

[54] ANTI-SPRING BUCKLING DEVICE

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[51] Int. Cl.F16f 1/10

[58] Field of Search267/166, 178; 206/DIG. 26

[56] References Cited

UNITED STATES PATENTS

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[57] ABSTRACT

A combination which includes a housing having an inner wall, a helically coiled spring located within the housing and laterally spaced from the inner wall, apparatus connecting the spring to the housing so that the length of the spring changes in response to a change in loading on the spring, and apparatus which is movably connected to and extends tangentially of the spring for contacting the inner wall of the housing at radially spaced positions on the inner wall to maintain the lateral spacing between the spring and housing. Preferably, the apparatus which contacts the inner wall is a rectangularly-shaped member having four wall contacting portions.

1 Claim, 3 Drawing Figures

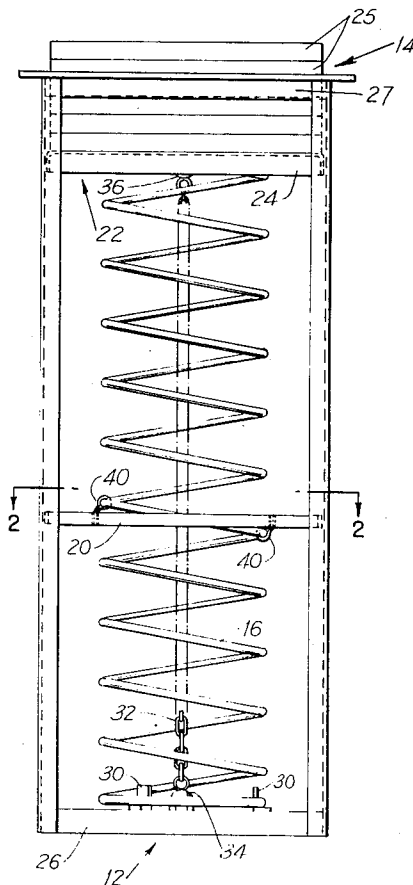


FIG. 1

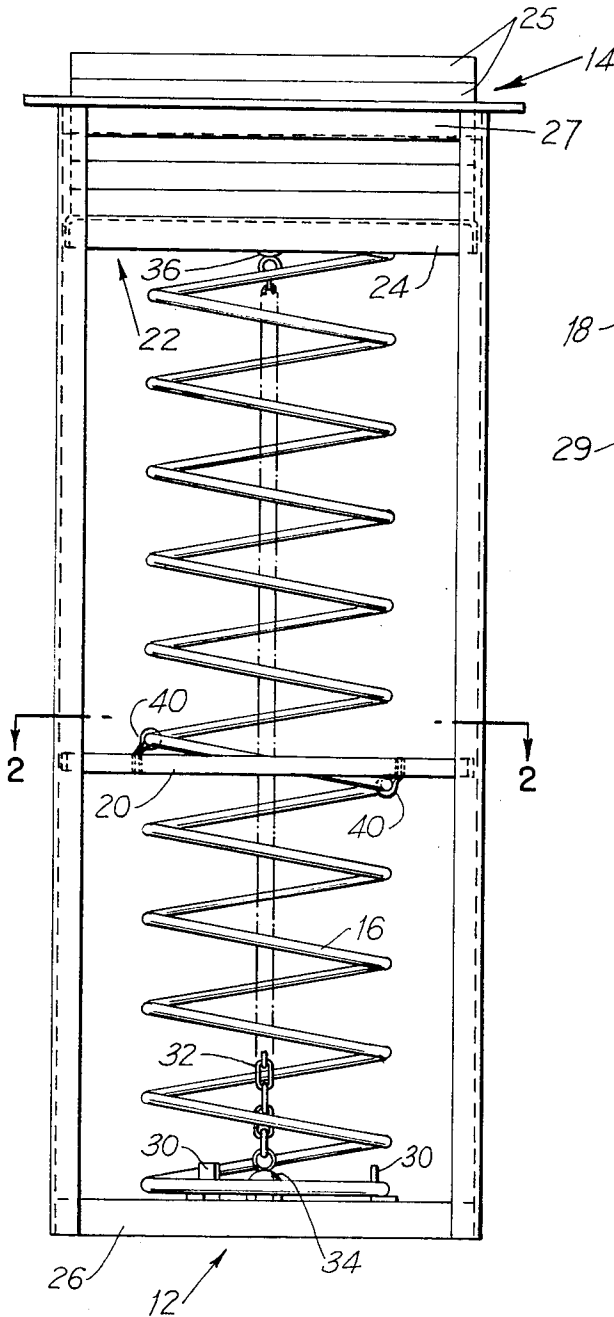


FIG. 2

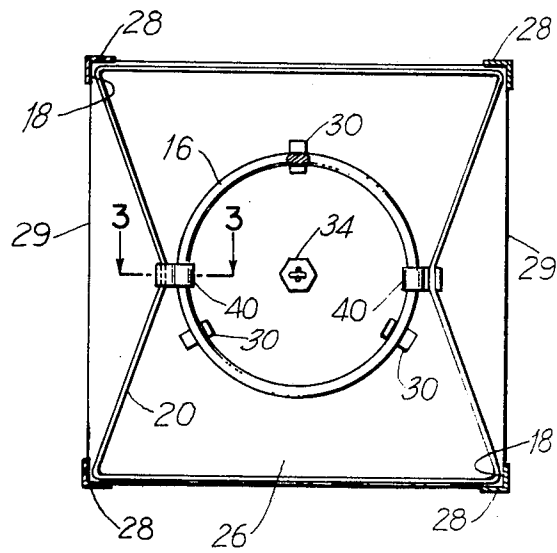
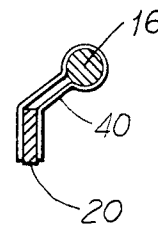


