Nov. 3, 1964 J. C. NORWOOD 3,155,228

ADJUSTABLE BOTTLE GRIPPERS

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Fig. 1.

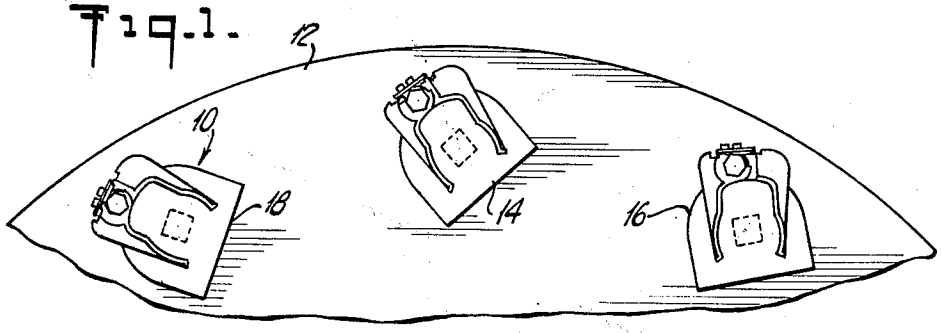

Fig. 2.

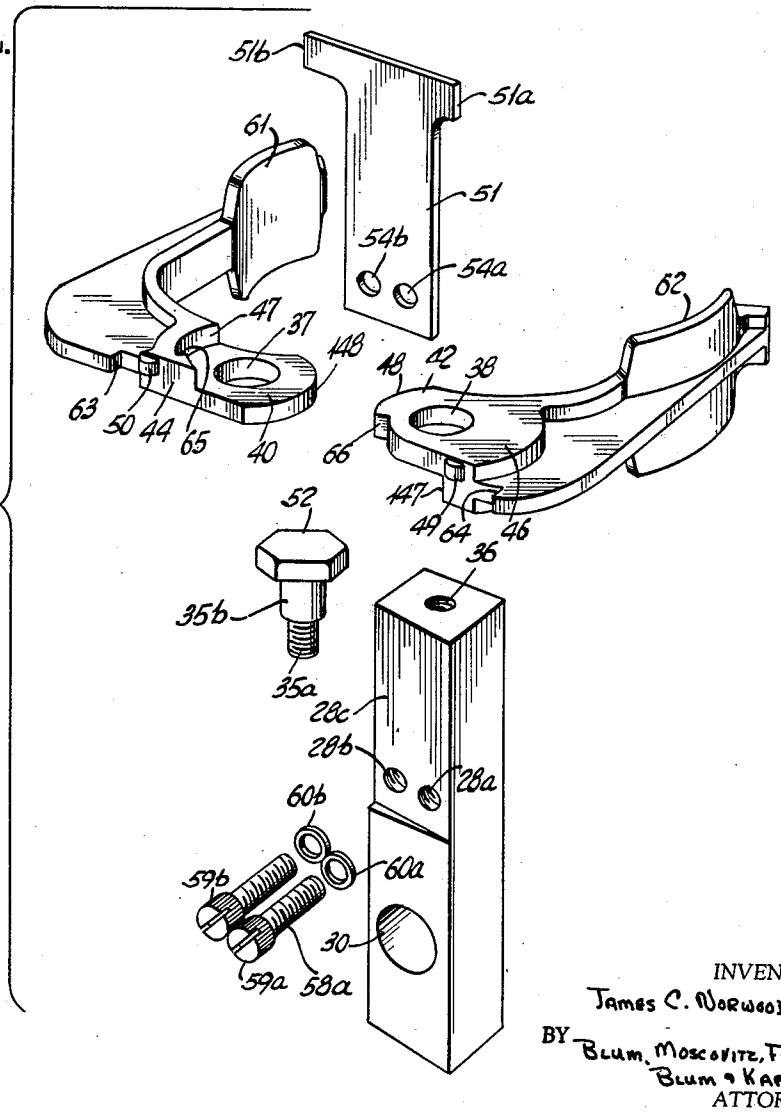

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FIG. 3.

