

Jan. 27, 1959

J. S. WARREN

2,870,927

ELEVATING AND DUMPING DEVICE

Filed Dec. 7, 1956

2 Sheets-Sheet 1

FIG. 1

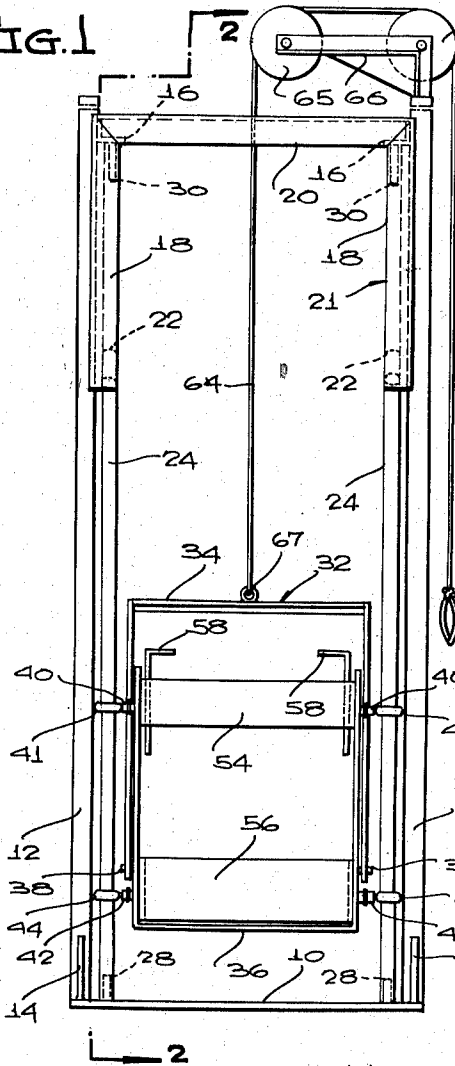


FIG. 2

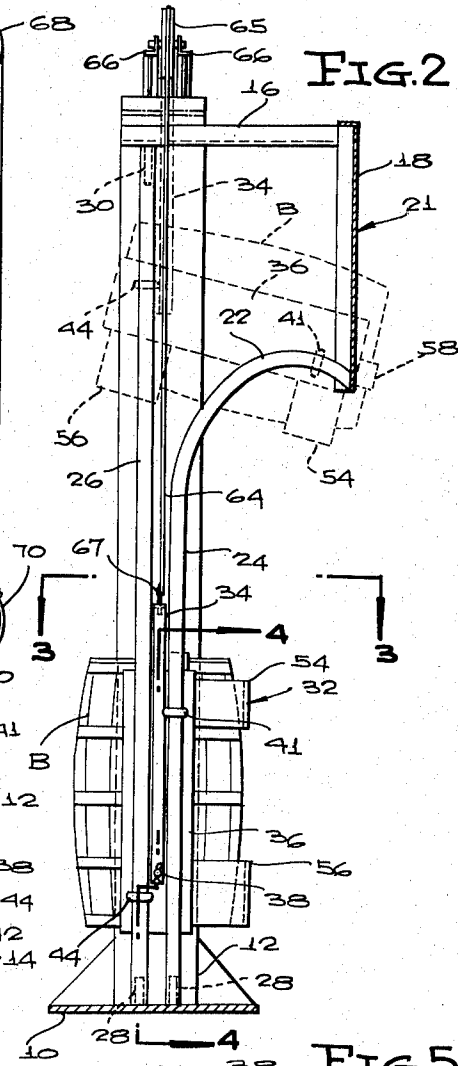


FIG. 3

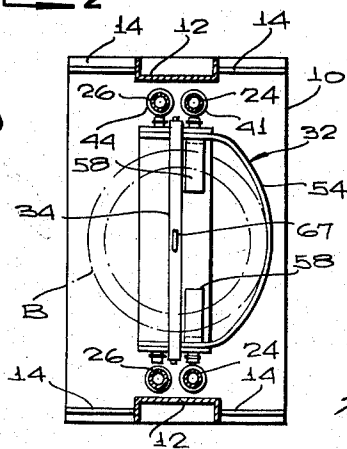
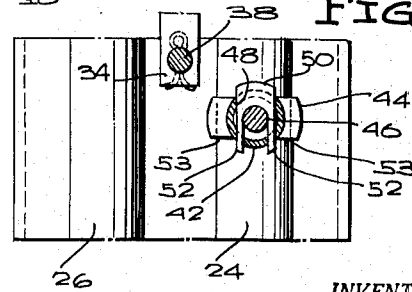


