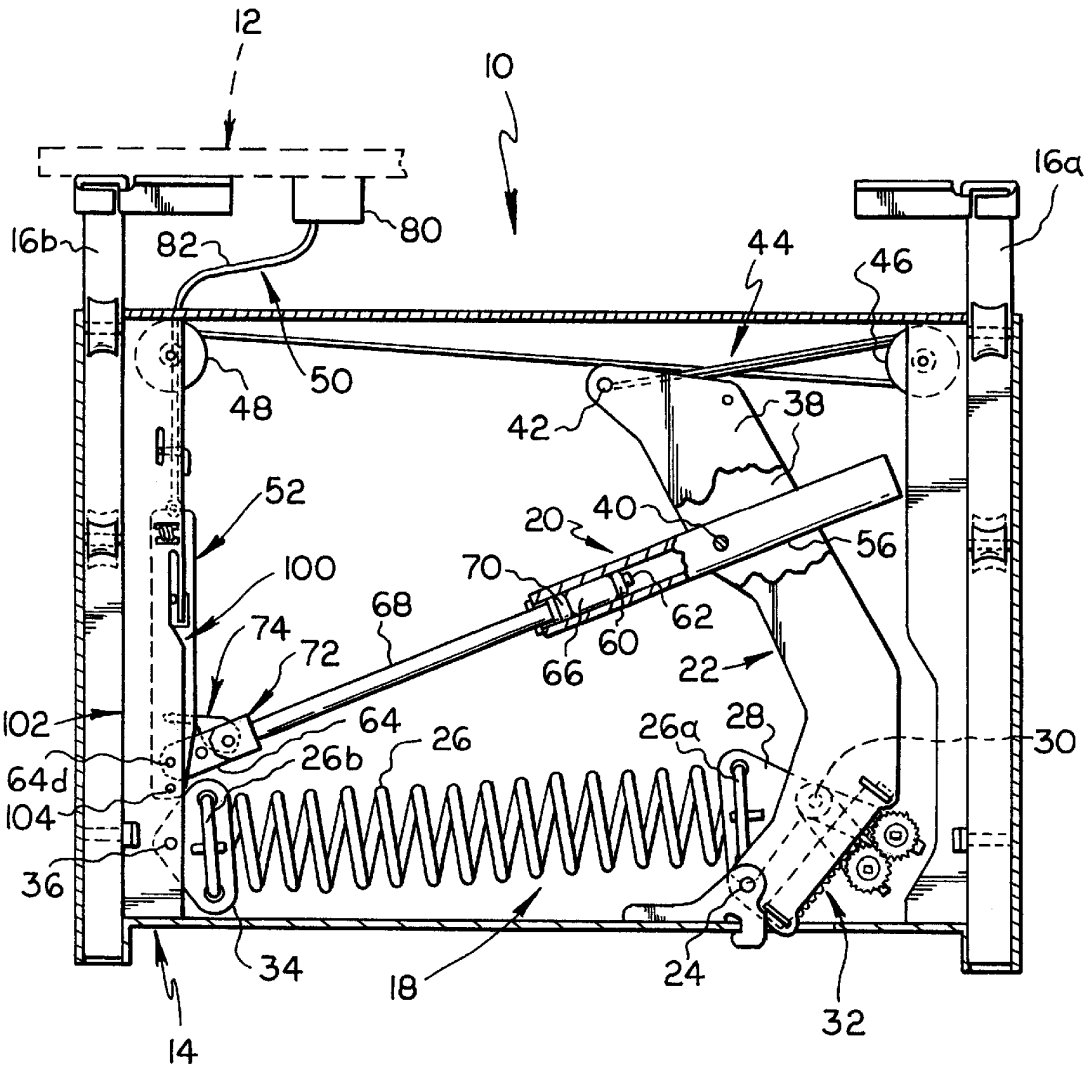
(57) **ABSTRACT**

A height adjustable mechanism for supporting a work surface for vertical movement relative to a base includes a counterbalance mechanism for providing a force opposing a downward force tending to lower the work surface; a brake mechanism for releasably retaining the work surface in a desired vertical position; a user operated release mechanism for selectively releasing the brake mechanism to permit vertical movement of the work surface; and an interlock mechanism for preventing release of the brake mechanism if the force and the downward force are out of balance by some given extent. In the preferred construction, the interlock mechanism includes an interlock plate supported by the base for pivotal movement between first and second blocking positions when the force is less than and greater than the downward force, respectively, through a neutral position when the force essentially corresponds to the downward force, and the release mechanism engages with the interlock plate when in the blocking positions thereof to prevent release of the brake mechanism by a user.

15 Claims, 7 Drawing Sheets

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74
72
60
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26a
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64d
26b
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14

