Nov. 19, 1968 R. H. MacKAY 3,411,464

VERTICALLY MOVING CANTILEVER PLATFORM

Filed June 16, 1966 3 Sheets-Sheet 1

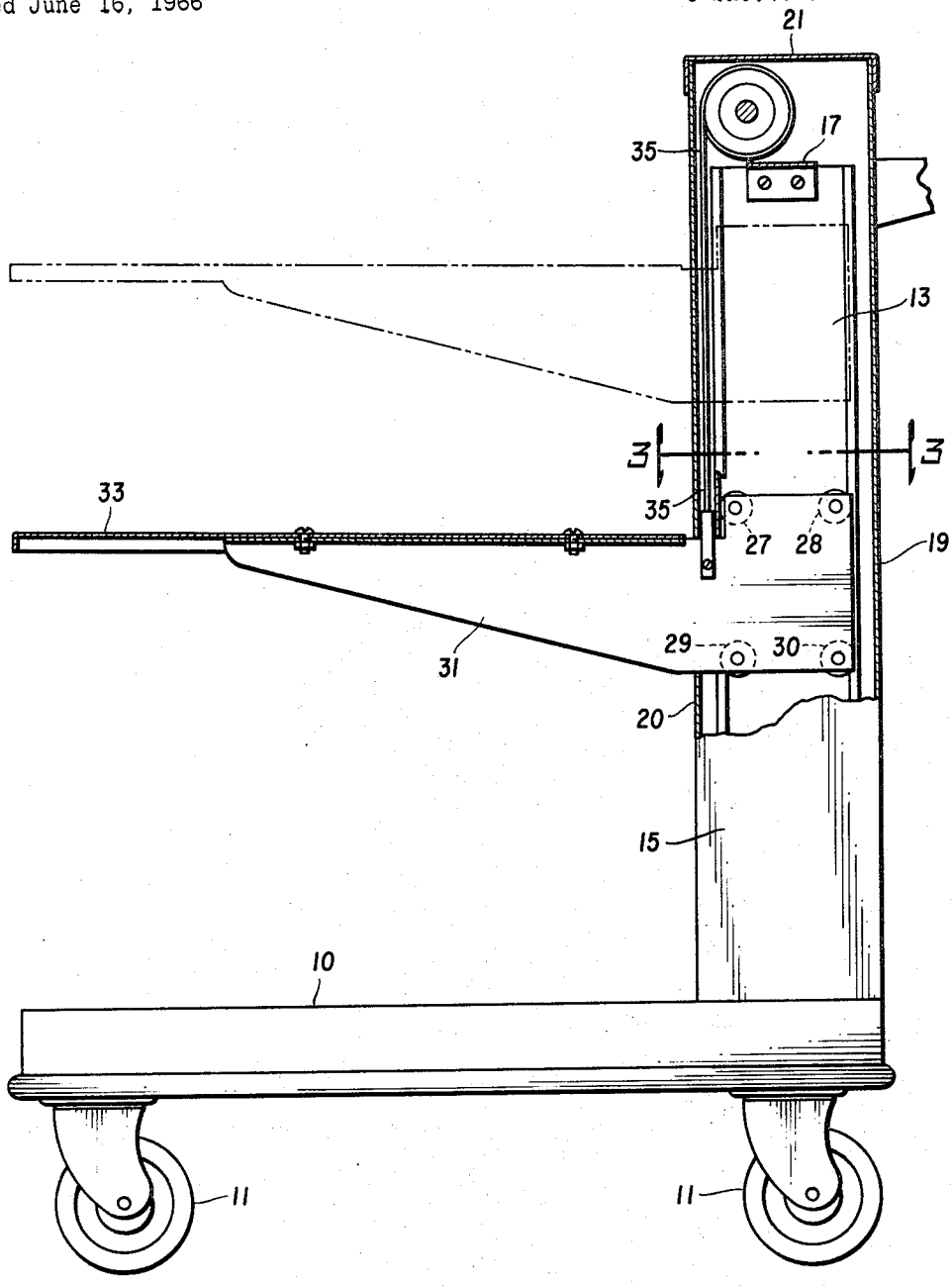


FIG. 1