FIG. 5



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2 Sheets-Sheet 2

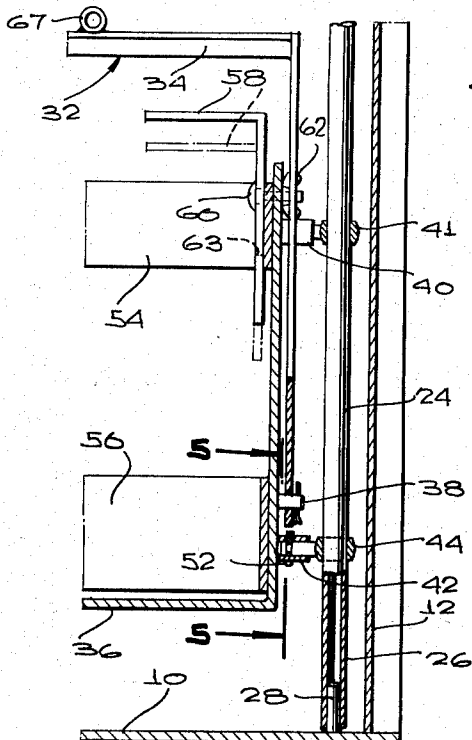


FIG. 4

FIG. 7

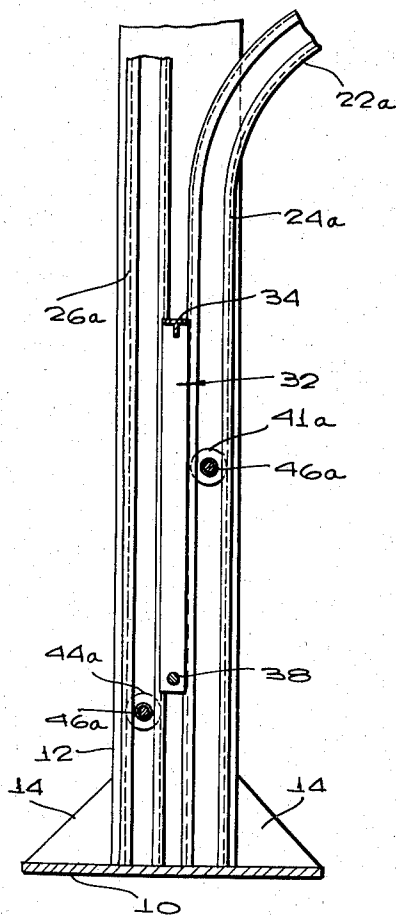
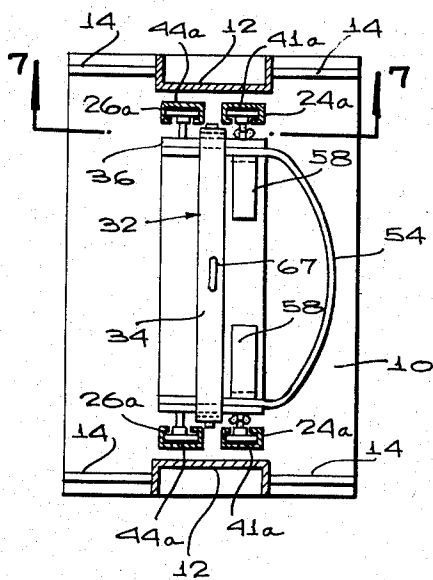


FIG. 6



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2,870,927

ELEVATING AND DUMPING DEVICE

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2 Claims. (Cl. 214—313)

This invention relates generally to apparatus for dumping the contents of a container, and in particular relates to an apparatus so designed that responsive to movement of a container, induced in an upward direction by any suitable means, the container, after travelling upwardly a predetermined distance, will be tilted to an open position to automatically release the contents thereof.

