June 18, 1968 R. H. MacKAY 3,388,677

DISPENSING APPARATUS

Filed Oct. 24, 1965 2 Sheets-Sheet 1

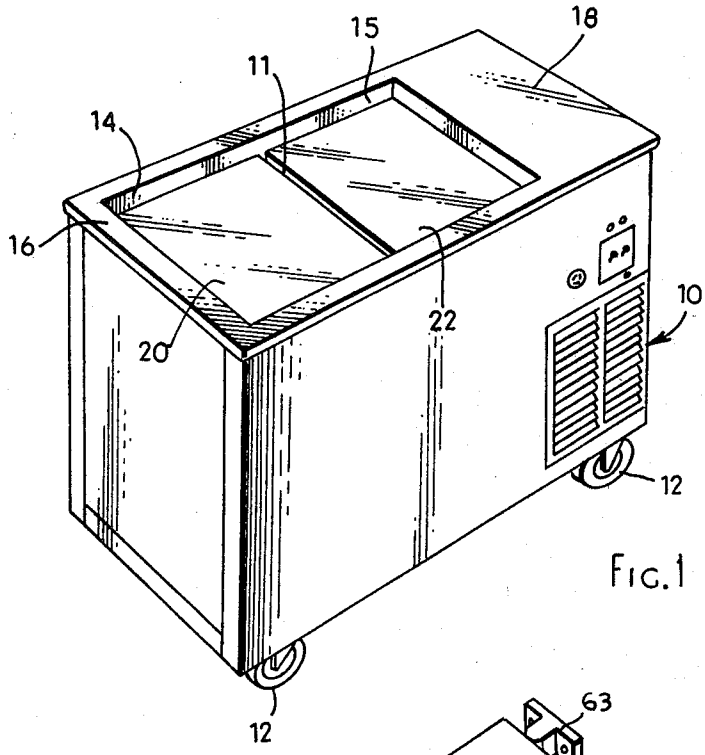


FIG. 1

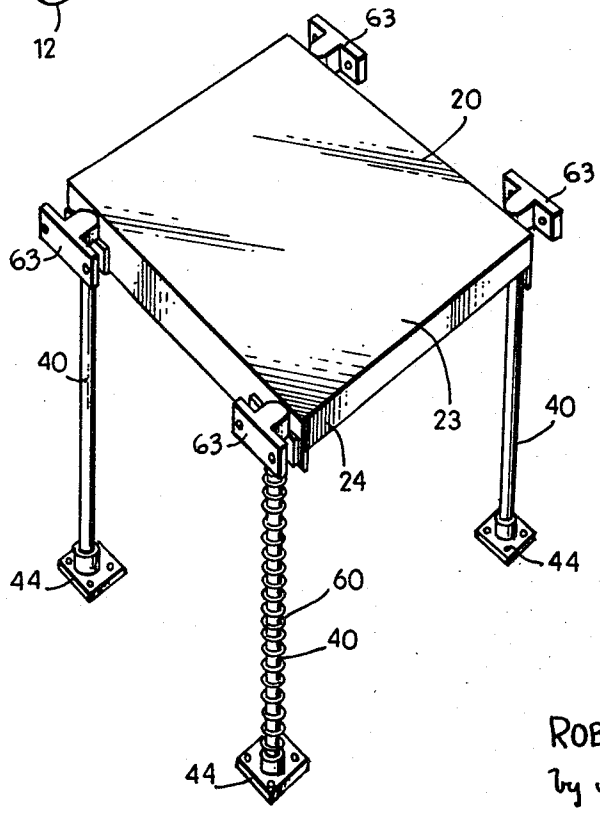


FIG. 2

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Filed Oct. 24, 1965 2 Sheets-Sheet 2