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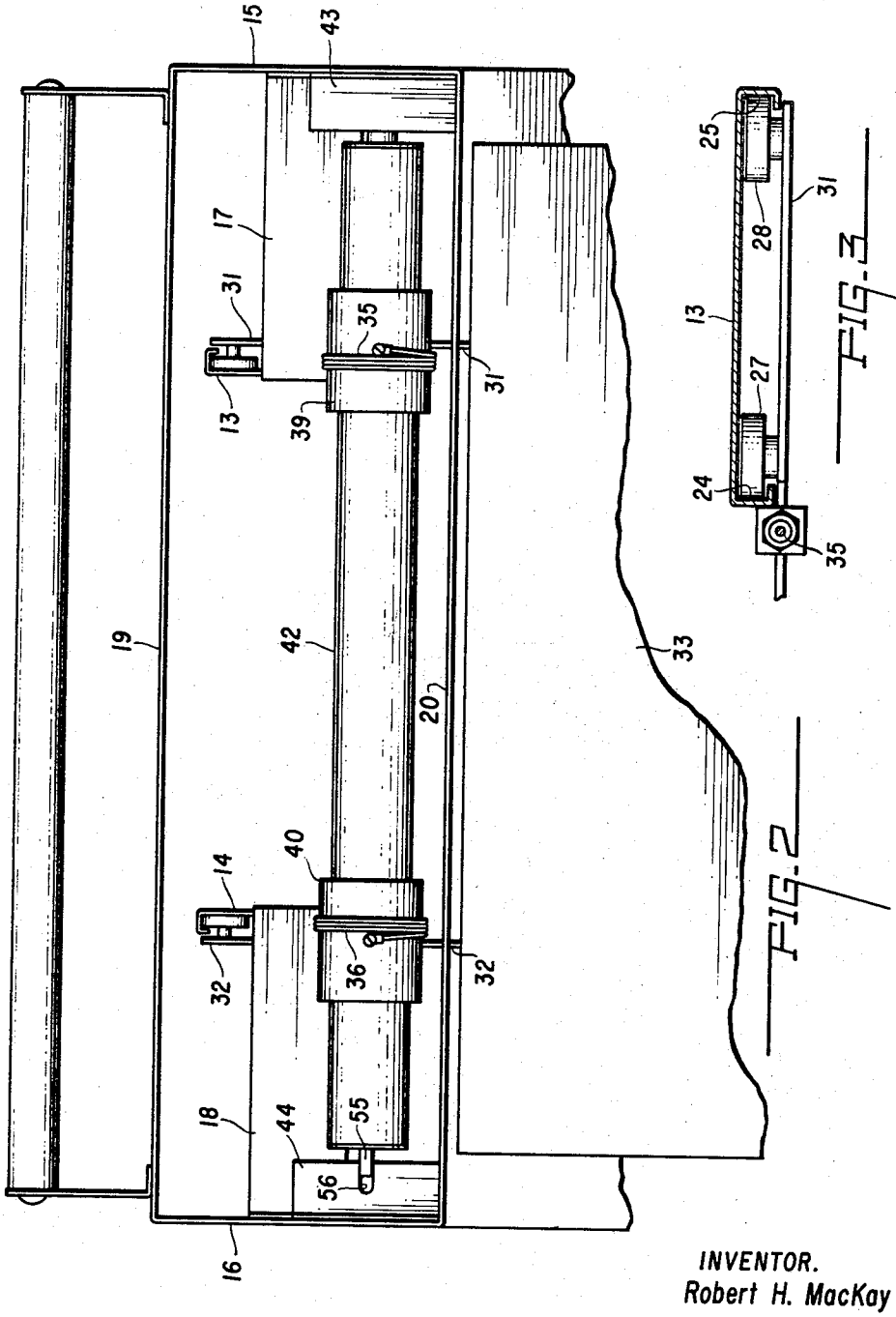


FIG. 2

FIG. 3

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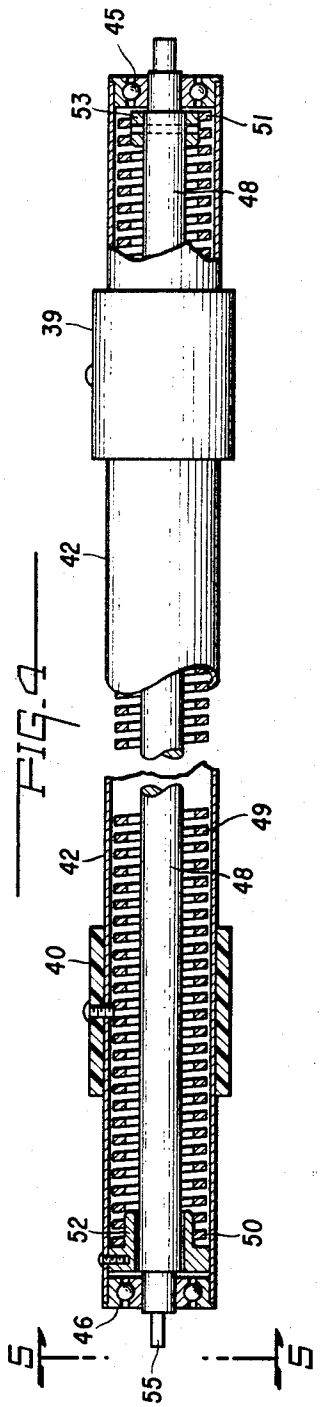