FIG. 1

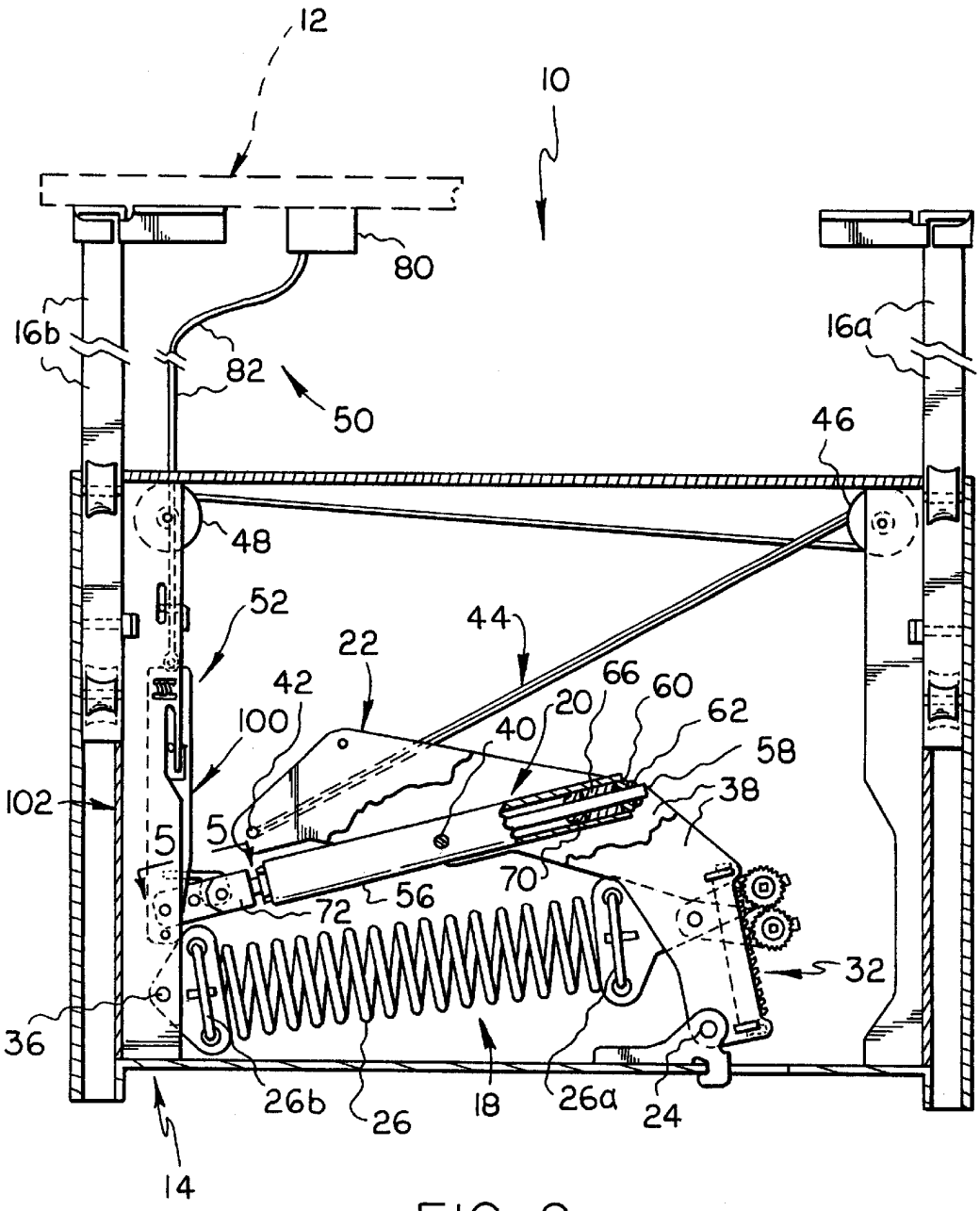
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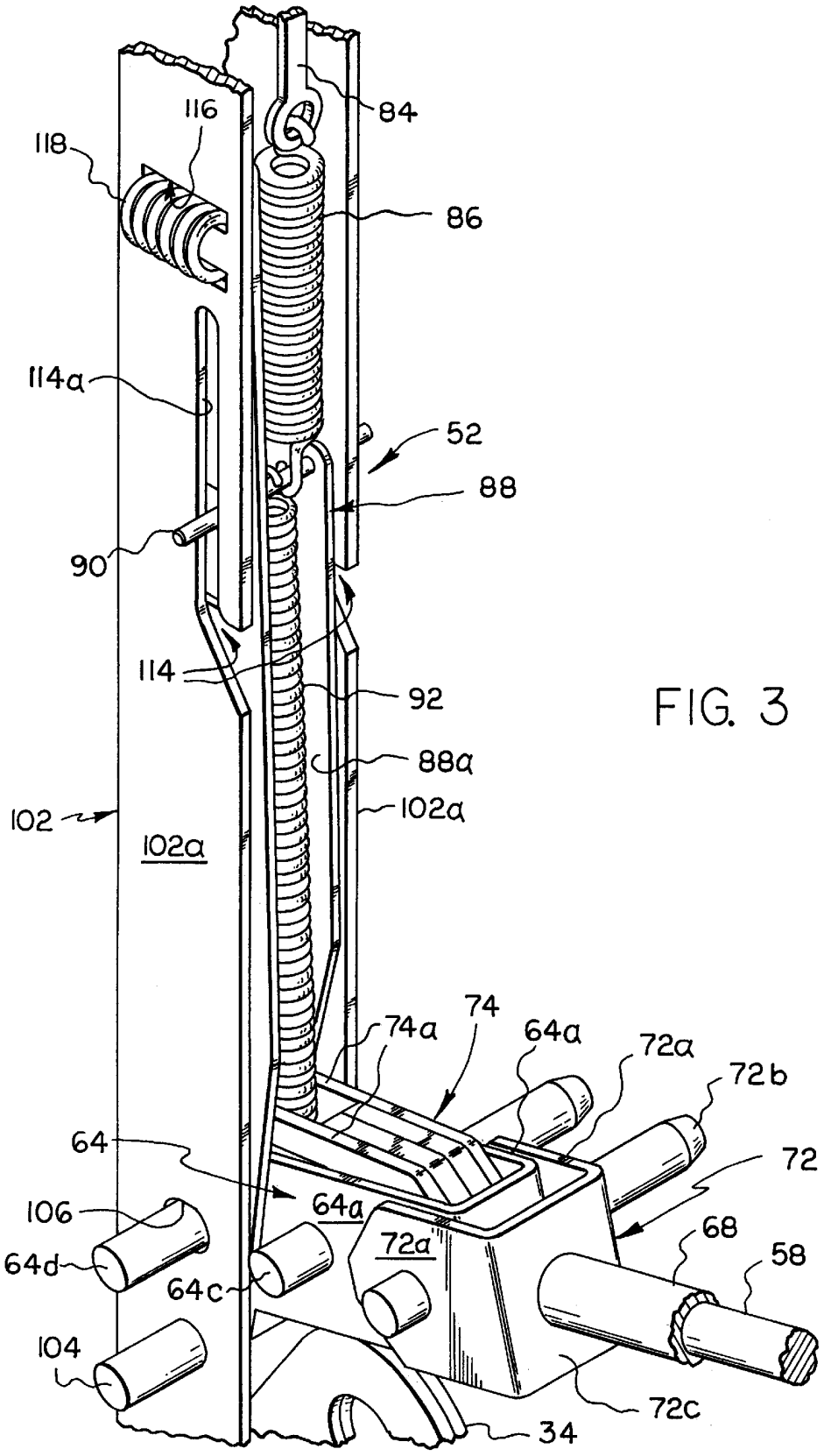
FIG. 2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118
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114a
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114
92
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102a
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102a
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74a
64a
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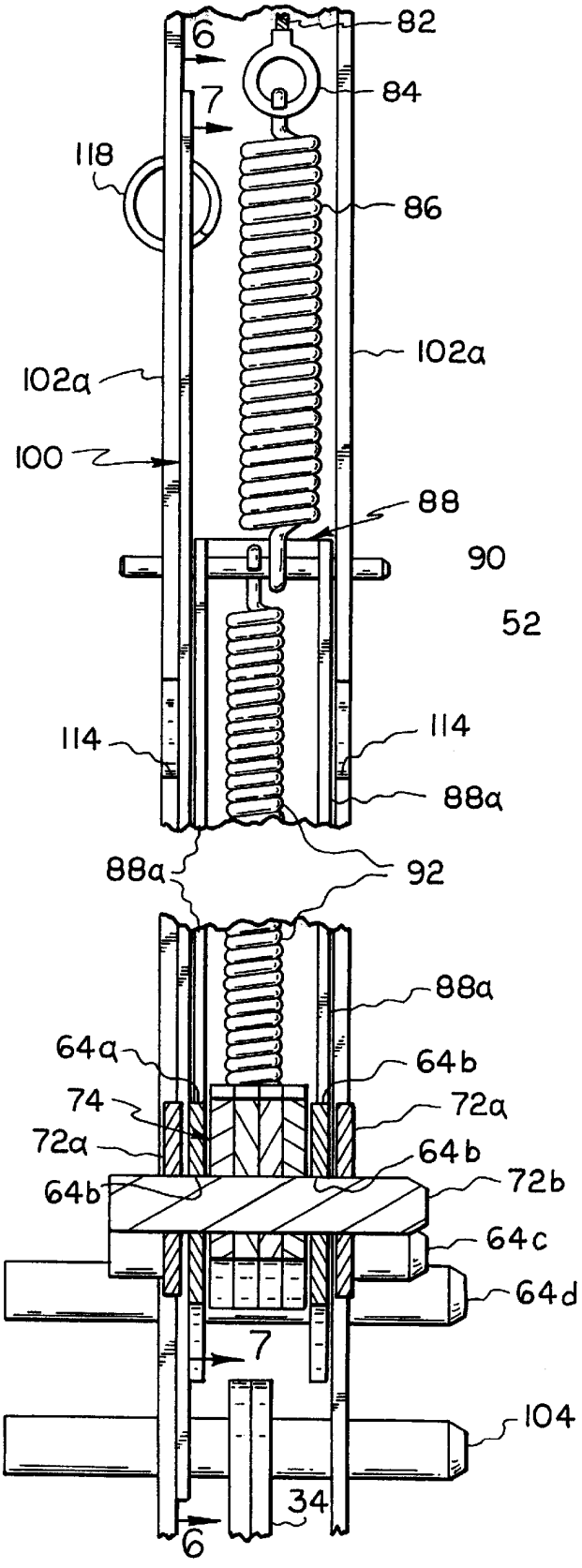
72b
64
72
64a
106
72a"
68
64d
58
64c
104
72c
34

