United States Patent [19]

Cummings

[11] **3,806,218**

[45] **Apr. 23, 1974**

[54] **STACK STORAGE AND LIFTER DEVICE**

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[73] Assignee: **Peters & Company, Inc.,** Boston, Mass.

[22] Filed: **May 18, 1972**

[21] Appl. No.: **254,487**

[52] **U.S. Cl.** **312/71,** 219/385

[51] **Int. Cl.** **A47f 1/00**

[58] **Field of Search** ..... 312/71, 306, 312; 211/49 D; 219/214, 385, 386, 392, 407, 521; 220/93; 108/36

[56] **References Cited**

UNITED STATES PATENTS

3,493,725	2/1970	MacKay	312/71 X
3,538,309	11/1970	Welker	219/386
2,609,265	9/1952	Larsen	312/71

Primary Examiner—James C. Mitchell

[57] **ABSTRACT**

A stack storage and lifter device suitable for dishware has a platform and a spring raising the platform for convenient dispensing of units from the stack. Simultaneous adjustment of platform level and preloading of spring for stacks of differing weight/height ratios are accomplished by an expansible, restrained assembly disposed between the platform and a compression spring. Hand access for units of dishware below the housing opening is provided by a rectangular or approximately square housing cross-section. Tilting of the housing and platform cause the stack to engage one side of the housing which stabilizes and guides the stack, enhances the hand access and provides for a heat conductive path directly with the edges of units in the stack. An upper extension guides units out of the top of the housing and can provide a heating path for dishware in that position.

22 Claims, 13 Drawing Figures

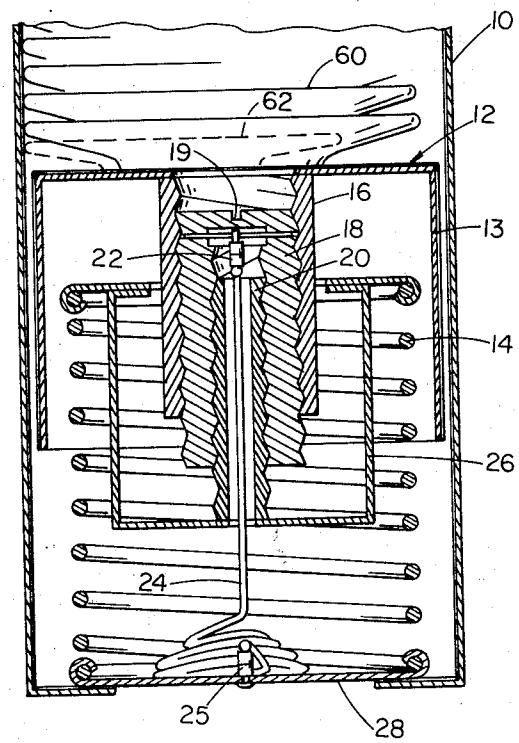


FIG 1

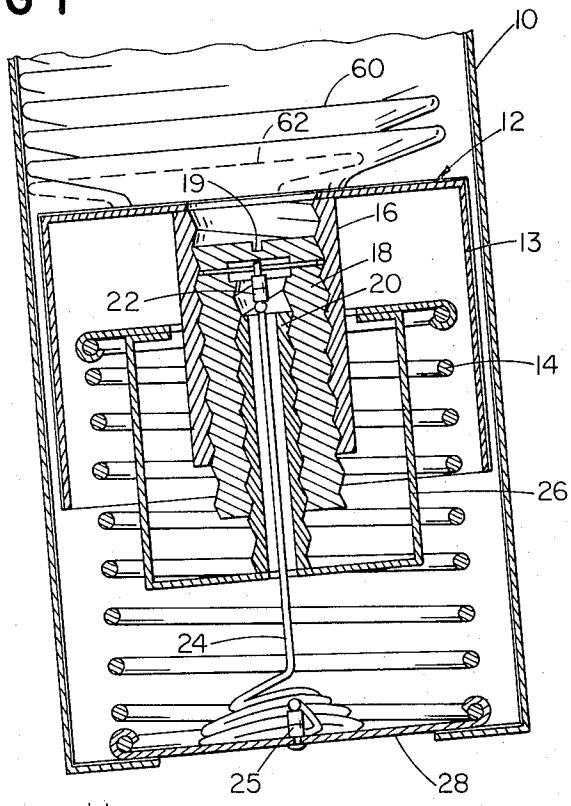
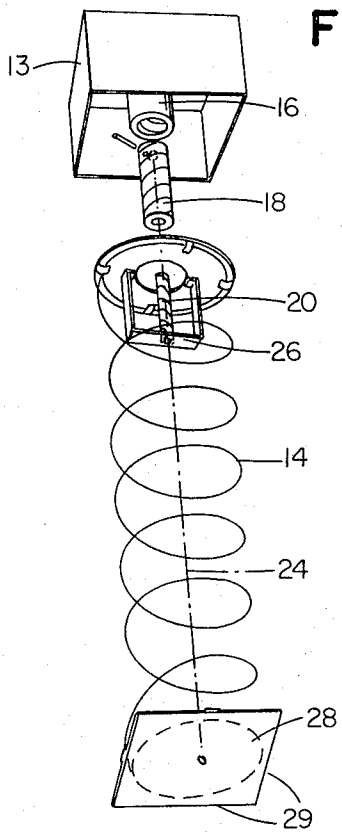