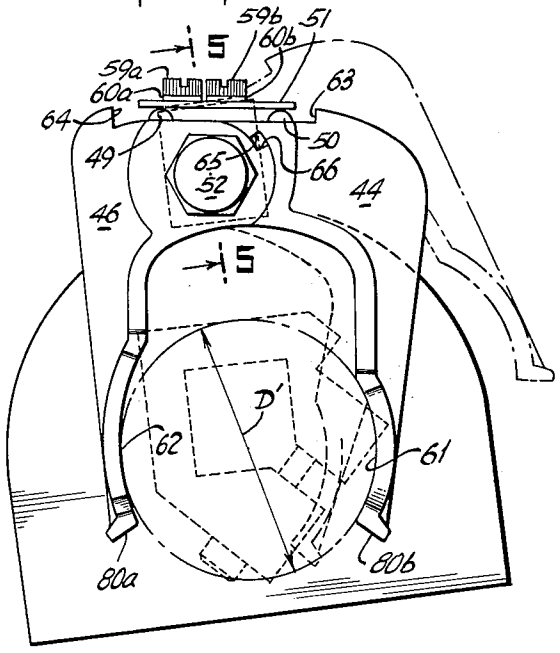
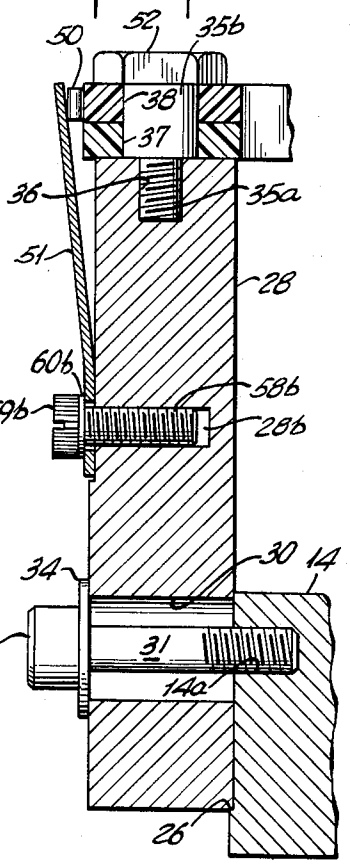


FIG. 5.



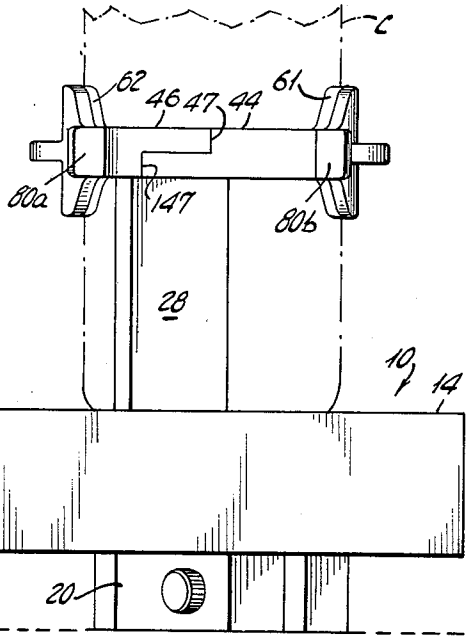


FIG. 4.

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FIG. 6.

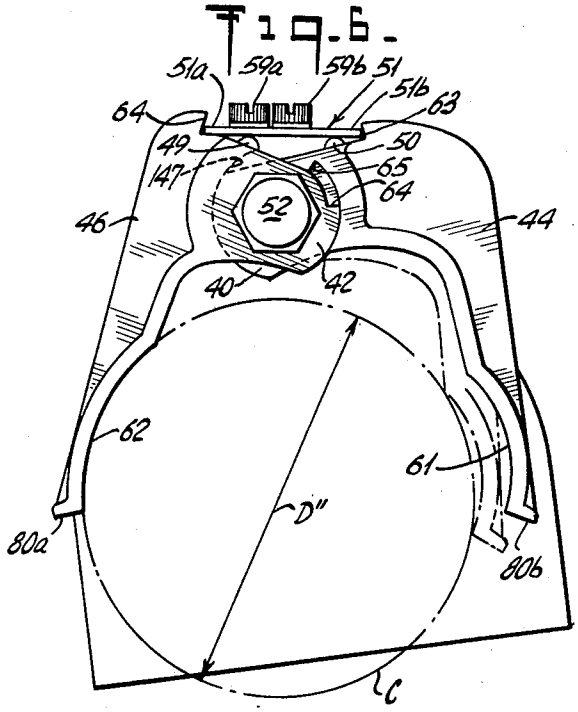
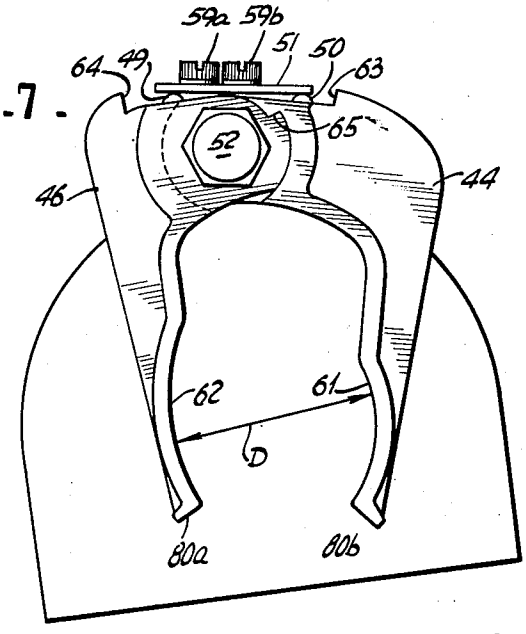