FIG. 3

FIG. 4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64b
72b
64c
64d
7
104
34
6

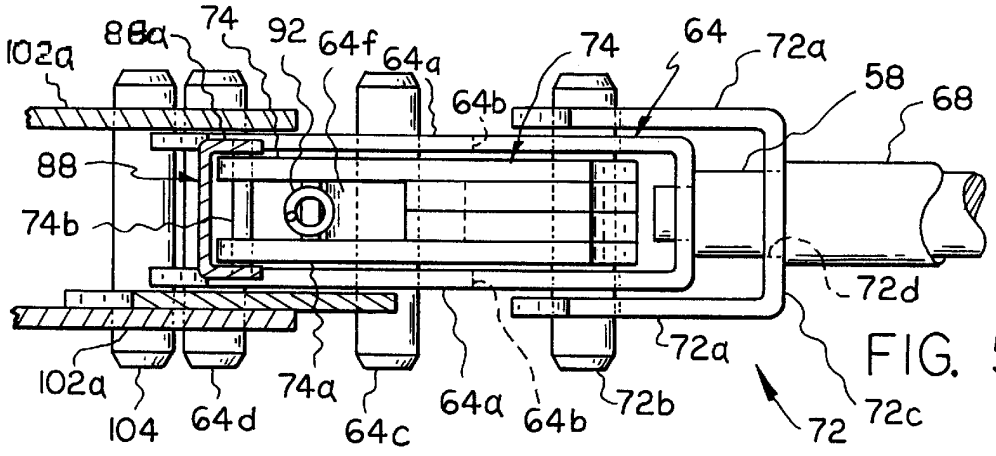


FIG. 5

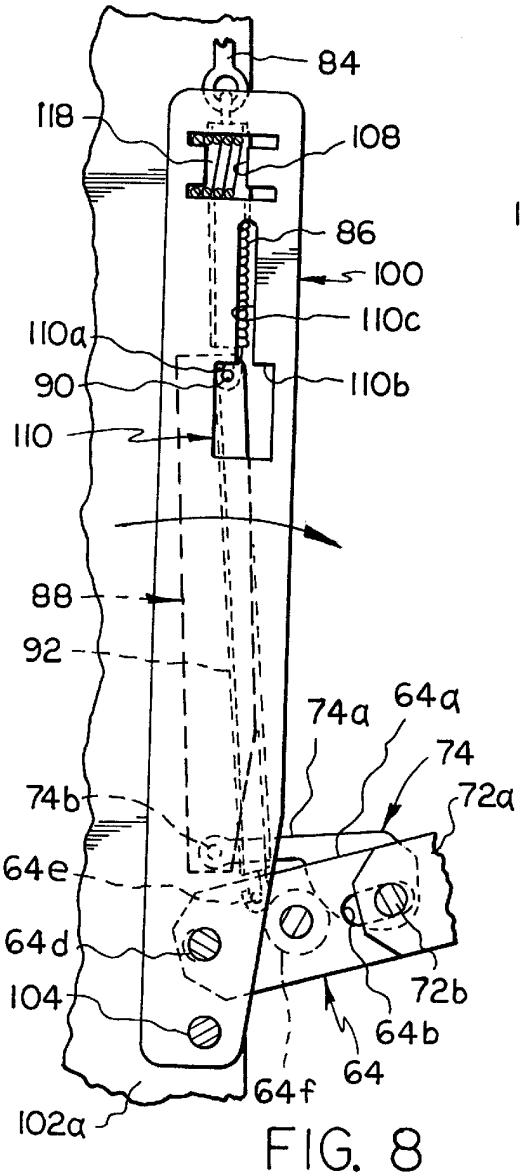


FIG. 8

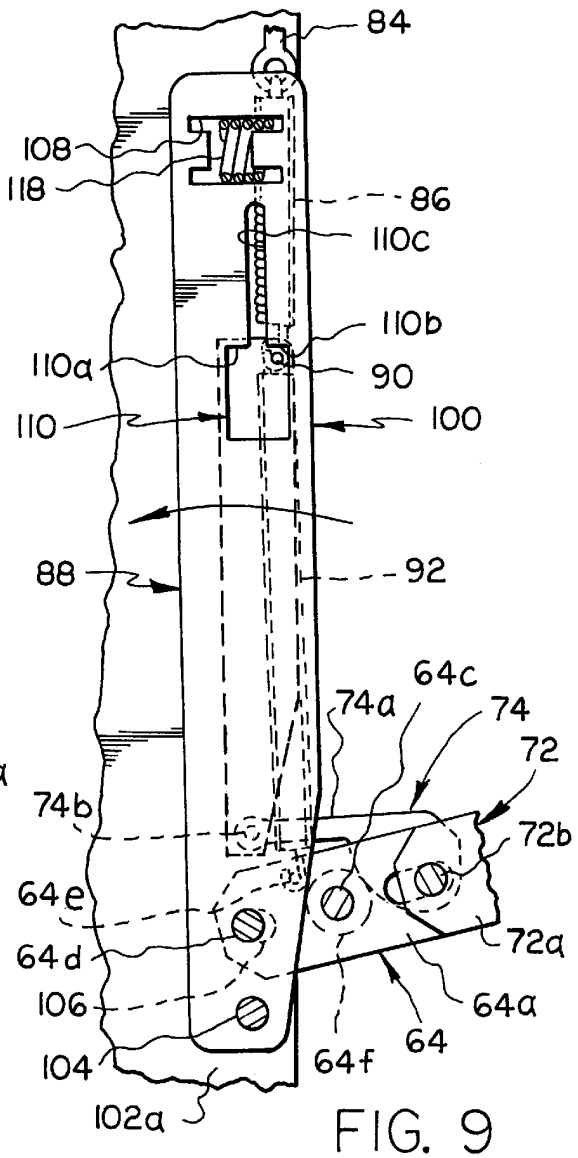
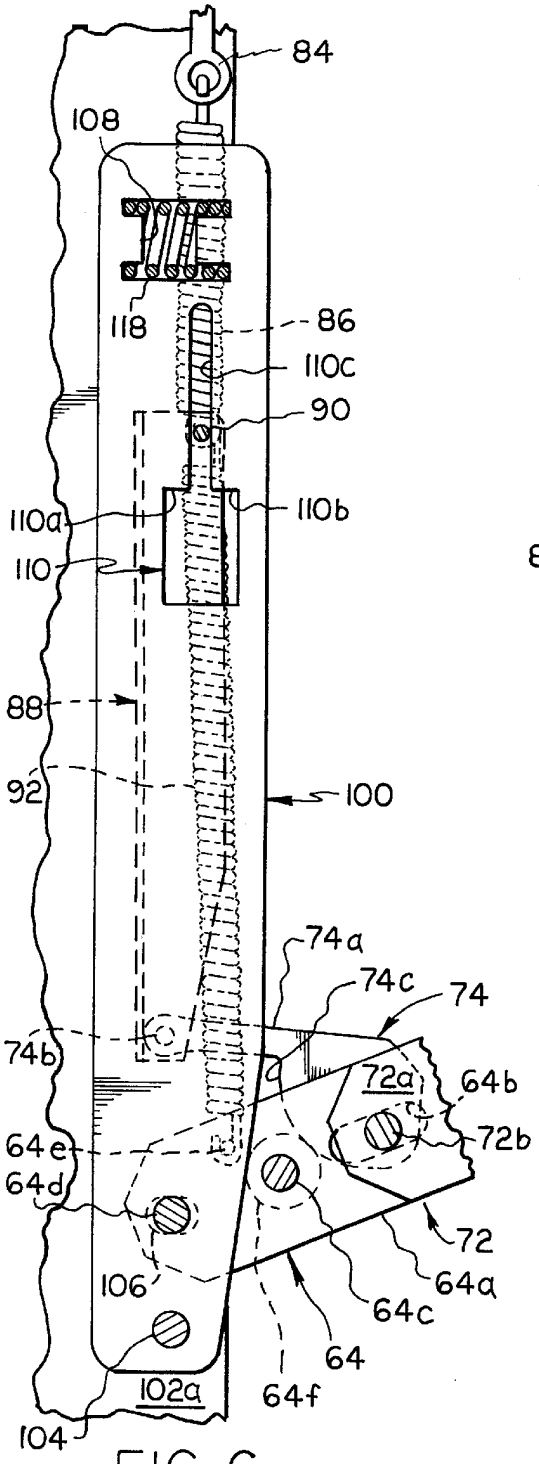


FIG. 9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108
118