FIG 2



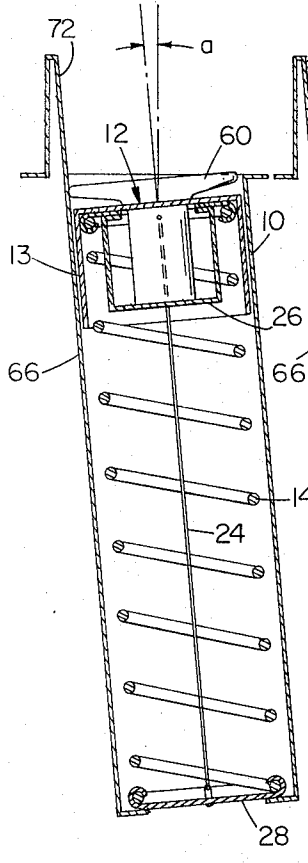


FIG 3

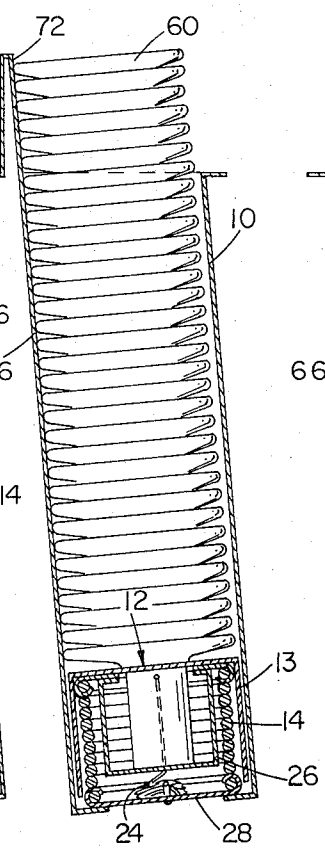


FIG 3a

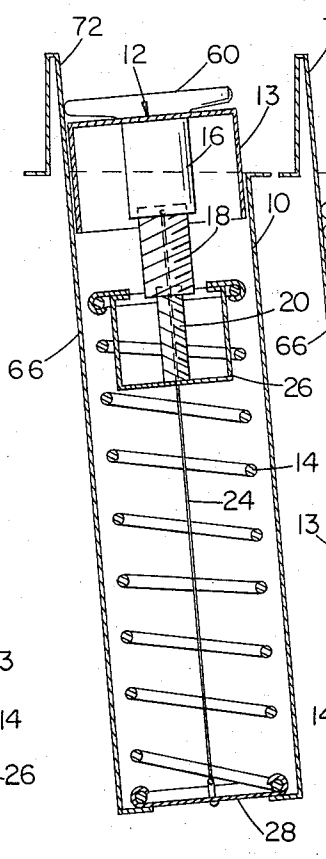