The present invention is an improvement on the structure shown in U. S. Patent 1,941,530, dated January 2, 1934 and issued to Arthur R. Beck and John S. Warren.

In the patent referred to there is shown apparatus of the general kind described above, including parallel, approximately Z-shaped rails with a carrier for a container being slidably mounted on and between the rails. The shape of the rails, in the patent, are such that on upward movement of the container, the container will be shifted off vertical portions of the rails onto downwardly, forwardly inclined portions, so as to be tilted to a dumping position.

In general, the object of the present invention is to provide an apparatus which will elevate and dump commercial receptacles of all types, as for example barrels, boxes, etc., with maximum speed and ease, through the provision of a novelly designed and efficiently acting carriage and rail assembly constituting an improvement over that shown in the mentioned patent.

A more specific object is to provide an improved apparatus of the character described that will have better qualities of balance than that shown in the patent.

A further object of importance is to provide an improved elevating and dumping device that will be of stronger construction, and will be capable of operation with greater speed, than the mentioned, patented device, with these desirable characteristics imparted to the improved construction by reason of a novel formation and relationship of the component parts.

Another object is to provide apparatus as stated that will be compact, and will be capable of manufacture as a portable, self-contained unit capable of erection wherever desired.

Still another object is to provide apparatus of the character stated in which the carriage will be so designed as to automatically return to its bottom or loading position, responsive merely to removal of the force tending to hold the same in the upper position thereof.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a front elevational view of hoisting and dumping apparatus according to the present invention;

Figure 2 is a sectional view through the apparatus substantially on line 2—2 of Figure 1, the carriage and supported container being shown in full and dotted lines in loading and dumping positions respectively;

Figure 3 is a horizontal section, substantially on line 3—3 of Figure 2, in which the container has been illustrated in dotted lines;

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Figure 4 is an enlarged, longitudinal sectional view on line 4—4 of Figure 2, showing the details of the slidable mounting of the carriage on the guide rail;

Figure 5 is a detail sectional view, still further enlarged, substantially on line 5—5 of Figure 4;

Figure 6 is a horizontal section, on the same cutting plane as Figure 3, showing a modified construction in which the scale has been enlarged slightly above that of Figure 3; and

Figure 7 is a vertical sectional view of the modified construction, substantially on line 7—7 of Figure 6.

Referring to the drawings in detail, the reference numeral 10 designates a flat, rectangular base plate, and rigid with and projecting upwardly therefrom are vertical, elongated standards 12 formed as outwardly facing channels and disposed at the opposite ends of the base plate. The channels 12 are braced at the location of their connection to the base plate, by gussets 14, and may be of any desired height. For example, in a permanent installation, the device can extend upwardly through one or more floors of a building, and could, for example, be used for loading materials into the barrel B or other container, hoisting the material to a higher floor in the structure, and dumping the materials when so hoisted. Alternatively, the entire device can be a portable unit, capable of loading materials into trucks or other receptacles.

In any event, regardless of the use to which the device is put, the construction thereof will be designed for elevation of the container with the container in a vertical position as shown in full lines in Figure 2, and for tilting of the container to the dotted line position of Figure 2 at the upper limit of the container travel.

To this end, at the upper ends of the standards 12, there are rigidly secured thereto forwardly projecting, horizontal support arms 16 (Figures 1 and 2) and welded or otherwise fixedly secured to the forward or outer ends of the arms are vertically depending support bars 18, between the upper ends of which is fixedly connected a cross bar 20.

The members 16, 18, 20 cooperate to define a guide rail support frame generally designated at 21. The guide rail support frame, together with the standards and the base plate, form a stationary supporting and guide structure for the movable carriage, to be described in detail hereinafter.

Spaced inwardly a short distance from the respective standards 12 are front guide rails of inverted J shape. The front guide rails are shown to particular advantage in Figure 2, and include forwardly extending, arcuately and upwardly bowed upper end portions 22 merging at their lower, rear ends into vertical main portions 24 of the front guide rails. As will be noted from Figure 2, initially, the upper end portions 22 curve gradually as they are extended upwardly forwardly from the main portions 24, with the curvature of the portions 22 becoming gradually more pronounced until eventually the forward ends of portions 22 begin to curve downwardly where they are fixedly connected to the lower ends of the bars 18.