FIG. 4

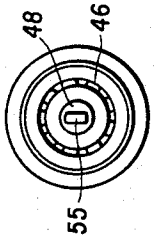


FIG. 5

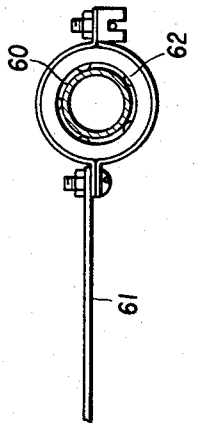


FIG. 7

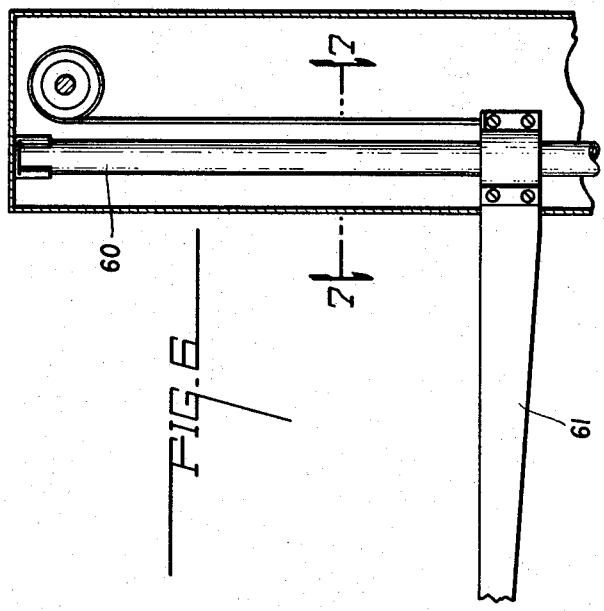


FIG. 6

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VERTICALLY MOVING CANTILEVER PLATFORM

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Filed June 16, 1966, Ser. No. 558,020
7 Claims. (Cl. 108—136)

ABSTRACT OF THE DISCLOSURE

A vertically movable platform is supported by flexible cables wound about a roller that is positioned at a fixed location above the platform. The roller is spring loaded so that dishes on the platform remain at a fixed level.

My invention relates to a vertically moving cantilever platform, and particularly to such a platform for dining apparatus or utinsels.

Dining apparatus or utensils, such as trays or racks of glasses, are frequently stacked vertically to make the most efficient utilization of available floor space. Previously, users of such stacked apparatus or utensils had to take a piece of the apparatus or a utensil from the stack at whatever height the next available piece happened to be. The next available piece might be inconveniently high or low. In addition, used pieces of apparatus or used utensils had to be stacked elsewhere or at some distance from the stack of clean apparatus or utensils. Such additional stacking required additional floor space.

Accordingly, an object of my invention is to provide an improved, vertically moving platform for supporting dining apparatus or utensils, the platform moving upward as pieces of apparatus or as utensils are removed so that the top utensil or piece of apparatus remains at substantially the same predetermined height.

Another object of my invention is to provide an improved platform that supports a stack of dining apparatus or equipment, and that moves vertically upward as such apparatus or equipment is removed to provide additional storage space beneath the platform for used apparatus or equipment.

Another object of my invention is to provide an improved, vertically moving platform that comprises a spring for actuating the platform upwardly, the spring being tensioned by the apparatus or equipment placed on the platform, and the spring raising the platform as pieces of apparatus or equipment are removed.

Prior art devices for stacking dining apparatus or equipment were accessible only from the top. In addition, cleaning of these prior art devices was difficult. These devices were inconvenient in that the stacked apparatus or equipment was not freely accessible. Also, these devices did not utilize the available space to the best advantage. And finally, these prior are devices were relatively difficult to clean.

Accordingly, another object of my invention is to provide an improved, vertically moving cantilever platform on which dining apparatus or equipment can be stacked in a more accessible manner.