FIG. 3



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ANTI-SPRING BUCKLING DEVICE

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to self-leveling storing and dispensing devices of the type wherein a helically coiled compression spring, on which a plurality of articles of like height and weight may be stacked, is mounted within an upright housing and guided by the housing in a vertical path of travel as its length changes in response to a change in loading; and more particularly to such a device which includes means for preventing the spring from buckling due to eccentric loading.

In apparatus of the aforesaid type, an article carrier is normally seated on the upper end of the spring and the spring is chosen to axially expand or contract a distance approximately equal to the height of one of the articles placed on or removed from the carrier. Assuming a plurality of like articles are stacked on the carrier, the carrier is thus adapted to move upwardly a distance approximately equal to the height of an article when it is removed from the platform, and move downwardly the same distance when a like article is added. The topmost article in a stack of like articles is thereby automatically located at a predetermined constant level irrespective of the height of the stack.

One of the difficulties associated with such apparatus is that the spring tends to buckle due to eccentric loading whether or not the articles are stacked centrally of the carrier, since the uppermost turn of the spring on which the carrier is seated is either tapered or partially wound within the next adjacent turn to present a horizontally oriented surface on which the carrier may be seated. As a consequence, a load located centrally of the carrier does not axially load the spring. Instead, it eccentrically loads the spring, thereby tending to cause the spring to buckle.

In the prior art, the problem has been alleviated through the use of springs of laterally extending cross-section slightly less than the housings in which they are respectively mounted. The arrangement ensures that when a spring starts buckling, it contacts the inner wall of the housing thereby preventing further buckling. To manufacture a large variety of sizes of such prior art apparatus, a large inventory of springs must be maintained by the manufacturer, since each spring must be tailor-made for its particular housing.

The inventory problem arises because the lateral area of the opening formed by the inner wall of the housing is dictated by the size of the article stacked on the carrier, and the laterally extending dimensions of the spring is fixed in consideration of the size of the opening. Springs mountable in one housing cannot be mounted in a differently sized housing for handling articles of the same weight and height, but of different laterally extending dimension, since the lateral extent of the spring has to be changed to prevent the spring from buckling. The inventory must also be large enough to accommodate users who wish to change the type of article handles by their device when the lateral area of the article to be dispensed is substantially the same as the article previously dispensed, but its weight and/or height are different. Any new spring provided must have substantially the same lateral extent as the old spring, as well having a different spring characteristic.

To reduce the inventory of springs I have devised an anti-spring buckling device which may be mounted on a variety of springs of different diameter. In conjunction with my device a manufacturer may utilize different sizes of springs in a given dispenser housing, or the same size of spring in differently sized housings.

The invention has generic application to preventing springs within housings from buckling. Accordingly, it is a combination comprising a housing having an inner wall, a helically coiled spring located within the housing and laterally spaced from the inner wall, means for connecting the spring to the housing so that the length of the spring changes in response to a change in loading thereon, and means movably connected to and extending tangentially of the spring for contacting the inner wall of the housing at radially spaced points thereon to maintain the lateral spacing between the spring and housing.

In the preferred embodiment the means for contacting the inner wall is normally spaced apart therefrom but contacts the inner wall at two radially spaced points in response eccentric spring loading, thereby preventing the spring from buckling. Although the inner wall contacting means need not be so made, a continuous member having radially spaced inner wall contacting portions at spaced intervals along its length may be utilized in housings of various cross-section; round, square, rectangular or the like. In most embodiments a single, rectangularly-shaped member may be used; whereas in others more than one such member may be used.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical elevation of a self-leveling dispenser according to the invention;

FIG. 2 is a plan view of the dispenser of FIG. 1, taken substantially along line 2—2 of FIG. 1; and

FIG. 3 is an enlarged section of a portion of the dispenser shown in FIG. 1, taken substantially along the line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although the invention is hereinafter described in connection with self-leveling storing and dispensing equipment extensively used in the food service industry for storing and dispensing articles such as trays, racks of cups or glasses, plates and saucers, and the like; it should not therefore be considered to be limited to such equipment.

As shown in the Figures, wherein like reference numerals designate like or corresponding parts throughout the several views, the dispenser of the preferred embodiment generally includes an upright rectangularly-shaped housing 10, having a closed lower end 12 and an open end 14, a helically coiled spring 16 mounted within the housing and laterally spaced from its inner wall 18, and a geometrically-shaped member 20 connected to the spring so as to tangentially extend from the spring toward the inner wall of the housing. A rectangularly-shaped carrier 22, having a rectangularly-shaped skirt 24, is seated on the upper end of the spring to receive a stack of like-dimensioned articles 25, such as a stack of trays or racks.