The guide rail assembly also includes rear guide rails 26. These are disposed rearwardly of and are in closely spaced relation to the front guide rails, and as shown in Figure 2 are vertical over their full lengths. At their lower ends, the respective guide rails receive upwardly projecting pins 28 that are fixedly secured to the base plate, with the upper ends of the rear guide rails 26 being adapted to receive downwardly extending pins 30 fixedly secured to the rear portions of the horizontal arms 16.

The guide rails are adapted to guide the movement of a carriage or carrier generally designated at 32. This includes a supporting yoke 34 of inverted U shape, the legs of which embrace a U-shaped container support

member 36. The legs of the yoke and container support member are closely spaced apart at each side of the carriage as best shown in Figure 1 and also in Figure 4, the carriage details being shown in the latter figure of the drawing. Further, as will be noted from Figure 2, the yoke is relatively narrow, while the container support member is formed from flat, wide bar stock with the width of the chamber 36 being substantially greater than the distance between the respective guide rails.

The member 36 is pivotally connected to the yoke 34, in such a manner that the yoke will remain in a vertical plane at all locations during its travel between its dumping and loading positions shown in full and dotted lines respectively, in Figure 2, with the member 36 in the dumping position of the apparatus being tilted about a horizontal transverse axis passing through the lower ends of the legs of yoke 34, to the dotted line position shown in Figure 2.

To provide the desired pivotal connection, lugs or studs 38 are welded to and project laterally outwardly from the respective legs of member 36, a short distance above the lower end or bight portion of said member 36. The studs 38, as best shown in Figure 4, extend through openings formed in openings in the lower ends of the legs of yoke 34, with cotter keys being used to hold the yoke and container support member assembled.

The container support member is so designed that it has a swivelled, slidable connection to each of the several guide rails. To this end, adjacent the upper ends of the legs of member 36 laterally, outwardly projecting sockets 40 are fixedly secured thereto, and swivelled in the sockets are shanks projecting inwardly from annular guides 41 circumsposed about and freely slidable upon the front guide rail 24.

Adjacent the lower ends of the legs of the container support member, below the studs 38, similar sockets 42 are fixedly secured to and project outwardly from the member 36, and swivelled in the sockets 42 are the shanks of annular guides 44 sliding freely on the rear guide rails 26.

In Figure 5 there are shown the details of construction of each guide means. Figure 5 shows the construction of the lower guide means 42, 44, but it will be understood that the same construction is carried out with respect to the upper guide means 40, 41.

As will be noted from Figure 5, the shanks of the guides 44 are formed with circumferential grooves 46 intermediate their ends, within the sockets 42. In the planes of the grooves, the sockets 42 are formed with circumferentially extending slots 48, and extending through the slots 48 are flat keys 50 having fork arms 52 at their lower ends extending within the grooves 46 of the respective shanks. The lower ends of the fork arms extend through circumferentially spaced openings 53 formed in the respective sockets in the plane of the slots 48 thereof.

By reason of this construction, it will be seen that on insertion of the shanks of the guides in their associated sockets, the keys 50 can be dropped into place as in Figure 5, and thereafter, the shanks will be held against axial displacement within the sockets, while still being freely rotatable therein to provide the desired swivelled connection of the guides to the member 36. The guides swivel, as will be observed, about axes paralleling the axis on which member 36 pivots upon yoke 34.

To prevent the container from dropping out of the carriage when the carriage is tilted, there are provided vertically spaced, forwardly bowed retaining bars 54, 56, welded at their ends to and projecting forwardly from the legs of member 36.