FIG 4

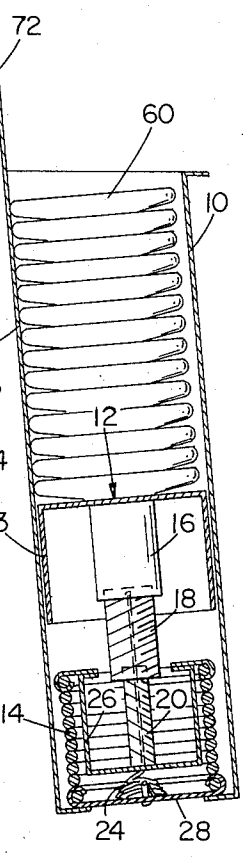


FIG 4a

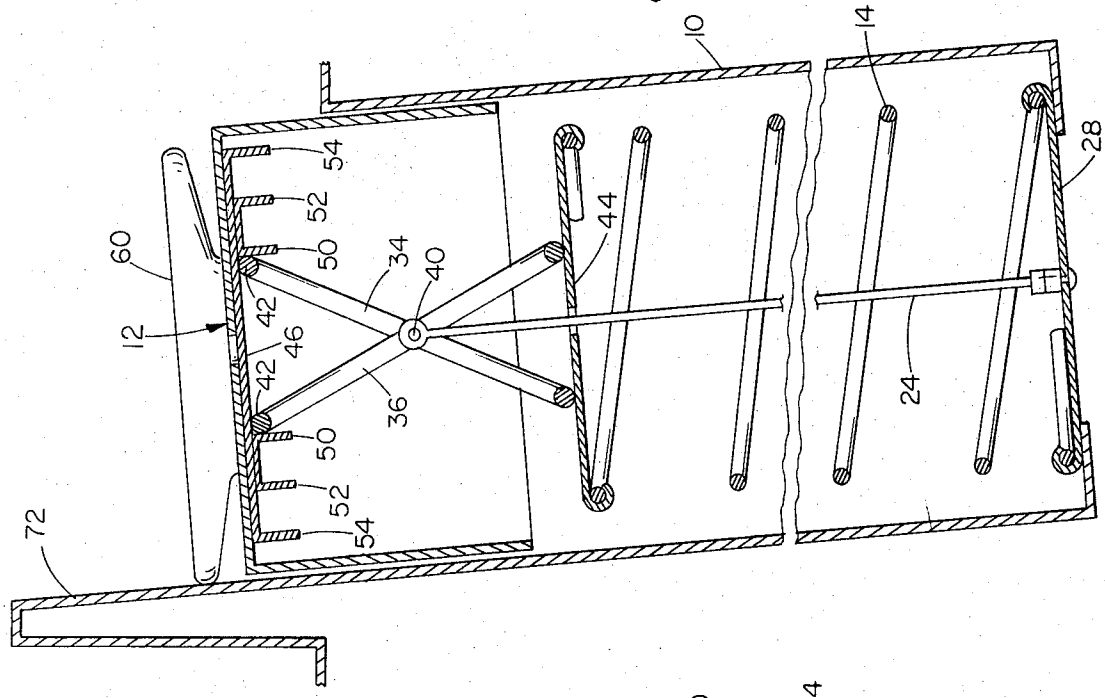


FIG 6a

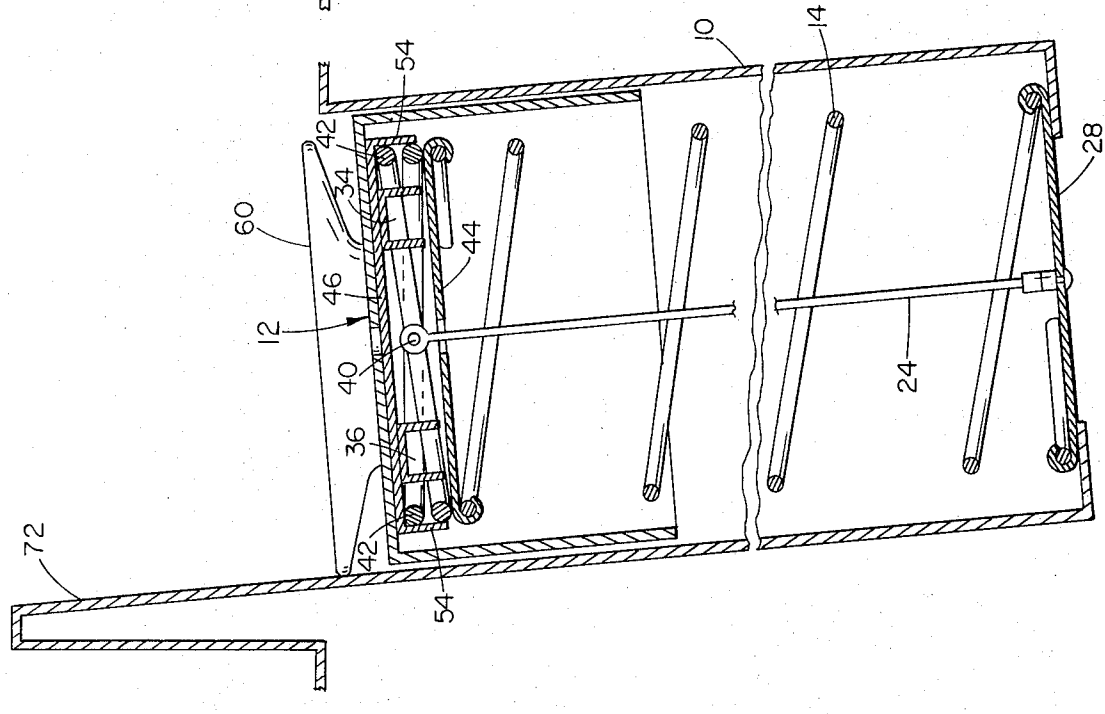