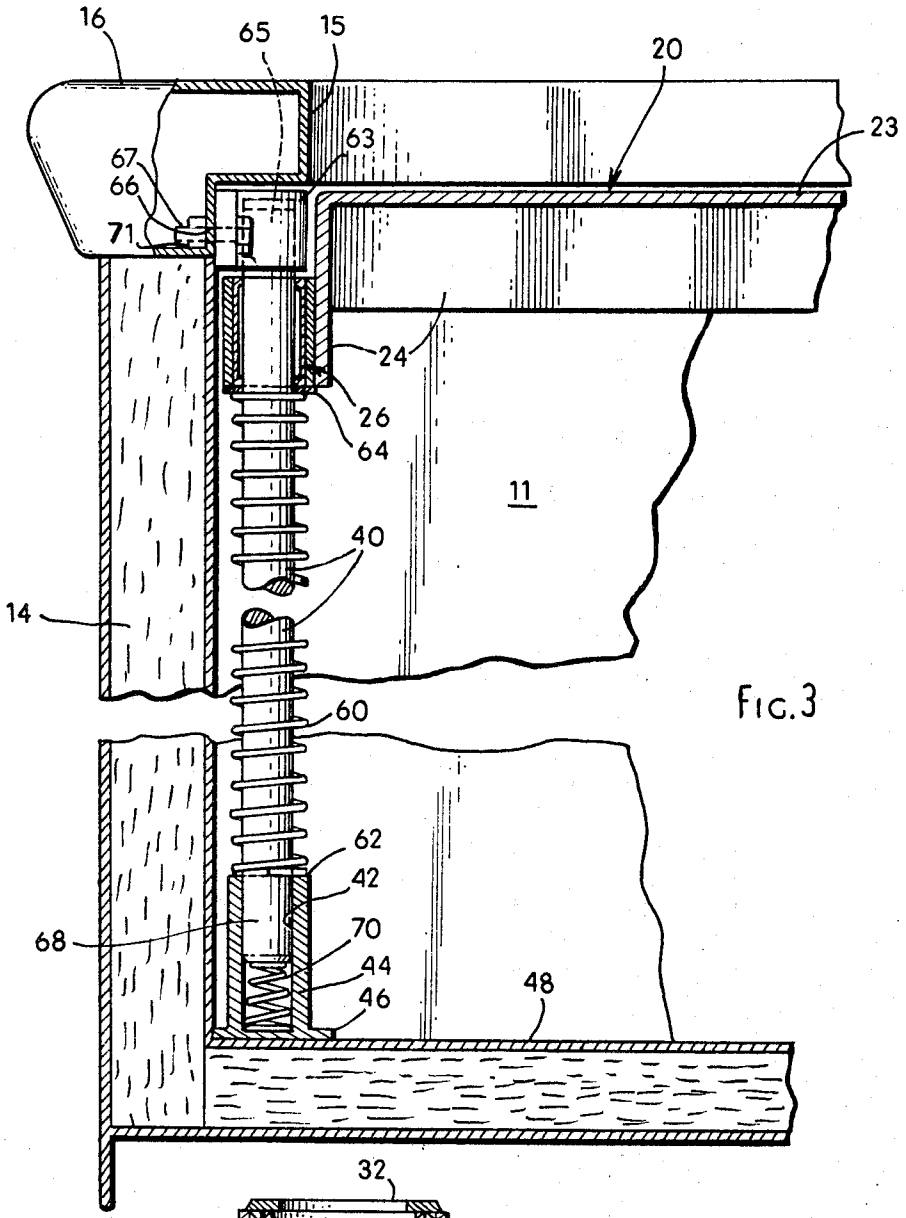


FIG. 3

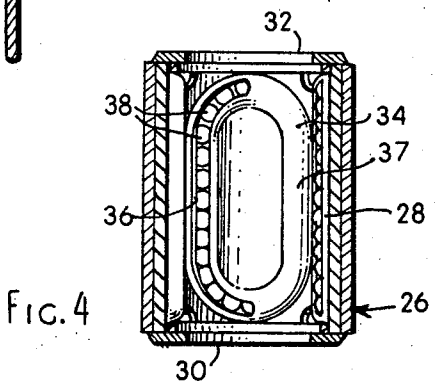


FIG. 4

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DISPENSING APPARATUS

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ABSTRACT OF THE DISCLOSURE

A platform is supported by a cylindrical bearing which surrounds a fixed vertical post at each of four corners so that the platform can move vertically but cannot tilt or cant. A spring surrounds each post and urges the platform upward.