Also, to hold the barrel or other container against endwise movement when the same is in dumping position, there are provided retaining brackets 58, at the upper ends of the legs of members 36. These are of

inverted L shape, and are disposed in confronting relation as shown in Figure 1. The brackets are vertically adjustable (Figure 4), being connected to the legs 36 by bolts 60 having wing nuts 62, the bolts extending through longitudinal slots 63 formed in the vertical legs of the respective brackets. This permits the brackets to be adjusted upwardly or downwardly as necessary, according to the length of the particular container supported upon the carriage, the brackets being readily adjustable into engagement with the upper end of the container, to clampably engage the container between the brackets and the bight portion of the member 36. By reference to Figure 3, it will be noted that the retaining bars 54, 56, are so disposed as to cause the supported barrel B to tend toward centering itself between the legs of the container support member. In other words, when the worker inserts the barrel in the container support member from the back, that is, from the left in Figure 2, he need merely push the barrel into place. If the barrel moves into the container support member closer to one side thereof than to the other, it will strike the retaining bars, and due to the curvature of said bars, will tend to move toward the midlength or crest portions of the arcs defined by the bars. Thus, the supported barrel centers itself. In this connection, even if the barrel should not be perfectly centered when it is being hoisted, it will center itself when it is inverted to the dotted line position of Figure 2. Considering this characteristic further, during the hoisting of the barrel the horizontal, laterally inwardly extending legs of brackets 58 could be left in positions in which they do not tightly bear against the top of the barrel. Further, the barrel need not be perfectly centered between the legs of the brackets 58. Instead, when the barrel is inverted, since it is not tightly clamped between the brackets 58 and the bight portion of the container support member, it will roll laterally to a perfectly centered position, that is, it will roll down one side or the other of the retaining bars into the lowermost or crest portions of the retaining bars. Now, the barrel will be perfectly centered in respect to the horizontal legs of the retaining brackets, and when inverted, will be engaged at its opposite sides by the respective retaining brackets. The advantage of this arrangement may be readily noted, in that the workers need not bring the retaining brackets into clamping engagement with the successively elevated and dumped barrels, but instead may merely position the barrels and container support member below the retaining brackets, without concern as to whether the barrels are centered perfectly and clamped at the time they are being hoisted.

A hoisting cable 64 is trained about a sheave or pulley 65 rotatably mounted between the outer ends of pulley support arms 66 of inverted L shape, that are welded or otherwise fixedly secured to the upper ends of one of the standards 12. Adjacent the inner ends of the pulley support arms, a second pulley 68 is rotatably mounted on the arms, with cable 64 being trained also about the second pulley and being then extended downwardly along the outside of the adjacent standard 12. At its lower end, the cable may be provided with a loop 70 to facilitate its being grasped for the purpose of hoisting the carriage. Cable 64, as shown in Figure 1, is connected to an eye 67 welded to the yoke 34.

It will be understood that various means can be employed for hoisting the carriage, that shown being merely typical of one installation that might be used.

In any event, in use, the container B is placed upon the carriage, and engaged in position in the manner previously described. Loading of the container can occur at this time, or alternatively, the container may be loaded before being placed upon the carriage.

Thereafter, pull is exerted on the cable to hoist the carriage. Initially the carriage will move vertically, as long as the guides 41, 44 are travelling upon vertical

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portions of the guide rails. However, as the container approaches its uppermost position, guides 41 begin to travel onto the upper end portions 22 of the front guide rails. As a result, during further upward pull on the cable, the yoke 34 will travel straight upwardly, while member 36 will pivot to the inclined position shown in Figure 2 with its forward end disposed lower than its rear or bottom end, thus to tilt the container to dumping position. The guides 44, as will be noted by reference to the dotted line showing of Figure 2, remain in a vertical path, due to their being slidably mounted on the straight, vertical rear guide rails 26.

When it is desired to lower the carriage, after dumping of the contents of the container, the pulling force is relaxed, after which the container will automatically return to its normal position due to the tendency of the bottom end of the yoke to gravitate along the rail 26. As the lower end of yoke 26 travels downwardly, it will return the container to an upwardly opening position with guides 21 now travelling rearwardly along the portions 22, so that ultimately, the carriage and container will be vertically disposed as they approach their lowermost positions.

The construction has distinct advantages, in that the container tends to return automatically to its lower position with a highly compact yet strong guide assembly being provided for the carriage and the container. Additionally, the container can be securely clamped in position upon the carriage by means of the bracket, and will be securely held against falling accidentally from the carriage.