86
110c
90
110a
110b
110
88
92
100
74a
74c
74
74b
72a
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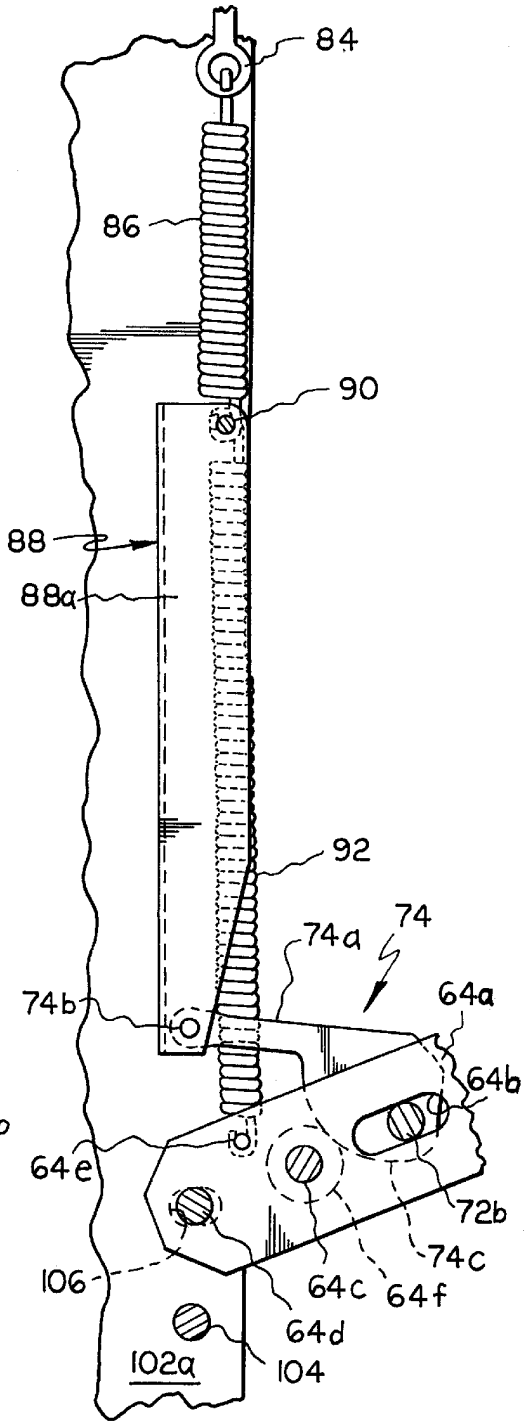
64d
72b
72
64a
106
64c
64
64f
102a
104

FIG. 6


84
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64a
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64e
72b
74c
106
64c
64f
64d
102a
104