FIG. 7.



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ADJUSTABLE BOTTLE GRIPPERS

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10 Claims. (Cl. 198—210)

This invention relates to a container holder for a container filling machine and more particularly to a container holder which automatically adjusts for different size containers. This application forms a continuation-in-part to my co-pending application filed on May 14, 1962, Serial No. 194,526, now Patent No. 3,109,535.

It is an object of the invention to provide a holder for a bottle, jar, can or other container while being filled in an automatic filling machine. Another object is to provide a container holder having automatically adjustable gripper fingers for engaging containers of various sizes.

It has been known heretofore to provide a container filling machine with a turntable on which the open containers are mounted in spaced positions around the turntable. The containers may be placed on the turntable manually, but in fully automatic machines the containers are placed on the turntable and removed therefrom by means of endless chain belts or other devices. A particular difficulty has been encountered in providing suitable devices for holding the containers upight and in fixed positions while the turntable is in motion and while the containers are being filled. Various gripping devices have been proposed but have not proven wholly satisfactory because of rapid wear, tendency to warp, crack and deteriorate under constant use, non-adjustability for containers of different sizes, etc. When the prior container holders were made of molded rubber, the material deteriorated rapidly in use and could not be repaired. The present invention avoids the difficulties and disadvantages of prior container holders in filling machines, and affords improvements in durability and adjustability, in addition to being repairable.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth. In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a perspective view, on a reduced scale, of part of a turntable of a container filling machine, with a plurality of container holders embodying the invention mounted thereon;

FIG. 2 is an exploded perspective view of the parts of the container holder;

FIG. 3 is a top plan view of the container holder;

FIG. 4 is a front elevational view, partially in section, of the container holder;

FIG. 5 is a sectional view, on an enlarged scale, taken along line 5—5 of FIG. 3; and

FIG. 6 and FIG. 7 are top plan views, similar to FIG. 3, of the container holder with the gripper fingers shown in their respective maximum and minimum positions.

Referring to the drawings, there is shown in FIG. 1 a plurality of container holders 10 horizontally mounted in equally spaced fixed positions around the periphery of a circular turntable 12, only part of which is shown. Each container holder includes a massive metal base plate 14 having a rounded end 16 disposed adjacent to the rim of the turntable and a flat end 18 facing radially inward of the turntable. The base plate has a depending foot 20 which is polygonal in shape (FIG. 4). This foot fits into

a correspondingly shaped aperture (not shown) in turntable 12 to secure the container holder nonrotatably on the turntable.

A vertically extending groove 26 is formed in the outer rounded end 16 of base plate 14 (FIG. 5). A rectangular post 28 having a vertical axis is fitted into groove 26 and extends vertically perpendicularly upward from base 14. Post 28 is so positioned on plate 14 that it will be slightly off-center with respect to a radius of turntable 12 passing through foot 20. Thus, if a container (bottle) breaks while it is being filled, it will easily fall off base plate 14. If post 28 was positioned on center with respect to the aforementioned radius, the post would prevent the container from falling off thereby possibly causing the container filling appaatus to jam. The post is shown in detail in FIGS. 2, 4 and 5.

Post 28 has a lateral bore 30 therein near its bottom end, as shown in FIG. 2. Through this bore extends the partially threaded shank 31 of a bolt 32 which is screwed into a threaded hole 14*a* formed inside groove 26 of base 14 (FIG. 5). A washer 34 is disposed between the head of the bolt and the rear or outer side of the post.