FIG 6

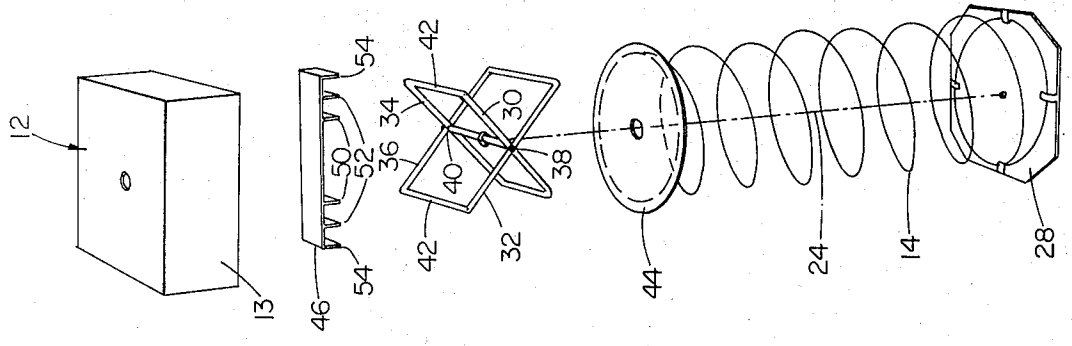


FIG 5

FIG 7

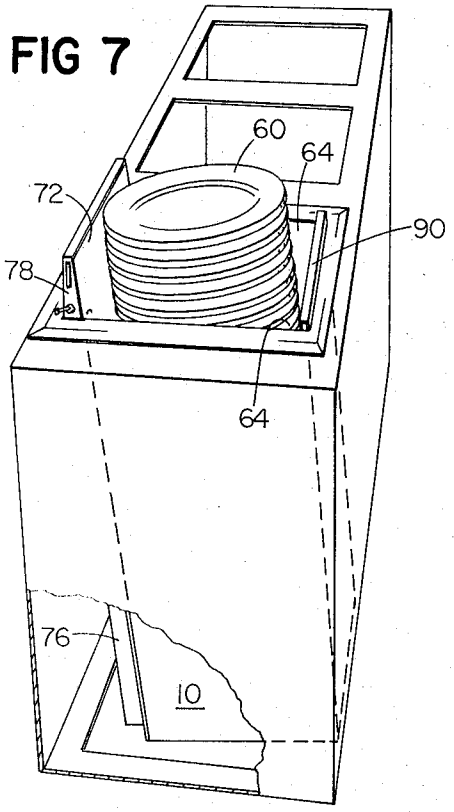
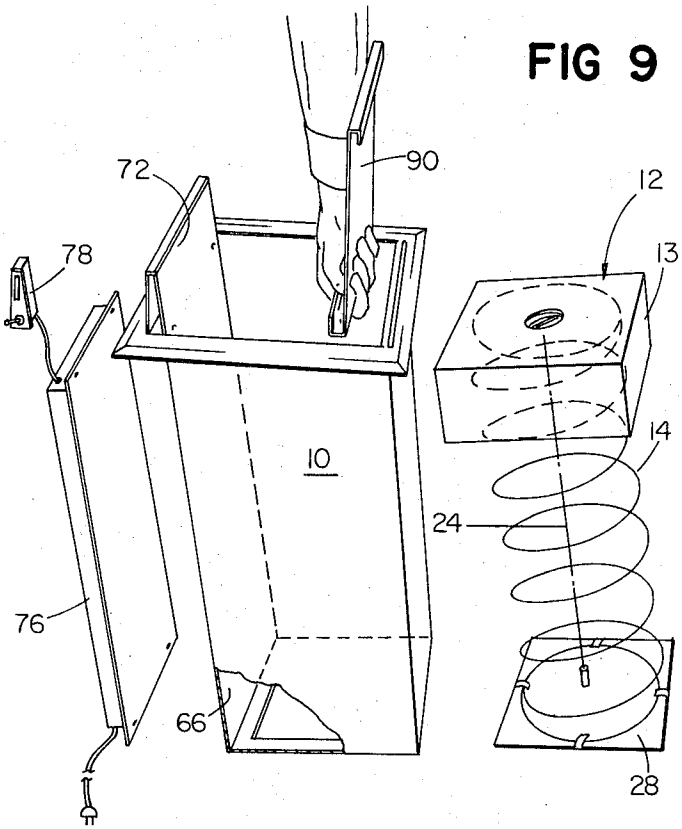