This invention relates to apparatus for dispensing materials such as food trays, or the like, and particularly to a new and improved combination of elevator and support platform for maintaining a stack of objects or articles with the uppermost one at a substantially constant level.

When trays or other articles are stored within a compartment it is desirable to provide means for constant raising of the stack of articles so that the uppermost one can be conveniently removed. Otherwise it becomes inconvenient to reach down into the storage compartment, or other storage means, for removing the uppermost article, whether it be a food tray or other article.

Those skilled in the art have proposed elevator means for constantly urging the support platform, on which a stack of articles is rested, in an upward direction so that as the articles are removed and the weight of the stack diminishes, the elevator means can raise the stack successively higher with the net result being that the uppermost article remains substantially at the same height and is always within convenient grasp.

One of the major shortcomings of the elevator means is that should the support platform be unevenly loaded from side to side there tends to occur a binding between the elevator and one of its support surfaces because of the tendency of the platform to tilt or tip under the uneven loading condition. Also, the art has experienced considerable difficulty in devising an elevator means which will be effective in raising the platform in an even horizontal attitude under loads of trays whether they are evenly or unevenly stacked, and regardless of the total weight of the stack of trays or other articles.

It is one of the principal objects of the present invention to provide a novel elevator means which includes a support platform which has bearing surfaces of substantial length, and which insures that the support platform portion of the elevator will assume a horizontal position and will remain in such position at all times during its raising and lowering movements. In this way a stack of articles is raised or lowered in a true vertical direction and without causing such articles to scrape or move against the sidewalls of the compartment within which they are stored in lowered position.

It is a further object of the present invention to provide a simple and inexpensive bearing means which insures that the elevator will move evenly and the support platform will not be tilted from its horizontal position and develop objectionable binding at any of its points of contact with the spaced guide means, regardless of the distribution of loading on the platform. Consequently, the need for equalizing devices which will cause the support platform to move "squarely" in its vertical movements, regardless of the weight distribution thereon, can be eliminated entirely.

Briefly, these and other objects are achieved in accordance with the invention by guidance means which are disposed at the corners of the support platform and which provide substantial guidance surfaces which effectively prevent cocking or tilting of the platform as it moves under the weight of an unevenly or evenly distributed load, vertically upwardly or downwardly within a storage compartment. The guidance means includes a sleeve and a bearing cage with a number of spaced closed loop races having bearing elements movable therein to provide antifriction contact at a number of spaced surfaces between the guide surfaces on coacting vertical members within the storage compartment, and the support platform. In this manner costly and annoying adjustments which are required in weight-equalizing devices can be entirely and completely eliminated and in its place there is provided a simple and economically constructed device.

Other objects and features of the present invention will become apparent from a consideration of the following description which proceeds with reference to the accompanying drawings, wherein:

FIGURE 1 is a perspective view of a transportable cart having storage compartments therein including two spaced elevator means on which articles are received and stored within the compartments;

FIGURE 2 is a perspective view of the elevator shown removed from the compartments in FIGURE 1;

FIGURE 3 is an enlarged view of the elevator showing the guidance means in longitudinal section view, the upper part of the compartment being shown broken away to better illustrate the bearing construction; and

FIGURE 4 is an enlarged detail view of the bearings which are provided between the coacting guidance surfaces on the platform and vertical guide means.