As illustrated in FIG. 2, a threaded axial hole 36 extends downwardly in post 28 from the top thereof. Hole 36 receives the lower threaded shank portion 35*a* of a bolt 52. Bolt 52 has an upper shank portion 35*b* which has a larger diameter than the aforementioned shank portion 35*a*. The bottom shoulder of shank portion 35*b* abuts the top of post 28 to limit penetration of threaded shank portion 35*a* into post 28. A pair of horizontally extending arms 44 and 46 are rotatably received on shank portion 35*a* so as to be movable about the vertical axis of post 28. Thus, shank portion 35*a* is engaged in registering holes 37 and 38 which are formed in the overlapping ends 40 and 42 of the respective arms 44 and 46. Arm 44, at end 40, is recessed to form a concave surface 47. Similarly, the underside of arm 46 is recessed at end 42 to form a concave surface 147. The end 42 of arm 46 has a convex edge surface 48 and the end 40 of arm 44 has a similar convex edge surface 148. The end of surface 47 ends in a laterally extending stop 65 and edge 48 has a complementary stop 66 at the end thereof which engages stop 65 to limit rotation of the arms. Concave edge surface 48 fits rotatably in abutment with surface 47 and concave edge surface 148 fits rotatably in abutment with surface 147. The arms 44 and 46 are angularly adjustable with respect to each other in a horizontal plane perpendicular to the vertical axis of post 28; however, movement of the arms toward each other, as noted above, is limited by means of stop 65 engaging stop 66. The underside of the head of bolt 52 overlies hole 38 in arm 46 (FIG. 5) thereby preventing the vertical movement of arms 44 and 46.

Arms 44 and 46 extend longitudinally and then laterally with respect to post 28 and have the respective enlarged arcuate portions 61 and 62 formed at the ends of the lateral extensions. The longitudinal extension of arm 44 is greater than that of arm 46 and the lateral extension of arm 44 is smaller than that of arm 46 to compensate for the fact post 28 is off-center. A cam 49 projects laterally rearwardly from the rear of arm 46, past the rear surface 28*c* of post 28. Similarly, a cam 50 projects laterally rearwardly from the rear surface of arm 44, past rear surface 28*c* of post 28. Cams 49 and 50 lie in the same horizontal plane. A notch 63 extends laterally rearwardly perpendicularly from the rear surface of arm 44; a notch 64 extends laterally rearwardly perpendicularly from the rear surface of arm 46. These notches lie on the same horizontal plane.

The arcuate portions 61 and 62 oppose each other and cooperate in engaging the body of a bottle, jar, can or

other container *c*, as indicated by the broken lines in FIG. 4. The arms 44 and 46 have the respective outwardly tapered, wedge-shaped edges 80*b* and 80*a*, which cooperate in facilitating the insertion of a container body between the arms. The arms are preferably made of a smooth, self-lubricating type of plastic such as nylon, polyethylene, or the like. Fingers made of these materials resist deterioration by contact with acids, alkalines and other strong chemical reagents. They are readily washed and wiped clean and do not absorb odors or contaminating substances. They are preferred for use in beverage-filling machines because they can easily be sterilized by boiling water and steam without deterioration or loss of strength or flexibility.

The vertically extending upper rear portion 28*c* of post 28 tapers inwardly longitudinally from right to left (as taken in FIG. 2) to form a wedge-shaped notch 55. The bottom surface of a vertically upwardly extending spring blade 51, having two apertures 54*a* and 54*b* at the bottom thereof, abuts the bottom surface of notch 55 and is secured in place by the respective bolts 59*a* and 59*b*. Thus, the threaded shanks 58*a* and 58*b* of bolts 59*a* and 59*b* respectively pass through apertures 54*a* and 54*b* and are respectively engaged in the threaded apertures 28*a* and 28*b* in post 28. The respective washers 60*a* and 60*b* are interposed between the rear surface of blade 51 and the undersurface of the respective heads of bolts 59*a* and 59*b* to evenly distribute the pressure over the bottom surface of member 51. Two longitudinally extending arms 51*a* and 51*b* are formed at the top of blade 51. The arms 51*a* and 51*b* respectively bear against the projecting cams 49 and 50 and provide cam surfaces therefor. The vertically upwardly extending portion of spring blade 51, below arms 51*a* and 51*b*, is approximately equal to the width of post 28.