FIG 9



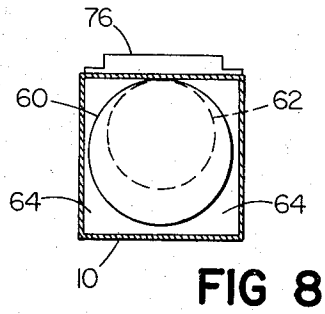


FIG 8

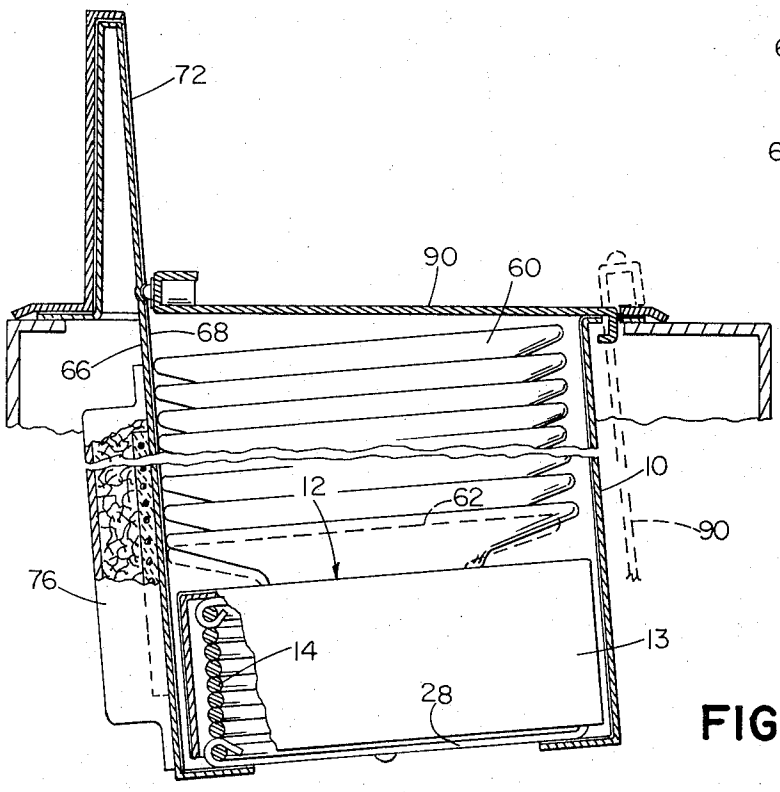


FIG 10

STACK STORAGE AND LIFTER DEVICE

This invention relates to stack lifters capable of progressively dispensing dishware in a convenient fashion. Some prior patenta concerned with such devices are U. S. Pat. Nos. 2,609,265; 2,980,479; 3,004,813 and 3,181,919.

Current construction of tubular dispensers for single stacks of dishware are offered in a large range of sizes. Commonly from 16 to 24 different sizes of tubular dispensers are sold, each with a variety of differently rated springs to accommodate the various weights and sizes of dishware employed in restaurants and food service operations. In order to obtain a useful installation it has been necessary to specify accurately both the size of the intended dishware and its weight, and to make sure that the correct units are installed. The resulting confusion and necessary cost in stocking such a range of dispensers have been disadvantages to the industry for a long time, as has been the disadvantage of being very limited in the ability to interchange the use,installed, of a dispenser between differing categories of dishware.

Field adjustments have been suggested for changing the empty and full levels of the dispenser, but those in use have generally not permitted the reduction of the number of dispenser sizes below about **16.**

It has also been desired to dispense dishware at controlled temperature but units available have not been satisfactory.

Objects of the present invention are to provide improved stack lifters and in particular, tubular dispensers, which alleviate the foregoing problems and provide a simple, relatively inexpensive and effective unit.

A particular object is to provide means whereby the necessary number of different size units of tubular dispensers is reduced and the problems involved in setting up a food service operation are simplified.

According to one aspect of the invention a means for field-adjustment of stack lifters employing compression spring elevated platforms is provided by the use of an expansible and contractible adjustment assembly. This assembly has a reference point tethered in fixed vertical position to the base, and dependently movable portions which simultaneously raise the platform and press downwardly and preload the spring, thus accommodating stacks of heavy china, with vice versa movement for light dishware.

Preferred embodiments of this aspect of the invention include use of a telescopic system and in particular a series of alternately right and left handed threaded elements, with the elements associated with platform and spring restrained from rotation and an intermediate element tethered against vertical movement while rotatable. An alternative embodiment employs a lever means pivoted near the reference point and having different portions which respectively rise and lower in dependent motion.

Another aspect of the invention lies in the use of a rectangular or square, or at least a cross-section greater than that of the dishware to provide hand access for dishware units below the top of the tubular housing. The advantage of such a provision is enhanced by effective tilting of the stack of dishware against one side of the enclosure.

Still another aspect of the invention lies in the combination of a temperature modifying means with a side wall of a stack lifter which is engaged by the edges of

dishware units in the stack with resultant temperature control of the units through heat conduction.

These and other objects and features will be understood from the following detailed description taken in conjunction with the drawings of preferred embodiments.

In the drawings:

FIG. **1** is a vertical cross-sectional view of a preferred embodiment in the form of a tubular dispenser with an expansible, telescopic threaded adjustment;

FIG. **2** is an exploded perspective view of the spring, adjustment and platform of the embodiment of FIG. **1**;

FIGS. **3** and **3***a* are vertical cross-sections of the embodiment of FIG. **1** respectively empty and full of a stack of light-weight china;

FIGS. **4** and **4a** are views similar to FIGS. **3** and **3a** respectively empty and full of a stack of heavy china;

FIG. **5** is an exploded perspective view similar to FIG. **2** of the moving parts of another preferred embodiment;

FIGS. **6** and **6***a* are vertical cross-sectional views of the different extremes of adjustment possible with the embodiment of FIG. **5**;

FIG. **7** is a perspective view of a preferred embodiment of the invention illustrating the features of a square cross-section enclosure with tilted unit;

FIG. **8** is a plan view showing the relation of dishware to the housing compartment;

FIG. **9** is an exploded view of portions of the embodiment of FIG. **7**, and

FIG. **10** is a vertical cross-sectional view partly broken away of the embodiment of FIG. **7**.

Referring to FIGS. **1** and **2** the embodiment comprises an upwardly extending tubular enclosure **10** of approximately square cross-section in which is fitted a movable platform **12** positioned by a compression spring **14.**

The platform is a hollow structure having planar side skirts **13** disposed adjacent corresponding planar sides of the housing, the platform thereby restrained from rotation. Platform **12** is rigidly secured to a downwardly extending hollow outer member **16** threaded upon hollow intermediate member **18** which in turn is threaded upon inner member **20.** Matching threads of members **16** and **18** are of one hand and matching threads of members **18** and **20** are of opposite hand. Intermediate member **18** is free to rotate with respect to members **16** and **20** but is tethered against vertical movement through swivel **22** and flexible tether member **24** which is a substantially constant length tension element, extending through a bore in the inner member **20** to an anchor **25** at the bottom of the housing.