Another object of my invention is to provide an improved vertically moving platform that is relatively easy to clean and that is for use in dining establishments or kitchens.

Another object of my invention is to provide a platform vertically actuated by a sealed spring assembly, the platform being for dining apparatus or equipment and being easily cleaned or sterilized with hot liquids and strong cleansers without special protection or disassembly.

Briefly, these and other objects are achieved in accordance with my invention by a structure comprising a base which may be either movable or stationary. First and second vertical guides are fastened to the base and extend upward in parallel directions from the base. A rolling or moving bearing structure is mounted on each of the guides and arranged so as to slide up and down its respective guide with substantially no transverse or canting. A horizontally extending arm is fastened to each guide, and a platform is fastened to both arms to support the dining apparatus or equipment. The platform causes the arms and the bearing structures to move as a unit. A roller mechanism is rotatably mounted on the base or the vertical guides, preferably at the top of the vertical guides. This roller mechanism contains a torsion spring which is tensioned or wound to cause the roller mechanism to rotate in one direction. The roller mechanism includes one or more flexible cables fastened at one end and wound about the roller. The other end is connected to the unit comprising the platform, the arms, and the bearing structures. The platform tends to maintain the top of the dining apparatus or utensils stacked on the platform at a given height.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the claims. The structure and operation of my invention, together with further objects and advantages, may be better understood from the following description given in connection with the accompanying drawing, in which:

FIGURE 1 shows a side elevation view, partly in cross section, of a cantilever platform in accordance with my invention;

FIGURE 2 shows a plan view of the cantilever platform of FIGURE 1;

FIGURE 3 shows a cross sectional view taken along the lines 3—3 of FIGURE 1;

FIGURE 4 shows a view, partly in cross section, of the spring and roller mechanism for the platform;

FIGURE 5 shows an end view of the spring and roller mechanism of FIGURE 4; and

FIGURES 6 and 7 show elevation and cross sectional views respectively of a modification of the cantilever platform in accordance with my invention.

The cantilever platform shown in the various figures has been assumed to be used for trays or racks of glasses. However, it is to be understood that the platform may be shaped or designed to hold any particular type of dining apparatus or utensils. As shown in FIGURE 1, the platform in accordance with my invention comprises a horizontal base **10** which may be stationary, or which may be mounted on wheels or rollers **11** as shown. A pair of vertical guides **13**, **14** are attached to the base **10** at spaced locations, and extend vertically upward in parallel directions. In FIGURE 1, only one vertical guide **13** is visible, but FIGURE 2 shows the location of both vertical guides **13**, **14**. Each of the vertical guides **13**, **14** is supported by or fastened to respective sides **15**, **16** by horizontal support brackets **17**, **18**. The structure may be provided with a suitable back **19** (with a handle), a front **20** (with suitable slits or openings), and a top **21** which provide additional strength and also seal the structure to some extent. The structure as thus far described may be assembled in any convenient fashion, as by welding or riveting.

The two vertical guides (FIGURE 3 shows the vertical guide **13**) are substantially identical, and each comprises an intermediate section which is formed or bent so that it has a channel or groove **24** at one end of the intermediate section, and a channel or groove **25** at the other end of the intermediate section. These channels **24**, **25** face each other and serve as tracks or guides for a set of four rollers **27**, **28**, **29**, **30** which are fastened to respective and similar support arms **31**, **32**. The support arm **31** runs up

and down on its respective rollers in the channels of the vertical support **13**, and the support arm **32** runs up and down on its respective rollers in the channels of the vertical support **14**. Thus, the two support arms **31**, **32** are supported for vertical movement in or by their respective vertical supports **13**, **14**. The support arms **31**, **32** are preferably symmetrical, and extend outward in the direction from the structure, as shown in FIGURE 1. A suitable platform **33** is attached to the two support arms **31**, **32** so that the support arms **31**, **32** and the platform **33** move as a unit. With respect to FIGURE 1, it will be noted that the support arms **31**, **32** and the platform **33** are supported in cantilever fashion. Actually only the two rollers **27**, **30** are needed to provide this cantilever support. However, it has been found that the two added rollers **28**, **29** provide further guidance and tend to eliminate binding or reduce friction.