Due to the forces exerted against the bottom of blade 51 (by bolts 59*a* and 59*b*) the blade will attempt to align itself in a plane parallel to the plane of and against surface 28*c*. However, since cams 49 and 50 project past surface 28*c*, thereby flexing blade 51 outwardly (FIG. 5), blade 51 will exert a force on arms 44 and 46 which will cause the arms to rotate about shank portion 35*a* toward each other. However, this inward movement will be limited by stop 66 on arm 46 engaging notched stop 65 on arm 44. Thus, the device of the present invention will normally assume the position indicated in FIG. 7, wherein the minimum distance between the arms is denoted by "D." Hence, the bottle gripper of the present invention will only be effective to grip containers having a diameter greater than D.

In operation, assume a container having a diameter D' (greater than D) is to be inserted between arms 44 and 46 (FIG. 3). Normally, arm 44 will be in the position shown by the broken line. However, as the container is forced between wedges 80*a* and 80*b* and into engagement with arcuate portions 61 and 62, arm 46 will rotate slightly away from arm 44 whereas arm 44, having the greater longitudinal extension, will be forced to the position indicated by the solid lines. As the outer ends of arms 44 and 46 rotate further away from each other due to the insertion of the bottle, cams 49 and 50 project further past surface 28*c* of post 28, relative to their normal position. This action flexes spring blade 51 even more thereby causing blade 51 to exert a greater force on arms 44 and 46 tending to move them toward each other. The net result of this action is that the container will be held firmly in place by arcuate portions 61 and 62.

Hence, in accordance with the present invention, I have provided a container gripper which automatically adjusts to different sized containers.

Since the arms are made of a relatively breakable material, as noted above, provision must be made for limiting the greatest distance they can move apart otherwise the strain set up in the arms due to the oppositely directed forces caused by the bottle being inserted and the spring

blade 51 might crack the arms. Thus, the outer limit of movement of the arms (i.e., the greatest distance the arms can move apart) is determined by the space between the rearwardly extending notches 63 and 64, formed on the back of the respective arms 44 and 46, and the width between the edges of arms 51*a* and 51*b*. Thus, as shown in FIG. 6, notches 64 and 63 abut the edges of the respective arms 51*a* and 51*b* thereby limiting outer movement of arms 44 and 46. This orientation of the arms occurs when a container having a diameter D'' is inserted between the arms. Hence, the arms may effectively accommodate any container having a diameter between D'' and D.

FIG. 2 shows the several parts of the holder 10 described above. It will be noted that all parts are removable for individual cleaning, repair or replacement. Once assembled, the parts form a unitary structure. If any parts should need replacement, it is not necessary to replace the whole assembly or even a major portion thereof as in prior known container holders for filling machines.

The holders are arranged so that a container body can easily be slipped in between the arms and will be engaged securely in the opposing arcuate portion 61 and 62, while the turntable rotates to a filling position with the empty container and then rotates away from the filling position after the container is filled.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

What is claimed is:

1. A container holder for a filling machine having a turntable, comprising a post secured to said turntable and extending upwardly perpendicularly from said turntable and having a vertical axis, a pair of arms, each of said arms having an aperture therein, means being received in said arm apertures for rotatably mounting said arms to said post with respective ends of said arms overlapped and overlying said post so as to be turnable about said axes, said arms extending longitudinally and then laterally from said post over said turntable to form a pocket for receiving a container therebetween, said arms having respective cam portions projecting rearwardly of said post outwardly from said axes, a flexible and resilient blade extending vertically and located behind said post, means connecting said blade to said post below the level of said arms, said arms having a normal spacing in which said cam portions bear against said blade, said cam portions positioned and adapted, upon the turning of said arms to increase the spacing therebetween beyond normal spacing and resulting rearward movement of said cam portions, to flex said blade rearwardly, said blade thereby serving as a spring to resist such turning of said arms.

2. A container holder for a filling machine as defined in claim 1 wherein the lateral extension of said arms are formed with opposing arcuate portions which receive the container body therebetween, each of said arms having an end adjacent the arcuate portion which tapers outwardly to facilitate insertion of the container body between the arms and into engagement with said arcuate portions.