FIG. 7

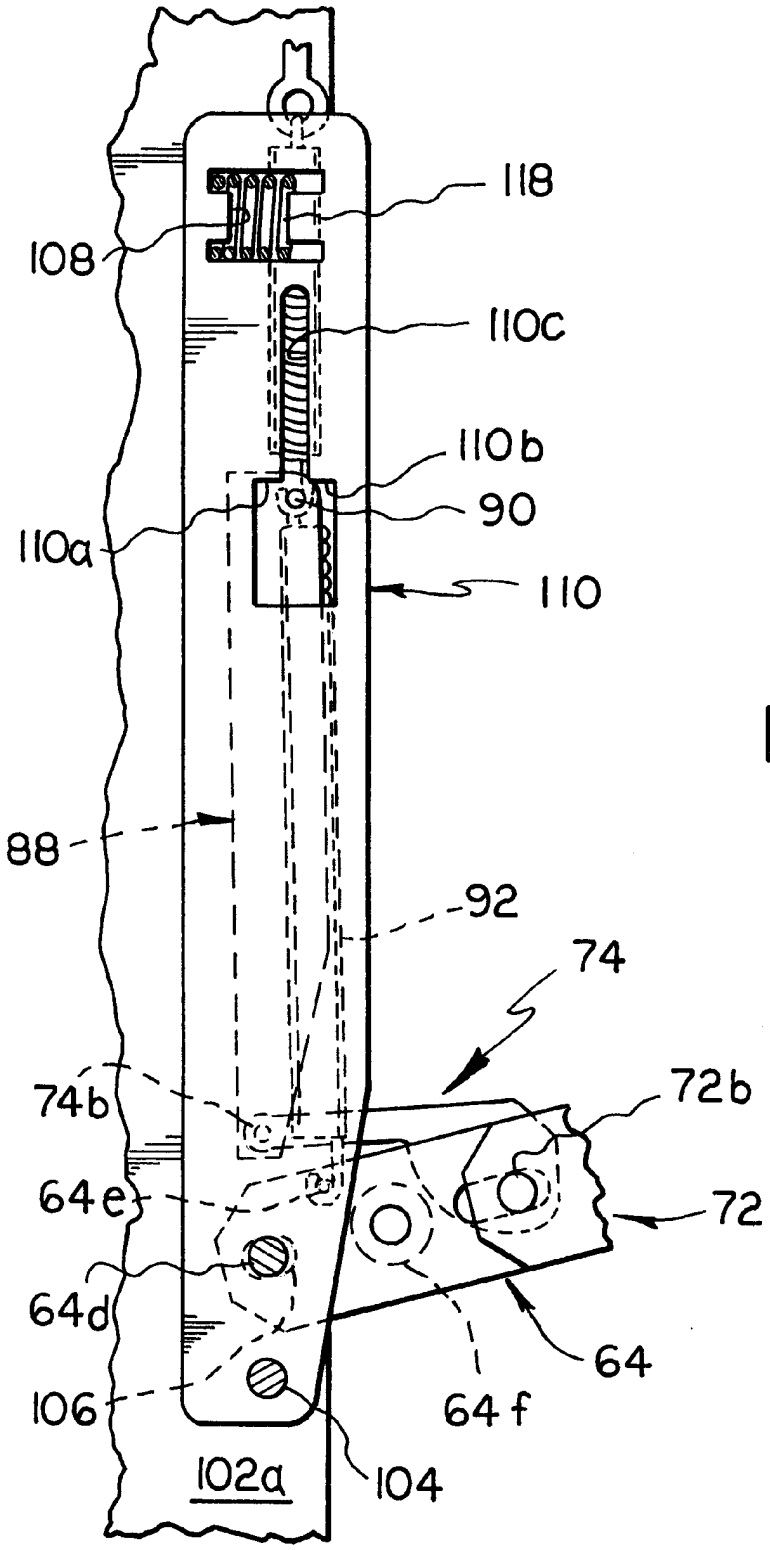
118
108
110c
110b
90
110a
110
88
92
74
74b
72b
64e
72
64d
64
106
64f
102a
104

FIG. 10

SAFETY INTERLOCK BRAKING SYSTEM FOR HEIGHT ADJUSTABLE TABLE

FIELD OF THE INVENTION

The invention relates to height adjustment mechanisms for work surfaces, such as table tops.

BACKGROUND OF THE INVENTION

It is known to provide a height adjustment mechanism for a work surface including a counterbalance mechanism for providing a counterbalance force opposing a downward force including tending to lower the work surface, a brake mechanism for releasably retaining the work surface in a desired vertical position, and a manual operated release mechanism for selectively releasing the brake mechanism to permit vertical movement of the work surface, as evidenced by U.S. Pat. Nos. 2,892,050; 3,213,809; and 5,797,331. Further, it is known to provide means for preventing release of the work surface for vertical movement when the counterbalance force and the downward force are out of balance, as evidenced by U.S. Pat. No 5,706,739 and commonly assigned U.S. application Ser. No. 09/215,838.

SUMMARY OF THE INVENTION

The present invention is generally directed towards a height adjustment mechanism for a work surface and more particulars to a mechanism employing a brake mechanism for releasably retaining the work surface in a desired vertical position and a manual operator for selectively releasing the brake mechanism, except when a vertically downwardly directed force acting on the work surface differs by some given amount from a counterbalance force tending to oppose downward movement of the work surface.

More specifically, the present invention is directed towards an improved interlock mechanism particularly adapted to be used with a counterbalance table mechanism of the type described in U.S. Pat. No. 5,797,331, wherein release of the brake mechanism is prevented when the force exerted by a counterbalance mechanism on the work. surface differs by some given extent from a downwardly directed force acting on such work surface.

In accordance with the present invention, the interlock mechanism includes an interlock plate pivotally supported by the base or frame of a table mechanism to undergo movement between fist and second blocking positions when the counterbalance force is less than and greater than the downward force, respectively, through a neutral position, wherein the force essentially corresponds to the downward force, and the brake mechanism is freed for release by a user.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature and mode of operation of the present invention will now be more fully described in the following detailed description taken with the accompanying drawings wherein:

FIG. **1** is a rear elevational view of a table mechanism with its work surface disposed in a lowered position in which parts, including a privacy panel, are broken away for purposes of clarity;

FIG. **2** is a view similar to FIG. **1**, but with the work surface disposed in an elevated or upper position;

FIG. **3** is a fragmentary prospective view of the left hand side of the mechanism of FIG. **1**;

FIG. **4** is a side elevational view of the left hand side of the mechanism of FIG. **1**, as viewed from the right thereof

FIG. **5** is a sectional view taken generally along the line **5—5** in FIG. **2**;

FIG. **6** is a sectional view taken generally along the line **6—6** in FIG. **4** and showing the mechanism in brake release condition;

FIG. **7** is a sectional view taken generally along the line **7—7** in FIG. **4**;

FIG. **8** is a view taken generally along the line **6—6** in FIG. **4**, but showing the interlock plate in a first blocking position to prevent release of the brake mechanism;

FIG. **9** is a view similar to FIG. **8**, but showing the interlock plate in a second blocking position thereof and

FIG. **10** is a view similar to FIGS. **8** and **9**, but showing the interlock plate in its neutral or intermediate position in order to perm subsequent release of the brake mechanism

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is first made to FIGS. **1** and **2**, wherein a table is generally designated as **10** and shown as having a work surface or top **12** supported for vertical movement relative to a base **14** between lower and upper positions, shown respectively, in FIGS. **1** and **2**, by a pair of columns **16***a* and **16***b*, which are suitably guided by the base for vertical reciprocating movement under the control of a counterbalance mechanism **18** and a brake mechanism **20**.