As shown in FIGURES 1 and 2, the unit comprising the support arms **31**, **32** and the platform **33**, is supported by a pair of flexible wires or cables **35**, **36** which are respectively attached to the support arms **31**, **32**. These wires or cables extend upward from the support arms **31**, **32** and are similarly wound a number of times around respective sleeves **39**, **40** and then securely attached to these sleeves by screws or other fastening elements. The sleeves **39**, **40** are supported on a roller tube **42**. The roller tube **42** is mounted, as will be described, for rotation in suitable tube brackets **43**, **44** which are respectively fastened to the sides **15**, **16**.

FIGURE 4 shows details of the construction of the roller tube **42** and its internal elements. The sleeves **39**, **40** are securely fastened to and rotate with the roller tube **42**. The roller tube **42** is a hollow, cylindrical metallic structure which is supported at its two ends by ball bearing structures **45**, **46**. These ball bearing structures **45**, **46** are supported on a shaft **48** so that the roller tube **42** is free to rotate with respect to the shaft **48**. A helical spring **49**, preferably wound of rectangular wire, is positioned around and extends for substantially the full length of the shaft **48**. The left end **50** of the spring **49** is mounted for rotation with the roller tube **42** by a spring roller hub **52**. This spring roller hub **52** is positioned inside and is fastened to the left end of the roller tube **42** by any suitable means such as the machine screw shown in FIGURE 4. The spring roller hub **52** has an internal bore or hole which permits this hub **52** to rotate freely on the shaft **48**. The left end **50** of the spring **49** is attached to the hub **52** by any suitable means, such as by a force or press fit which, in connection with the pitch or direction of rotation of the spring **49**, causes the end **50** of the spring **49** to grip the spring roller hub **52** more tightly as the spring **49** is tensioned. The right end **51** of the spring **49** is fastened to the shaft **48** by a spring shaft hub **53**. This hub **53** is securely fastened to the shaft **48**, and the right end **51** of the spring is attached to the hub **53** in any suitable manner, such as by the force or press fit provided at its left end **50**. Thus the structure shown in FIGURE 4 supports the roller tube **42** for rotation relative to the shaft **48**. As the roller tube **42** rotates, it rotates the left end **50** of the spring **49**. The right end **51** of the spring **49** is fastened securely to the shaft **48**. The shaft **48** is, in turn, secured against rotation by a shaped or keyed end **55** which, as shown in FIGURE 5, has flat, parallel edges which fit into a correspondingly shaped groove or notch **56** in the tube bracket **44**, as shown in FIGURE 2. The other end of the shaft **48** is inserted in a hole in the tube bracket **43**, and supported thereby.

With the cables **35**, **36** wrapped in the proper direction around their respective sleeves **39**, **40**, as the platform **33** is moved downward, this causes the roller tube **42** to rotate. As the roller tube **42** rotates, it transmits this rotational motion through the spring roller hub **52** to the left end **50** of the spring **49** so as to wind or tension the spring **49** more tightly. It will be recalled that the right end **51** of the spring **49** is fixed to the shaft **48**, and the shaft **48** is

prevented from rotating by its keyed end **55**. Thus, downward motion of the platform **33** causes the spring **49** to wind up more tightly or to have more tension. Conversely, as the platform **33** moves upward, the tension in the spring **49** is reduced. Or, expressed in another manner, if the weight on the platform **33** is reduced, the tension in the spring **49** turns the roller tube **42** to wind the cables and move the platform **33** upward. It will thus be seen that the structure provides means which permit the platform **33** to move downward when weight is applied or added thereto. This downward movement places increased tension on the spring **49** until the tension on the spring **49** and the added weight reach a point of equilibrium. As weight is removed from the platform **33**, the tension on the spring **49** causes the platform **33** to move upward until the tension on the spring **49** and the reduced weight reach a new point of equilibrium. Because of the relatively long length of the spring **49**, it has been found that its force is linear over a substantially wide range of applied forces or tensions. Thus, if the platform **33** is adjusted for a predetermined stack of dining apparatus such as trays, the removal of each tray from the stack will permit the spring **49** to provide a slight upward motion of the platform **33** so that the topmost tray on the stack remains at substantially the same height. The tension on the spring **49** may be adjusted by removing the keyed or shaped end **55** of the shaft **48** from its notch **56**; turning the shaft **48** in either direction by a wrench or similar tool to provide the desired tension; holding the shaft position by the wrench or tool; and inserting the keyed or shaped end **55** of the shaft **48** back into its notch **56**. FIGURE 1 shows an upper position of the platform and support arms in phantom lines.