3. A container holder for a filling machine as defined in claim 1 wherein each of said arms have notched portions projecting rearwardly of said post outwardly of said axis beyond said blade, said notches positioned and adapted, upon the turning of said arms a predetermined distance, to abut said blade to limit the maximum rotation of said arms away from each other.

4. A container holder as defined in claim 1, wherein the overlapped ends of said arms have complementary stops which engage one another when said arms are in their normal position to prevent further rotation of said arms toward each other.

5. A container holder for a filling machine having a horizontal turntable, comprising a base plate for horizontal mounting on said turntable, a post secured at one end of said base plate and extending upwardly perpendicularly from said base plate and having a vertical axis, a pair of arms, said post having an axially downwardly extending threaded aperture in the top surface thereof, each of said arms having an aperture therein, means being rotatably received within said arm apertures and being threadably received within said threaded aperture for rotatably mounting said arms to said post with respective ends of said arms overlapped and overlying said post so as to be turnable about said axis, said last-named means overlying said arms to prevent separation of the arms therefrom, said arms extending longitudinally and then laterally from said post over said base plate and forming a pocket to hold the container body between said arms on said base plate, said arms having respective cam portions projecting rearwardly of said post outwardly from said axis, a flexible and resilient blade extending vertically and located behind said post, means releasably attaching the lower end of said blade to said post below the level of said arms, said arms having a normal spacing in which said cam portions bear against said blade, said cam portions positioned and adapted, upon the turning of said arms to increase the spacing therebetween beyond normal spacing and resulting rearward movement of said cam portions, to flex said blade rearwardly, said blade thereby serving as a spring to resist such turning of said arms.

6. A container holder for a filling machine as defined in claim 5, wherein said means for rotatably mounting said arms to said post comprises a bolt having a head portion and a first shank extending downwardly vertically therefrom and a second shank extending downwardly vertically from said first shank and being threaded, said first shank being rotatably received in said arm apertures and said second shank being received in threaded engagement within said threaded aperture with the bottom surface of said first shank abutting the top surface of said post.

7. A container holder as defined in claim 5 wherein the end of said post secured to said base has an aperture therein, and a threaded aperture in said base, a bolt having a head thereon threadably engaged in said threaded aperture in said base and passing through said aperture in said post, and a washer interposed between the head of said bolt and said post, whereby the tightening of said bolt causes said washer to press against said post thereby securing said post in place.

8. A container holder as defined in claim 5, the overlapped portion of each of said arms being recessed and having a projecting concave surface, the ends of said overlapped portions of said arms having convex surfaces which are sized and positioned to abut the respective concave portion of the other arm and be rotatable with respect thereto, and stop means associated with said arms for limiting the minimum distance between said lateral extensions.

9. A container holder for a filling machine as defined in claim 8, wherein said stop means comprises an extension from the concave portion of one arm and a complementary extension on the convex surface of the other arm which engage one another when said arms are rotated a predetermined distance toward each other.

10. A container holder for a filling machine having a horizontal turntable, comprising a base plate for horizontal mounting on said turntable, a post secured at one end to said base plate and extending upwardly perpendicularly from said base plate and having a vertical axis, a pair of arms, said post having an axially downwardly extending threaded aperture in the top surface thereof, each of said arms having an aperture therein, means being rotatably received within said arm apertures and being threadably received within said threaded aperture for rotatably mounting said arms to said post with respective ends of said arms overlapped and overlying said post so as to be turnable about said axis, said last-named means overlying said arms to prevent separation of said arms therefrom, said arms extending longitudinally and then laterally from said post over said base plate to hold the container body between said arms on said base plate, said arms having respective cam portions projecting rearwardly of said post outwardly from said axis, said arms having projecting notches rearwardly of said post longitudinally spaced from said cams outwardly of said axis, a flexible and resilient blade having longitudinally extending arms at the top thereof extending vertically and located behind said post, means releasably attaching the lower end of said blade to the post below the level of said arms, said arms having a normal spacing in which said cam portions bear against the respective arms of said blade to flex said blade to a first position, said cam portions positioned and adapted, upon the turning of said arms to increase the spacing therebetween beyond normal spacing and resulting rearward movement of said cam portions, to flex said blade rearwardly from said first position, said blade thereby serving as a spring to resist such turning of said arms said notches positioned and adapted, upon the turning of said arms to increase the spacing therebetween beyond normal spacing and resulting rearward movement of said notches, to engage the edges of the respective longitudinally extending arms of said blade for limiting further turning of said arms.

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