Counterbalance mechanism **18** is generally shown as including a member **22** coupled to base **14** by a pivot pin **24** for pivotal movement about a horizontally disposed axis and biasing means. The biasing means may be defined by a coil spring **26** having a first end **26***a* connected to member **22** for adjustment of the moment arm through which the spring acts via a connector plate **28**, a pivot pin **30** and a rack and gear assembly **32**; and a second end **26***b* connected to base **14** via a connector plate **34** and a pivot pin **36**. Member **22** may be defined by a pair of parallel plates **38** and **38** having first ends bored to receive pivot pin **24**; mid-portions bored to receive a pivot pin **40**, which serves to pivotally connect the member to brake mechanism **20**; and second ends bored to receive a connector pin **42**.

Member **22** is coupled to columns **16***a* and **16***b* via flexible cable **44** having its opposite ends, not shown, suitably fixed to the lower ends of the columns and a mid-portion fixedly located by connector pin **42**. A cable first end is trained over a first double pulley **46** in passing for attachment to the lower end of column **16***a* and a cable second end is trained successively over pulley **46** and a second pulley **48** in passing for attachment to the lower end of column **16***b*.

With this arrangement, surface **12** moves upwardly from its lowermost position of FIG. **1** into its uppermost position of FIG. **2** incident to counterclockwise swinging movement of member **22** about pivot pin **24**, as viewed in FIG. **1**. The bias of spring **26** acting on member **22** about the axis of pivot pin **24** creates a vertically upwardly directed counterbalance force tending to oppose a downwardly directed force acting on work surface **12** resulting from the weight of the work surface **12**, columns **16***a* and **16***b*, and an object placed by a user on the work surface. The value of the counterbalance force may be selectively varied by user adjustments of rack and gear assembly **32**.

As thus far described, the construction of table **10** is known and described more particularly in commonly assigned. U.S. Pat. No. 5,797,331, whose disclosure is incorporated by reference herein.

In the prior table mechanism described above, a manual operator carried by work surface **12** was connected by an operating cable directly to the brake mechanism, whereby to permit the brake mechanism to be released to permit vertical movement of the work surface whenever a user chooses to operate the manual operator.

In accordance with the present invention, a user operated brake release mechanism **50** to be described with particular reference to FIGS. **3–10** is coupled to brake mechanism **20** under the control of an interlock mechanism **52**, which serves to prevent release of the brake mechanism, when ever the counterbalance force differs to some given extent from the downwardly directed force acting on work surface **12** Thus, for example, release of an otherwise properly balanced work surface would be prevented while an additional temporary loading were applied to a work. surface, such as that resulting from a person leaning or resting on such work surface.

Brake mechanism **20** of the present invention differs from that described in U.S. Pat. No. 5,797,331 in that it generally includes in combination an open-ended brake cylinder **56** connected to member **22** by pivot pin **40**; a brake rod **58** having a first end received within the brake cylinder and mounting a first. pressure applying member **60** retained by a nut **62** and a second end disposed outwardly of the brake cylinder and carrying a head member **64**; a resiliently deformable piston head **66** sized to be slidably received by the brake cylinder when in a non-deformed. condition and having an axially extending through opening for receiving the brake rod; a pusher tube **68** disposed concentrically outwardly of the brake rod and having a first end disposed within the brake cylinder and mounting a second pressure applying member **70** and a second end disposed outwardly of the brake cylinder and mounting a slide member **72**; and a cam member **74**.

Head member **64** is of U-shaped configuration having parallel side flanges **64***a* and **64***a*, which are formed with a pair of aligned, elongated mounting openings **64***b* and **64***b*, and three pairs of aligned bore openings, which support opposite ends of pivot pins **64***c*, **64***d* and **64***e*. Pivot pin **64***c* in turn serves to support a cylindrical bearing surface **64***f*.

Slide member **72** is of U-shaped configuration having parallel side flanges **72***a* and **72***a*, which are arranged to slidably engage with side flanges **64***a* and **64***a* and formed with a pair of aligned bore openings to support a pivot pin **72***b* rotatably and slidably received within mounting openings **64***b* and **64***b*, and a base flange **72***c* formed with a bore opening **72***d* for slidably receiving brake rod **58**.

Cam member **74** is through bored to receive pivot pin **72***b*, formed with an elongated cam end portions **74***a* and **74***a* through bored to receive a pivot pin **74***b* and formed with a cam surface **74***c* arranged to bear against bearing surface **64***f*.

Brake release mechanism **50** is shown as including a suitable manually operable release mechanism **80** supported by work surface **12**; an operating cable **82** having one end coupled to the release mechanism and an opposite end terminating in an eyelet **84**; a compensating spring **86**; a release bracket **88** mounting a bearing pin or follower **90**; and a return spring **92**. Compensating spring **86** has its opposite ends connected to eyelet **84** and release bracket **88** via. bearing pin **90**. Release bracket **88** is of U-shaped configuration having parallel side flanges **88***a* and **88***a* whose upper ends are provided with aligned bore openings for supporting bearing pin **90** and whose lower ends are provided with aligned bore openings for receiving pivot pin **74***b*, whereby to pivotally connect the release bracket to cam end portions **74***a* and **74***a* by pivot pin **74***b*. Return spring **92** has its opposite ends connected to bearing pin **90** and head member **64** via pin **64***e*.

Interlock mechanism **52** includes an interlock plate **100**, which is arranged intermediate the left hand side flange **88***a* of release bracket **88** and the left hand one of a pair of side flanges **102***a* and **102***a*of a rigid, upstanding, U-shaped structural member **102** as viewed in FIG. **4**. Interlock plate **100** has its lower end formed with a bore opening for receiving a pivot pin **104** whose ends are received within a pair of bore openings provided within side flanges **102***a* and **102***a,* a bore opening for receiving pivot pin **64***d* whose opposite ends are received within a pair of horizontally elongated motion limiting slots **106** and **106** provided within side flanges **102***a* and **102***a*; its upper end formed with a reclined generally H-shaped spring mounting opening **108**; and its mid-portion formed with a release control opening **110**. Release control opening **110** is bounded in part by aligned, downwardly facing first and second blocking surfaces **110***a* and **110***b* adapted for alternate engagement by bearing pin **90** for purposes of preventing release of brake mechanism **20** by release mechanism **50** when interlock plate is pivoted about the axis of pin **104** into either of its first and second blocking positions shown in FIGS. **8** and **9**. Blocking surfaces **110***a* and **110***b* are arranged to extend generally horizontally from adjacent opposite sides of a vertically upwardly extending release passageway **110***c*, which is sized to permit free upward movement of bearing pin **90**, whenever the bearing pin is disposed horizontally intermediate the blocking surfaces incident to pivotal movement of interlock plate **100** into its neutral position shown in FIG. **10** and release mechanism **50** is manually operated.