Referring now to the drawings, there is illustrated a transport cart **10** having support wheels **1** by which the cart can be readily transported from one location to the other. Within the cart **10** is a compartment **11** having heat insulating walls **14** and a base to maintain the compartment **11** in either refrigerated or heated condition as desired. An opening **15** provides access to the compartment **11**. The opening **15** is surrounded by a border **16** of suitable composition material and a counter section **18** on which articles can be rested.

Within the compartment **11** is a pair of spaced elevators **20** and **22**, both of which are identically constructed and only one of which will be explained in detail, it being understood that the explanation applies to both. The elevator **20** includes a weight supporting platform **23** having a depending flange **24** along each of its sides. To the flange **24** there is secured at the four corners of the platform **23** a cylindrical bearing **26** having a plurality of cages **28**. Four cages are preferred. The cages **28** are held within the bearing **26** by end plates **30** and **32**. Each of the cages **28** has a loop-shaped raceway **32** including an open section **36** and a closed section **37**. A plurality of balls **38** are positioned in the raceway **34** tangent to each other so that they can rotate and move around the raceway **34**. The balls **36** extend slightly beyond the open section **36** to provide antifriction roller bearing contact between the bearing **26** and an upright post **40**. Because of there being a substantial length to the open section **36** of the race way **34**, and also because there are a plurality of raceways **34** within the same bearing **26**, there is ample support for insuring that the cylindrical bearing **26** can only move longitudinally along the post **40**. The post **40** is received within a socket **42** of a bushing **44** having a base flange **46** secured to the bottom **48** in the compartment **11**. As indicated in FIGURE 2, there are four such posts **40**, one at each of the corners at the support platform **23**, in order to adequately define the planar posi-

tion for the platform 23 which is disposed horizontally and retains its horizontal position during the vertical movements within the compartment. Thus, as articles are stacked onto the platform 23 and the platform moves downwardly, the platform 23 remains in a horizontal plane because there is a substantial extent of bearing length between each bearing 26 at the four corners of the platform 23 and their respective posts 40. Downward movement of the platform 23 is resisted by a plurality of helical springs 60, there being one for each guide post 40. Each spring 60 surrounds its respective guide post 40, and bears at one end against the upper portion 62 of the bushing 44 and acts at the other end through a bearing washer 64 (FIGURE 3) against the bottom of the bearing 26. The strength of each of the springs 60 can be selected so that they will adequately support a stack of articles on the platform 23 which lowers under such weight into the compartment 11 and against the resistance of the springs. As the articles are removed, one by one and the weight is relieved, the springs 60 raise the platform 23 and its supported load by increments. The strength and and characteristic of the springs 60 is such that upon removal of each tray or other article, the springs 60 will effect a raising of the supported load by an amount equal to the vertical height of the removed article. Consequently, the uppermost article of the stack always remains at the same height. This is an important consideration because in dispensing foods, trays and numerous other articles, it is important and desirable that articles are available for dispensing, that such articles remain in view, and that such articles can be conveniently reached for removal.