The inner threaded member **20** is secured at its lower end to a structure **26** in turn secured to the top of spring **14** in a manner preventing relative rotation between members **20, 26** and **14.**

At its lower end the spring **14** is secured to a plate **28** having sides **29** corresponding to the sides of housing **10,** the housing thus restraining the bottom of the spring from rotation.

The tethered intermediate member **18** is provided with a slot **19** for insertion of a screwdriver and rotation thereby causes expansion and contraction of the assembly.

To understand the operation assume a stack lifter having a nominal spring rate, i.e., relief of a certain weight results in a certain deflection of the spring. In

certain instances dishware will be encountered having a weight to height ratio less than the nominal rate of the spring, thus if one starts dispensing with the top of the full stack at a certain level, by the time the stack is nearly consumed the spring will have been deflected a lesser amount than nominal and the top of the remaining stack will be at a lower level. Conversely, if dishware of a greater weight to height ratio than nominal is employed, the level of the top of the stack, when the stack is just large enough to fully compress the springs will be lower than the level of the top of the stack when few dishware units remain. The challenge to the industry has been to expand the range of dishware which can be handled by a given model of dispenser. The possibility of some adjustment to extend the range has been known e.g., from the above-cited patents; the present invention achieves a very extended adjustment using a principle which enables both simple instruction and rapidity of use.

In use with dishware of weight to height ratio, less than nominal, the adjustment assembly of FIG. **1** is contracted. In FIGS. **3** and **3***a* it is fully contracted and it will be seen that though differing, the tops of the stacks are accessible in either full or nearly exhausted condition.

In use with dishware of weight to height ratio greater than nominal, the adjustment assembly is expanded. In FIGS. **4** and **4a** it is fully expanded. Note that member **16** is projected above the tethered member **18,** thus raising the position of the platform. In dependent motion, member **20** is forced downwardly, and in reaction against non-yielding tether element **24,** member **20** through structure **26** forces the top of the spring downward,preloading the spring. In this condition, when a stack of the heavy dishware is inserted to fill the dispenser, because some of the weight is required to relieve the preload, the total deflection of the spring is less than would occur without preload. This cooperates with the now raised platform to ensure that the top of the full stack is at an accessible level. As the full stack is consumed the level of the top of the stack creeps up, but remains within usable range.

Thus by a rapid-acting and hence convenient adjustment, the dispenser can be adjusted over a considerable range to accommodate stacks of differing weight to height ratio as may be encountered with different kinds of china or different sizes thereof.

In the alternate preferred embodiment the two mode adjustment just described is accomplished by opposite pairs of levers **30, 32** and **34,36** joined at pivots **38, 40,** the lever pairs being joined by cross members **42.**

The lever pairs rest upon a top spring plate **44** secured to the spring and bear upwardly through the adjustment bar **46** to support the platform.

The levers in effect form a scissors support, and when collapsed substantially to the plane of the pivots **38,40,** they occupy little vertical space (see FIG. **6**) but when expanded substantially to the vertical plane, they occupy considerable vertical space. The adjustment bar **46** has pairs of retainers **50, 52, 54,** which in different positions engage the upper ends of the levers, retaining the levers in selected positions as illustrated in FIGS. **6** and **6***a*. The pivot points **38, 40** define the reference point, being tethered by member **24,** and it will thus be seen that raising the platform and preloading the spring is possible by manually squeezing the levers together to change from the position of FIG. **6** to that of FIG. **6***a*, and replacing the adjustment bar on top thereof to lock the assembly in the new position. Thus in a general way the embodiment of FIGS. **5, 6** and **6***a* has principles in common with that of FIGS. **1–4.**

In addition to the adjustment in platform level and preload just discussed, another feature leading to expanded range of ware handled by a given dispenser is the configuration of the housing itself. In the embodiment of FIGS. **1–4***a* (referring also to FIGS. **7** and **8**) the usual round dishware **60** (or the smaller size **62**) is disposed in an approximately square cross-section housing. By thus not having the housing closely surround the stack, access is provided for the hands of the user to dishware below the top of the housing, see the corner regions **64.** This access has the effect of extending considerably the range of access levels which are convenient to food service personnel. The constancy of this access space is enhanced by intentional tilting of the entire unit to a slight angle *a* (FIG. **3**) relative to the vertical, causing the stack of dishware to tilt to one side and engage a sidewall **66** of the dispenser.

A further important advantage of such tilting and contact with wall **66** is that it serves to guide the stack, and because of friction units in the stack are not so apt to be dislodged sideways. The result is that dishware(**62** FIG. **7**) considerably smaller than the nominal diameter for a given dispenser can be accommodated.

Referring to FIG. **10** advantageously a protective coating **68** is applied to the wall **66,** such as a vinyl clad applied to aluminum, which protects the dishware, preventing discoloration.