As shown in FIG. **3**, each of structural member side flanges **102***a* and **102***a* is formed with an assembly opening **114**, which opens through one side edge there of to permit insertion of bearing pin **90** thereinto and terminates in a vertically upwardly extending release passageway **114***a*, which serves to constrain bearing pin **90** for movement along a vertical path of travel, as the latter moves vertically within control opening **110** and release passageway **110***c*. Structural member side flanges **102***a* are also formed with a reclined generally H-shaped spring mounting opening **116**.

Interlock mechanism **52** is completed by the provision of a coil return spring **118** supported within H-shaped openings **108** and **116**.

Passageways **110***c* and **114***a* are arranged for alignment when interlock plate **100** is disposed in its neutral position shown in FIG. **10**, and spring **118** is progressively compressed incident to pivotal movement of interlock plate away from its neutral position into either of its blocking positions shown in FIGS. **8** and **9**. Thus, spring **118** tends to bias interlock plate **100** for return to its neutral position, and helps control how much of a force mismatch or difference between the counter balance force and the force tending to lower work surface **12** is required to move interlock plate into its blocking positions.

To facilitate description of the operation of the present invention, it will first be assumed that work surface **12** is retained in a desired elevated position by brake mechanism **20** and that the counterbalance force exerted by mechanism **22** essentially corresponds to the force tending to lower the work surface. In this balanced operating condition, pivot pin **64***d* is disposed adjacent the midpoint of elongated slots **106** and **106** and interlock plate **100** is maintained in its neutral or intermediate position, as shown in FIG. **10**, by operation

of spring **118**. Then, when a user desires to release brake mechanism **20**, the user would operate mechanism **80** with the result that bearing pin **90** would be drawn upwardly within passageway **110***c* against the return bias of spring **92** and the connection between release bracket **88** and cam end portions **74***a* and **74***a* would cause cam member **74** to pivot about the axis of pivot pin **72***b* into the position shown in FIGS. **6** and **7**. As a result, cam bearing surface **74***c* rides up on cylindrical bearing surface **64***f* to permit pivot pin **72***b* and slide member **72** to move relative to head member **64** towards pivot pin **64***d* under the axially expansive bias of piston head **66** tending to move second pressure applying member **70** axially away from first, pressure applying member **60**. As piston head **66** is permitted to expand axially, it. also contracts radially, whereby to free its outer surface from frictional braking engagement with the inner surface of brake cylinder **56**, and allow the user to manually move work surface **12** vertically to a newly chosen position. Thereafter, mechanism **80** is released thereby permitting spring **92** in cooperation with gravity to return release bracket **88** to its initial lower position shown in FIG. **10**. As a result, cam **74** is forced to pivot into its initial position and cause brake mechanism **20** to again become operative for purposes of retaining work surface **12** in user chosen position. As long as the force tending to lower work surface **12** remains in balance with the counterbalance force established by counterbalance mechanism **18**, the above described operation may be repeated whenever the user desires to readjust the position of the work surface.

The mode of operation of the invention differs from that described above when the force tending to lower work surface **12** is no longer in balance with the counterbalance force, such as would be the case where a substantial load is added to or removed from the work surface without the user making a corresponding adjustment of rack and gear assembly **32** to change the moment arm through which spring **26** acts on member **22**.

When for example, some unbalancing load is added to work surface **12**, the force tending to lower the work surface exceeds the counterbalance force with the result that the work surface tends to move downwardly and cause member **22** to pivot in a clockwise direction, as viewed in FIG. **2**. This movement results in pivot pin **64***d* being drawn towards the right hand end of slots **106** and **106**, and interlock plate **100** being forced to pivot clockwise about the axis of pivot pin **104** into its first blocking position shown in FIG. **8**. In this first blocking position of interlock plate **100**, first blocking surface **110***a* is positioned to overlie bearing pin **90** and block upwardly directed movement thereof for purposes of releasing brake mechanism **20** upon subsequent user operation of mechanism **80**. Damage to the release mechanisms, due to abutting engagement of bearing pin **90** with blocking surface **110***a*, is prevented by expansion of spring **86**. Interlock plate **100** will remain in its first blocking position until the unbalancing load is removed from work surface **12** or rack and gear mechanism **32** adjusted by the user to increase the counterbalance force, as required to again balance the force tending to lower the work surface and permit the interlock plate to be returned to its neutral position shown in. FIG. **10**.

On the other hand, when a load is removed from work surface **12**, such that the counterbalance force becomes greater than the force tending to lower the work surface, the work surface tends to move upwardly and member **22** tends to pivot in. a counterclockwise direction, as viewed in FIG. **2**. This movement results in pivot pin **64***d* being forced to move towards the left hand end of slots **106** and **106**, and interlock plate **100** being forced to pivot counterclockwise about the axis of pivot pin **104** into its second blocking position as shown in FIG. **9**. In this second blocking position of interlock plate **100**, second blocking surface **110***b* is positioned to overlie bearing pin **90** and block upwardly directed movement thereof for purposes of releasing brake mechanism **20** upon subsequent user operation of mechanism **80**. As with the case of engagement of bearing pin **90** with first blocking surface **110***a*, damage to the release mechanism due to abutting engagement of the bearing pin with second blocking surface **110***b*, is prevented by expansion of spring **86**. Interlock plate **100** will remain in its second blocking position until return of the previously removed load to work surface **12** or rack and gear mechanism adjusted by the user to decrease the counterbalance force, as required to again balance the force tending to lower the work surface and permit the interlock plate to return to its neutral position.

The permitted extent of vertical movement of work surface **12** incident to the addition or removal of loads, is determined by the length of slots **106** and **106**, and may for instance be as small as 3/16 inch.

The strength of spring **118** determines the change in work surface loading required to move the interlock plate from its neutral position, whereas the mode of mounting such spring, that is, the respective shapes/sizes of mounting openings **108** and **116** may be relied upon to require different loading changes to move the interlock plate into its first and second blocking positions. As by way of example, the lengths of the right hand legs of spring mounting opening **108** may be greater than that of the left hand legs of such opening, as shown in FIGS. **6** and **8–10**, so as to require a greater loading change to move interlock plate **100** into its first blocking position than into its second blocking position. Alternatively, for example, spring **118** may be replaced by plural springs of differing strengths.

What we claim is:

1. The combination comprising:

surface means;

base means;

support means for supporting said surface means for movement relative to said base means through plural vertical positions;

a counterbalance mechanism for opposing downwardly directed movement of said surface means and including a member coupled to said base means and said support means, and user adjustable biasing means coupled to said base means and said member for establishing a counterbalance force acting on said surface and tending to oppose downwardly directed movement thereof;

brake means tending to retain said surface means in a user selected one of said vertical positions;

user operated release means for releasing said brake means; and

interlock means for preventing release of said brake means in the event that said counterbalance force is less than or greater than a force tending to lower said surface means from said selected one of said positions, said interlock means includes an interlock plate having first and second blocking positions and a neutral position arranged intermediate said blocking positions, said interlock plate being supported by said base means for movement between said first and second blocking positions when said counterbalance force is less than and greater than said force, respectively, through a said neutral position when said counterbalance force corre-

sponds essentially to said force; and said release means engages with said interlock plate when in said first and second blocking positions to prevent release of said brake means.