In the present invention, as the articles are removed, they are always positioned so that the uppermost one of the articles remains at the same height. Should the stack of articles be unevenly positioned on the platform so that there is a greater load at one or the other of the corners of the platform, this uneven loading will not produce excessive binding at any of the corners to interfere with the proper functioning of the elevator means because of the bearings 26. Also, because of the considerable bearing length which is provided between each post 40 and its respective bearing 26, there is prevented any cocking or tilting of the platform 23. Referring, for example, to FIGURES 3 and 4 it should be seen that the bearing 26 at each corner of the platform 23 provides considerable support because of the relatively long length provided by the open section 36 of the raceway 34. A fairly large number of balls 38 protrude through the open section 36. The accumulative support of these plurality of small balls 38 defines the position of the bearing 26 on the post 40 and prevents the bearing 26 from tilting or tipping with respect to the post 40, notwithstanding a considerable force tending to twist the bearing 26 with respect to the post 40. Consequently, at each of the four corners of the platform 23 there is a bearing 26. Each bearing 26 has a plurality of raceways 34 (preferably four) within the internal surface of the bearing 26, so that regardless of the degree of uneven loading and regardless of which corner the uneven loading occurs at, the platform 23 is always prevented from tilting and is constrained to a true vertical movement either upwardly or downwardly. Consequently the articles, such as trays or the like, are prevented from contacting the interior surface of the compartment 11. This arrangement of unique bearing-and-guide surfaces completely obviates any necessity for equalizing devices such as were previously considered essential. Such equalizing devices were costly and both to manufacture, to maintain, and particularly were objectionable because of the complications which they would lend to cleaning the interior surfaces. In the food dispensing art, cleanliness is essential, and any complicated internal structures which interfere with this cleanliness are highly objectionable. In the present invention, however, the novel bearing arrangement does not interfere with cleaning and servicing arrangements. In fact, the assembly and disassembly of the structure is an important feature of the present invention. The post 40 can be readily installed by preassemblying the bearing 26 onto the post 40. The post 40 is coupled by its end 65 to the border 16 through an adaptor 63 which is atttached by a bolt 67 which passes through an opening 66 of the border 16 and which is secured thereto by a nut 71 or the like. The opposite end 68 of the post 40 passes through the socket 42 and bears against a spring 70 contained within the socket of the bushing 44 (FIGURE 3).

The process of assembly and disassembly is greatly simplified. All that is required to clean the interior of the compartment 11 is to push the platform 23 downwardly and then manually press the guide post 40 down into the socket 42 against the resistance of spring 70 until the upper end 65 of the guide rod clears the adapter 63. Then, the guide rod 40 can be pulled toward the center of the compartment 11 and pulled out of the socket 42, thus permitting withdrawal of the guide rod spring 60, and other elements of the elevator. This accessibility for cleaning adds considerably to the hygienic standards which can be maintained for this equipment. Because there are no interfering surfaces which prevent access to all of the interior of the compartment, the cleaning operations can be most efficient.

When it is then time to reinstall the elevator, the elevator is simply reinserted into the compartment with the ends of the guide posts 40 refitted into the sockets 42 of the bushings 44.

In operation, the articles are first loaded onto the support platform 23 and under the weight of these articles the platform lowers against the resistance of the springs 60. As the load is removed, the springs raise the elevator and the supported load in such manner that the uppermost article always remains at the same level.

Whether the supported load is evenly or unevenly distributed, it will not interfere with normal operation of the elevator and no equalizing devices are required. Consequently, the apparatus is economical to service, to manufacture and is reliable in its intended function at all times. Also, as mentioned previously, it is cleanable throughout and can be installed and reinstalled without difficulty.

Although the present invention has been illustrated and described in connection with a single example embodiment, it will be understood that this is illustrative of the invention and is by no means restrictive thereof. It is reasonably to be expected that those skilled in this art can make numerous revisions and adaptations of the invention, and it is intended that such revisions and adaptations will be included within the scope of the following claims as equivalents of the invention.

I claim:

1. An article dispensing device, comprising:

(a) a base;

(b) a post receiving socket mounted on said base at each of four generally rectangularly positioned corners;

(c) a cylindrical post removably mounted in a respective one of each of said sockets and extending vertically upward therefrom;

(d) a supporting spring positioned around a respective one of each of said posts, the lower end of each of said springs resting on its respective socket and the upper end of each of said springs being positioned at a respective predetermined location;

(e) a cylindrical bearing positioned around a respective one of each of said posts and resting on said upper end of its respective support spring, each of said cylindrical bearings having a plurality of loop-type ball bearing raceways having an open section that extends in a vertical direction and a plurality of balls that engage their respective posts through said open section;

(f) a fixed support positioned at the top of a respec-

tive one of each of said posts for supporting said posts;

(g) and a platform attached to said cylindrical bearings and supported thereby.

2. The dispensing device of claim 1, and further comprising a spring positioned in a respective one of each of said sockets below the lower ends of said posts to permit said posts to be pushed downward from said fixed supports and removed.

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