A further feature is an extension **72** of the sloped rear wall **66,** against which the dishware rests even when they fully emerge from the top of the housing. This extension positions and stabilizes the top portion of the stack,enabling it to be quite high, while readily enabling access of the dishware from three sides.

As shown in FIGS. **7, 9** and **10** the rear wall **66** against which the stack is tilted is provided along its exterior with a heating unit **76,** the control **78** therefor being inserted in a re-entrant structure associated with wall extension **72.** The effect of the heating unit is to heat wall **66,** which then delivers the heat by conduction to the dishware through the edges of the dishware units contacting wall **66.** Indeed, as wall extension **72** is also of conductive metal, heat is conducted upwardly by the extension **72** from the heated wall **66,** and thence into the dishware at the top of the stack.

Thus in a simple dispenser of simple planar sheet metal construction it is possible to accommodate a complete range of dishware.

Indeed for substantially all weights of china, in substantially all the sizes conventionally employed in food service it is found that the dispenser just described need be provided in as few as four different sizes to accommodate the full range. As an example, details are given in the following table:

Nominal Size (in.)	Housing Cross Section Dimensions (in.)	Spring rate lb./inch	Acceptable range to height ratio lb./inch
6	6¼×6½	1.2	0.9 to 1.8
8	8¼×8½	2.0	1.5 to 3
10	10¼×10½	3.0	2.25 to 4.5
12	12¼×12½	4.0	3 to 6

Referring again to FIGS. **7, 9** and **10** a hide-away cover **90** is provided which slides down along the exterior of the housing (FIG. **10** dotted lines) when not in

use, or covers the dishware. In case of movement of the dispenser when loaded it is advantageous to employ a sufficient load of dishware to position the top of the stack above the opening of the housing. Then upon forcing the cover into position the stack is further stabilized, again adding to the practicality of handling dishware somewhat smaller than the cross-section of the housing.

Variations in the specific details are possible within the spirit and scope of the invention.

What is claimed is:

1. In a stack storage and lifter device comprising an upwardly extending housing having a top opening, a platform within the housing, a compression spring disposed beneath the platform for urging the platform upwardly and an adjustment means for adjusting to accommodate stacks of different weight/height ratio, the improvement wherein said adjustment means comprises an expansible and contractible assembly secured at a reference point to the upper end of a flexible tension member, said assembly carried upon the top of said spring and disposed in supporting relation below said platform, a portion of said assembly expansible upward relative to said reference point to raise said platform while another portion of said assembly is expansible in dependent motion downward relative to said reference point to force the top of said spring downward, said flexible tension member having its lower end secured to an anchor to limit said reference point to a predetermined upper position when said device is empty, expansion upward and downward of said respective portions having the simultaneous effect of lifting the platform and preloading said spring, and corresponding contraction of said portions having the simultaneous effect of lowering the platform and removing preload from said spring.

2. The stack storage device of claim **1** wherein said assembly comprises telescopic elements defining said portions connected for dependent motion relative to said reference point.

3. The stack storage device of claim **2** wherein said reference point is defined by a hollow upwardly extending member having external threads of one hand and internal threads of the opposite hand, one of said telescopic elements being threaded to the exterior and the other to the interior of said member and means to cause relative rotation between said member and said elements to cause said expansion.

4. The stack storage device of claim **3** wherein said element which is threaded to the exterior of said member is adapted to change the height of the platform and is secured against rotation relative to said platform, said platform being restrained by the housing from rotation, said reference point defining member being rotatable relative to said tension member without changing its heightwise relation thereto, said element which is threaded to the interior of said member adapted to load the spring and being secured against rotation relative to said spring, and the lower end of said spring being restrained by the housing from rotation.

5. The stack storage device of claim **4** wherein said platform and said housing are of similar rectangular form restraining relative rotation.

6. The stack storage device of claim **1** wherein said assembly comprises lever means pivoted near said reference point to move with a component in the vertical direction from a collapsed position lying generally horizontally near said reference point to an expanded position with lever portions displaced upwardly above and downward below said reference point.

7. The stack storage device of claim **1** wherein said housing and platform are of similar rectangular form and are tilted as a unit by a small acute angle from the vertical causing a stack of round dishware therewithin to tilt and contact one side of said housing for guiding and providing hand access at places apart from said contact for articles below the top opening of said housing.

8. The stack storage device of claim **1** wherein said housing is of tubular form for a single stack of a predetermined range of sizes of round dishware and wherein said tubular housing is of approximately square cross section with a side dimension slightly exceeding the diameter of the largest size in said range of dishware, corner regions of said housing providing access for the hand to reach units of dishware below the opening of the housing.