In practise, the spring is chosen in consideration of the weight and height of one of the articles stacked on the carrier. The spring characteristic is adjusted so that the spring is lengthwise compressed a distance approximately equal to the height of the article placed on the carrier, and expand the same distance when the article is removed. Assuming a plurality of articles of like weight and height stacked on the carrier, successive articles in the stack are automatically elevated to a level slightly above the open upper end of the housing for successive removal from the dispenser. Assuming the spring has space within the housing for further compression therein, when an article is added to a stack of like articles on the carrier, the added article will be lowered to the aforesaid level. Thus the topmost article in a stack of like articles is automatically located at a predetermined constant level irrespective of the height of the stack.

The housing forms a passageway, bounded by the inner wall 18 of the housing, within which the carrier moves upwardly and downwardly in response to addition or removal of articles. As shown, the cross-section of the passageway is rectangular, but it may be circular, square or elliptical, or the like, without departing from the spirit and scope of the invention.

The housing includes the horizontally oriented rectangularly-shaped base member 26, the like oriented rectangularly-shaped top member 27 which is spaced above and in registry with the base member, and four vertically oriented upright members 28 having their lower ends respectively connected to one of the four corners of the base member and their upper ends respectively connected to one of the four corners of the top member. The top member 27 acts as a frame defining an opening in the upper end of the housing through which the articles may pass. In practise, the housing is also provided with four rectangularly shaped panels 29 respectively connected to

the appropriate uprights 28 for covering the sides of the housing.

To connect the spring to the housing I provide a plurality of L-shaped metal members 30, and connect them to the upper surface of the base 26 as shown in FIG. 1. One leg of each of the members 30 is spot welded to the base, and the other leg extends upwardly from the base to laterally confine the lower end of the spring in place. In addition, I provide a chain assembly including a length of chain 32 having its lower end removably connected to the center of the top surface of the base member by means of a fixture 34, and its upper end removably connected to the center of the bottom surface of the carrier 22 by means of the fixture 36. The vertical length of the chain assembly, 32, 34 and 36, is chosen to pre-load the spring a sufficient amount to substantially align the top surface of the carrier 22 with the top surface of the top 27 of the housing.

To prevent buckling in response to eccentric loading, I provide the geometrically-shaped member 20. In the preferred embodiment, member 20 is a length of flat steel stock which is bent into a rectangularly-shaped form to define inner wall contacting portions or surfaces 30 at a spaced intervals along its longitudinal length. In practice the ends of the member are overlapped and spot welded together after the desired configuration is formed. The member may be fabricated from a single piece or several pieces of metal strip or round stock, and from various materials, such as steel, aluminum, brass, copper or plastic, or the like, without departing from the spirit and scope of the invention. In addition, the member may take other forms, such as the shape of a square, and be provided with more inner wall contacting portions or surfaces than shown in the Figs., without departing from the spirit and scope of the invention.

The member 20 is preferably movably connected to the spring by means of a pair of connectors 40. In practice each of the connectors 40 is a rectangularly-shaped strip of steel wrapped around a turn of the spring so that the free ends of the connector extend outwardly from the spring and are spaced apart from one another a sufficient distance to receive a portion of the longitudinal length of the member 20 between

them for spot welding to the member. With this arrangement the member 20 extends tangentially of the spring and does not interfere with its compression. For example, when the spring is fully compressed the turns of the spring next adjacent to the turn on which the member 20 is mounted are compressible against the connectors, rather than against the member 20. In addition, since the connectors are tightly wrapped around the spring rather than being welded or otherwise fixedly connected to the spring, the spring may twist within the connectors as it expands and contracts. The connectors 40, and thus the member 20, are movably mounted on the spring in a manner which allows the spring to operate without interference from the member 20.

In addition to the foregoing, the connectors are preferably mounted on the spring such that the free ends of one connector hang downwardly and those of the other protrude upwardly, so that the member 20 tends to be more horizontally oriented than it would be if both connectors had their free ends oriented in the same direction. In practice it has been found that this arrangement reduces the likelihood of the connectors being strained and eventually breaking away from the spring.

What is claimed:

1. In an article dispenser comprising a vertically disposed housing having an open upper end, a movable platform positioned within said open upper end, and a coil compression spring in said housing extending centrally along the vertical length thereof between said movable platform and the bottom of said housing, the side walls of said housing being spaced from said coil spring and means for preventing said coil spring from buckling and contacting said side walls, said means comprising a flat open frame member disposed in said housing between said coil spring and housing side walls, said frame member having a plurality of radially inner and radially outer portions disposed adjacent said coil spring and side walls respectively, hinge means connecting said radially inner portions to circumferentially spaced parts of a central turn of said spring, and said radially outer portions being close to diametrically opposite parts of said side walls for contact therewith to prevent buckling of said coil spring.

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