FIGURES 6 and 7 show another embodiment of my invention, FIGURE 7 being taken along the lines **7—7** in FIGURE 6. In this embodiment, the vertical guides **13**, **14** shown in the previous figures have been replaced by a pair of vertical tubes **60** which serve as supports for two support arms **61**. The support arms **61** are mounted for movement along the vertical tubes **60** by sleeve or roller bearings **62** which fit around the outside of the vertical tubes **60** as shown in FIGURE 7. It is preferable that upper and lower sleeve bearings **62** be provided in order to provide proper cantilever support. Also an additional sleeve bearing may be provided if desired. The other structure for the tray platform is otherwise the same as that shown in FIGURES 1 through 5.

It will thus be seen that my invention provides a new and improved, vertically moving, cantilever supported platform. This platform is accessible from a plurality of directions, and can be easily cleaned. The main moving or motivating element, namely the torsion spring, may be sealed within the roller tube so as to protect it against water and cleansers. The relatively long length of this spring provides a relatively wide range of weight or forces which can be accommodated on the platform. Persons skilled in the art will appreciate that modifications may be made to my invention. For example, other cantilever support structures may be provided. The roller tube may have only one sleeve with a cable for moving the platform, or the roller tube may be provided with more sleeves and cables for moving the platform. And, the roller tube may be positioned at other locations (such as on the base) if the cables can be threaded through pulleys to the proper locations. The roller tube may also be positioned on the vertical guides. Therefore, while my invention has been described with reference to a particular embodiment, it is to be understood that modifications may be made without departing from the spirit of my invention or from the scope of the claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A platform for movement up and down, comprising:

(a) a base;

(b) first and second vertical guides fastened to said base, said guides being spaced from each other and extending vertically upward from said base;

(c) first bearing means mounted on said first guide and arranged to slide up and down on said first guide;

(d) second bearing means mounted on said second guide and arranged to slide up and down on said second guide;

(e) horizontal platform means fastened to said first and second bearing means, said first and second bearing means and said horizontal platform means being movable as a unit up and down along said first and second guides;

(f) a roller mechanism rotatably mounted in a fixed location with respect to said first and second guides, said roller mechanism having rotational biasing means associated therewith that tend to rotate said roller mechanism in a predetermined direction;

(g) and flexible means connected at one end to said roller mechanism and extending vertically downward therefrom, the other end of said flexible means being connected to said unit of said horizontal platform means and said bearing means for moving said unit upward in response to the force of said biasing means exceeding the weight on said platform, and for moving said unit downward in response to the force on said unit that exceeds the forcing of said rotational biasing means.

2. A cantilever platform for dining apparatus and utensils or the like, comprising:

(a) a base;

(b) first and second elongated support elements each having one end fastened to said base, said support elements each extending vertically upward in the same parallel direction from said base;

(c) first and second movable elements positioned on said first and second support elements respectively for movement along said support elements in substantially only a direction parallel thereto;

(d) a platform fastened to and supported in cantilever fashion by said first and second movable elements for keeping said first and second movable elements at substantially the same distance from said base and for moving with said first and second movable elements as a unit;

(e) a rotatable element mounted at a fixed location on said support elements near the top thereof;

(f) spring bias means having one end fixed and the other end connected to said rotatable element;

(g) and means comprising at least one flexible member having one end wrapped around and attached to said rotatable element, extending vertically downward from said rotatable element, and having the other end attached to said unit for increasing the tension on said spring bias means in response to increased downward force applied to said unit, and for causing said unit to move upward in response to decreased downward force applied to said unit.

3. The cantilever platform of claim **2** wherein said spring bias means comprises a helical spring wound about a shaft, said spring and shaft being positioned within said rotatable element.

4. The cantilever platform of claim **3** wherein said one end of said helical spring is fastened to one end of said shaft, and said other end of said helical spring is fastened to said rotatable element at the end thereof away from said one end of said shaft.

5. The cantilever platform of claim **2** wherein said first and second support elements each comprise a pair of spaced vertical channels facing each other, and wherein said first and second movable elements each comprise a set of rollers respectively mounted in said channels to permit vertical motion of said movable elements and to support said unit in cantilever fashion.

6. The cantilever platform of claim **2** wherein said first and second support elements each comprise a tubular structure, and wherein said first and second movable elements each comprise an elongated sleeve bearing positioned around said tubular structure to permit vertical motion of said movable elements and the support said unit in cantilever fashion.

7. The cantilever platform of claim **3** and further comprising first and second sleeves mounted on said rotatable elements, and first and second cables wrapped around and attached to said sleeve at one end and attached to said unit at the other end.

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JAMES T. McCALL, *Primary Examiner.*