9. A tubular dispenser for progressively dispensing units of round dishware conveniently from a single stack, comprising an upwardly extending tubular housing having wall portions defining a cross-section larger than said units of ware and a top opening, a platform within the tubular housing, a compression spring having a spring rate generally corresponding to the nominal weight/height ratio of said units of ware for urging the platform upwardly, an adjustment means for adjusting to accommodate stacks of units of weight/height ratio varying within a predetermined range from said nominal ratio, the dispenser constructed to cause guiding of said stack along a said wall portion, providing open space between the stack and other wall portions for access of the hand to reach units of dishware below the opening of the tubular housing and wherein said platform is constrained to travel at a small acute angle to the vertical causing said stack of dishware to slidingly contact said wall portion and maintain said room for access of the hand.

10. The tubular dispenser of claim **9** wherein said housing and platform are tilted as a unit at said small acute angle to the vertical.

11. In a dispenser for progressively dispensing units of dishware conveniently from a stack, comprising an upwardly extending housing having a top opening, a platform within the housing, a spring for urging the platform upwardly and an adjustment means for adjusting to accommodate stacks of different weight/height ratio, the improvement wherein said housing tilts at a small acute angle to the vertical and said platform is constrained to travel at a similar angle thereby to cause said stack of dishware to slidingly contact one side of said housing, thereby to contribute stability to the stack.

12. The dispenser of claim **11** wherein said one side of said housing extends above the top opening of said housing, disposed to guide units at the top of the stack while exposing them to users.

13. The dispenser of claim **11** having a wall portion for heat transferring-sliding contact with the edges of units of said stack, and a temperature modifying means for modifying the temperature of said wall portion and thereby through conduction the temperature of said dishware.

14. The tubular dispenser of claim **13** wherein said wall portion extends above the top opening of said

housing, disposed to guide units at the top of the stack while exposing them to users and maintaining them at desired temperature.

15. In a dispenser for progressively dispensing units of dishware conveniently from a stack, comprising an upwardly extending housing having a top opening, a platform within the housing, a spring for urging the platform upwardly and an adjustment means for adjusting to accommodate stacks of different weight/height ratio, the improvement wherein said housing has a wall portion for heat transferring-sliding contact with the edges of units of said stack, and a temperature modifying means for modifying the temperature of said wall portion and thereby through conduction the temperature of said dishware,wherein said housing is defined in part by a planar metal wall portion, a planar heating device disposed in heat-transferring relation along the exterior of said wall portion, a dishware protective coating disposed along the interior of said wall portion and the parts of the dispenser arranged to cause a stack of dishware to press edge-wise against said coating and receive heat therethrough and wherein said wall portion defines a part of a generally rectangular housing, said housing and said elevator tilting at a small angle to the vertical in the direction of said wall portion thereby to cause said stack to slidably contact said coating and receive heat therethrough, corner regions of said housing providing access for the hand to reach units of dishware below the opening of the housing.

16. A dispenser for progressively dispensing units of round dishware from a single stack of like-sized units, comprising an upwardly extending housing having a top opening, a platform within the housing, and a platform-supporting compression spring, positioned below said platform and having a spring rate generally corresponding to the nominal weight/height ratio of said units of dishware for moving the platform upwardly in a compensating manner as dishware are removed, characterized in that the dispenser is constructed to dispense dishware of various diameters over a predetermined size range, the dispenser constructed to cause engagement of a stack of dishware units edgewise against a guiding wall portion of said housing no matter whether said stack comprises units of the smallest or largest size in said range, and said housing having a cross section larger in a given location than the largest size of said range, providing a hand access opening along the side of the stack, enabling the first unit in the stack to be grasped even when lying below the top of the housing.

17. The dispenser of claim **16** characterized in that said housing is of approximately square cross section with a side dimension slightly exceeding the diameter of the largest size of said range of dishware sizes accommodated by said dispenser, corner regions of said housing providing said hand access.

18. The dispenser of claim **16** characterized in that said guiding wall portion is set at a slight acute angle to the vertical, against which the edges of said stack rest, and said platform is adapted to move along a similarly angled axis, parallel to said wall portion.

19. The dispenser according to claim **18** characterized in that said housing and platform are of similar rectangular form and are tilted as a unit by said small acute angle from the vertical causing a stack of round dishware therewithin to tilt and contact one side of said housing for guiding and providing hand access at places apart from said contact for articles below the top opening of said housing.

20. The dispenser according to claim **16** characterized in that said side wall portion extends above the top opening of said housing to guide units at the top of the stack while exposing them to users.

21. The dispenser according to claim **16,** characterized in that said wall portion makes heat transferring-sliding contact with the edges of dishware in said stack, and a temperature modifying means associated with said wall portion for modifying the temperature of said wall portion and thereby through conduction the temperature of said dishware.

22. The dispenser according to claim **16,** characterized in that said wall portion is planar and a planar heating device lies in heat-transferring relation to the exterior of said wall portion, a dishware protective coating disposed along the interior of said wall portion and the parts of the dispenser arranged to cause a stack of dishware to press edgewise against said coating and receive heat therethrough.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,806,218 Dated April 23, 1974

Inventor(s) GILBERT A. CUMMINGS

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Under "References Cited" please insert

-- Olssen 3,741,512 --;

Col. 1, line 5, "patenta" should be --patents--.

Signed and sealed this 10th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

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Signed and sealed this 10th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

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Commissioner of Patents

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