In the modified construction shown in Figures 6 and 7, all components of the devices are identical to those already illustrated and described, with the exception of the guide rail and the means providing a swivelled connection of the member 36 to the guide rail. In this form, the rails 24, 24a are formed as channels the side walls of which are flanged inwardly as shown in Figure 6, and rolling in the channels are rollers 41a, 44a, rotating on shanks 46a, fixedly secured to and projecting outwardly from the legs of the member 36. At its upper end, each forward guide rail 24a has the guide portion 22a analogous to the curved portion 22 of the first form of the invention.

In another embodiment, not illustrated, the channelled guide rails could face outwardly instead of inwardly toward each other, with the rollers being engaged in the channels in the same manner as shown in Figure 6. In this instance, the webs of the channels might be longitudinally slotted to receive the shanks or stubs on which the rollers turn, or alternatively the rollers could be mounted upon angular brackets that extend about the brackets and are secured to the legs of members 36.

It is believed clear that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor changes in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. In a hoisting and dumping device, a supporting structure including straight, vertical rear guide rails and front guide rails including approximately vertical lower portions closely spaced from the rear guide rails and forwardly, arcuately and upwardly bowed upper end portions; a carriage for supporting a container the contents of which are to be dumped, said carriage being slidably mounted on the front and rear guide rails so as to be tilted to a container-dumping position on travel

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of the carriage onto the upper end portions of the respective guide rails; means connected to the carriage and carried by the supporting structure for shifting the carriage upwardly upon the guide rails, said carriage including a yoke connected to said means, said yoke being of inverted U-shape, and a container support member pivotally connected to and embraced by the legs of the yoke, said container support member pivoting on an axis extending transversely between the legs of the yoke, the container support member being slidably connected to both the front and rear guide rails so as to be tilted on its pivot axis responsive to movement of the yoke along the guide rails, said container support member being of a U-shape so as to include a bight portion on which the container may be supported; and retaining brackets mounted upon the container support member for adjustment toward and away from the bight portion thereof for clampably engaging the supported container between the brackets and said bight portion, the container support member including legs extending from the bight portion adjacent the respective guide rails, said brackets being of inverted L-shape and including first legs extending longitudinally of the respective legs of the container support member and connected to said legs of the container support member for adjustment longitudinally thereof, and short second legs spaced widely apart in the container support member and extending laterally inwardly from the respective legs of the container support member toward each other to engage opposite sides of the supported container.

2. In a hoisting and dumping device, a supporting structure including straight, vertical rear guide rails and front guide rails including approximately vertical lower portions closely spaced from the rear guide rails and forwardly, arcuately and upwardly bowed upper end portions; a carriage for supporting a container the contents of which are to be dumped, said carriage being slidably mounted on the front and rear guide rails so as to be tilted to a container-dumping position on travel of the carriage onto the upper end portions of the respective guide rails; means connected to the carriage and carried by the supporting structure for shifting the carriage upwardly upon the guide rails, said carriage including a yoke connected to said means, said yoke being of inverted U-shape, and a container support member pivotally connected to and embraced by the legs of the yoke, said container support member pivoting on an axis extending transversely between the legs of the yoke, the container support member being slidably connected to both the front and rear guide rails so as to be tilted on its pivot axis responsive to movement of the yoke along the guide rails, said container support member being of a U-shape so as to include a bight portion on which the container may be supported; and retaining brackets mounted upon the container support member for adjustment toward and away from the bight portion thereof for clampably engaging the supported container between the brackets and said bight portion, the container support member including legs extending from the bight portion adjacent the respective guide rails, said brackets being of inverted L-shape and including first legs extending longitudinally of the respective legs of the container support member and connected to said legs of the container support member for adjustment longitudinally thereof, and short second legs spaced widely apart in the container support member and extending laterally inwardly from the respective legs of the container support member toward each other to engage opposite sides of the supported container, the container support member further including vertically spaced retaining bars rigidly connected between the legs of the container support member and bowed forwardly arcuately from the legs of the container support member, whereby a supported container will tend to shift along the retaining bars to a centered position

between the legs of the container support member, said retaining brackets being symmetrically disposed in respect to the retaining bars at opposite sides thereof for engaging the container at the respective sides thereof in the centered position of the container.

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