2. The combination according to claim **1**, wherein said member is coupled to said interlock plate by said brake means.

3. The combination according to claim **1**, wherein said interlock plate is pivotally supported by said base means for movement between said first and second blocking positions.

4. The combination according to claim **3**, wherein said member is coupled to said interlock plate by said brake means by a pivot pin, and the extent of pivotal movement of said interlock plate between said blocking positions is limited by engagement of said pivot pin with said base means.

5. The combination according to claim **1**, wherein said interlock plate defines downwardly facing first and second abutments disposed on horizontally opposite sides of a vertically upwardly extending passageway, and said release means includes a follower constrained for vertical movement along a is given path of travel, said interlock plate alternatively positioning said fist and second abutments for engagement by said follower when said interlock plate is in said first and second blocking positions, respectively, to prevent movement of said follower along said path of travel and said interlock plate permitting said follower to pass upwardly within said passageway along said path of travel when said interlock plate is in said neutral position whereby to permit release of said brake means by said release means.

6. The combination according to claim **5**, wherein said interlock plate is pivotally supported by said base means for movement between said first and second blocking positions, and said follower is constrained against movement transversely of said path of travel by said base means.

7. The combination according to claim **6**, wherein said member is coupled to said interlock plate by said brake means.

8. The combination according to claim **1**, wherein said brake means includes a brake cylinder coupled to said member; a brake rod having a first end received within said brake cylinder and mounting a fist pressure applying member and a second end disposed outwardly of said brake cylinder and carrying a head member, said head member being pivotally connected to said interlock plate and provided with an elongated mounting opening and a bearing surface arranged intermediate said mounting opening and the pivotal connection of said head member and said interlock plate; a resiliently deformable piston head sized to be slidably received by said brake cylinder when in a non-deformed condition, said piston head having a through opening for receiving said brake rod adjacent said first pressure applying member; a pusher tube disposed concentrically outwardly of said brake rod and having a first end disposed within said brake cylinder and carrying a second pressure applying member and a second end disposed outwardly of said brake cylinder and carrying a slide member slidably engaging with said head member; a cam member supported for pivotal and sliding movement relative to said head member by a pivot pin received within said mounting opening said cam member being pivotally connected to said slide member by said pivot pin, said cam member having a cam surface arranged for engagement with said bearing surface being pivotally connected to said release means, characterized in that pivotal movement of said cam member relative to said head member in a fist direction by said release means causes said pin to move within said mounting opening away from said bearing surface resulting in sliding movement of said pusher tube lengthwise of said brake rod to effect compression of said piston head by clamping engagement of said first and second pressure applying members there with sufficiently to deform said piston head into frictional braking engagement with said brake cylinder, and in that pivotal movement of said cam member relative to said head member in a direction opposite to said first direction by said release means allows said pin to move within said mounting opening towards said bearing surface resulting in sliding movement of said pusher tube lengthwise of said brake rod relatively towards said head member incident to the tendency for said piston head to resiliently return to said non-deformed condition and move said second pressure applying member relatively away from said first pressure applying member.

9. The combination according to claim **8**, wherein said base means is formed with a motion limiting opening and said head member is pivotally connected to said interlock plate by pivot pin received within said motion limiting opening for defining the limit of vertical movement of said surface means when said piston head is in frictional braking engagement with said brake cylinder.

10. The combination according to claim **8**, wherein said release means includes a manual operator carried by said surface means; a release member carrying a follower and being pivotally connected to said cam member; means including a first spring for coupling said follower to said manual operator; and second spring for coupling said follower to said head member and tending to move said cam member in said first direction, and said follower engages with said interlock plate when in said blocking positions to prevent upwardly directed movement of said release member and resultant to pivotal movement of said cam member in said direction opposite to said first direction.

11. The combination according to claim **1**, wherein said interlock plate is pivotally supported by said base means for movement between said blocking positions, and spring means are provided to bias said interlock plate into said neutral positions.

12. The combination according to claim **1**, wherein said release means includes a follower; said base means constrains said follower for vertical movement along a path of travel; and said interlock plate includes first and second downwardly facing blocking surfaces disposed for abutting engagement by said follower when said interlock plate is alternatively arranged in said first and second blocking positions for preventing release of said brake means and a release passageway extending vertically intermediate said blocking surfaces and arranged for alignment with said follower when said interlock plate is disposed in said neutral position to permit movement of said follower upwardly within said release passageway along said path of travel to release said brake mechanism upon manual operation of said release means.

13. The combination according to claim **12**, wherein said interlock plate is pivotally supported by said base means for movement between said blocking positions, and spring means is provided to bias said interlock plate into said neutral position.

14. The combination according to claim **13**, wherein said member is coupled to said interlock plate by said brake means, and said brake means is coupled to said base means to permit a limited extent of vertical movement of said surface means while said surface means is retained in said user selected one of said vertical positions by said brake means.

15. The combination according to claim 14, wherein said brake means includes a brake cylinder coupled to said member; a brake rod having a first end received within said brake cylinder and mounting a fist pressure applying member and a second end disposed outwardly of said brake cylinder and carrying a head member, said head member being pivotally connected to said interlock plate and provided with an elongated mounting opening and a bearing surface arranged intermediate said mounting opening and the pivotal connection of said head member and said interlock plate; a resiliently deformable piston head sized to be slidably received by said brake cylinder when in a non-deformed condition, said piston head having a through opening for receiving said brake rod adjacent said first pressure applying member; a pusher tube disposed concentrically outwardly of said brake rod and having a first end disposed within said brake cylinder and carrying a second pressure applying member and a second end disposed outwardly of said brake cylinder and carrying a slide member slidably engaging with said head member; a cam member supported for pivotal and sliding movement relative to said head member by a pivot pin received within said mounting opening, said cam member being pivotally connected to said slide member by said pivot pin, said cam member having a cam surface arranged for engagement with said bearing surface being pivotally connected to said release means, characterized in that pivotal movement of said cam member relative to said head member in a first direction by said release means causes said pin to move within said mounting opening away from said bearing surface resulting in sliding movement of said pusher tube lengthwise of said brake rod to effect compression of said piston head by clamping engagement of said first and second pressure applying members therewith sufficiently to deform said piston head into frictional braking engagement with said brake cylinder, and in that pivotal movement of said cam member relative to said head member in a direction opposite to said first direction by said release means allows said pin to move within said mounting opening towards said bearing surface resulting in sliding movement of said pusher tube lengthwise of said brake rod relatively towards said head member incident to the tendency for said piston head to resiliently return to said non-deformed condition and move said second pressure applying member relatively away from said first pressure applying member.

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