May 23, 1972 G. R. SHELLEY 3,664,546

PLATE SEPARATOR FOR SELF-LEVELING PLATE DISPENSERS

Filed June 17, 1970

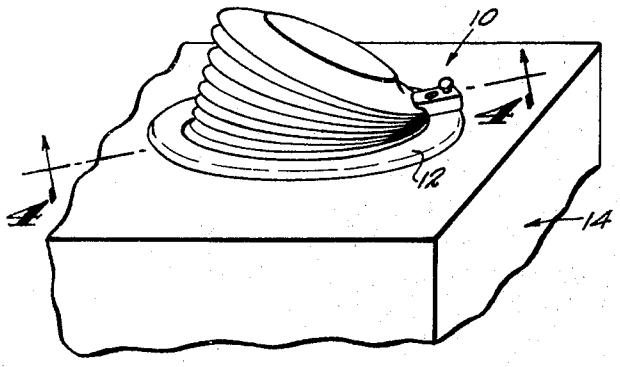


Fig. 1

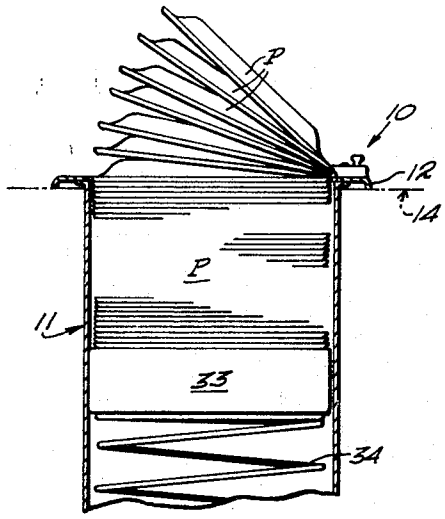


Fig. 2

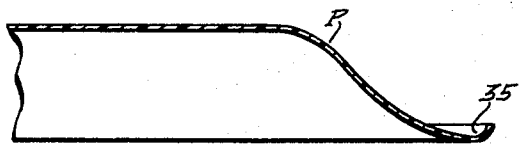


Fig. 3

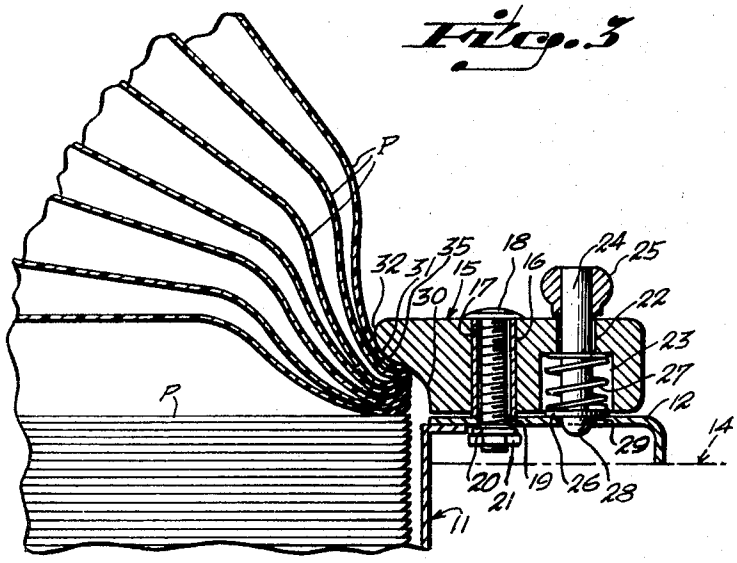


Fig. 4

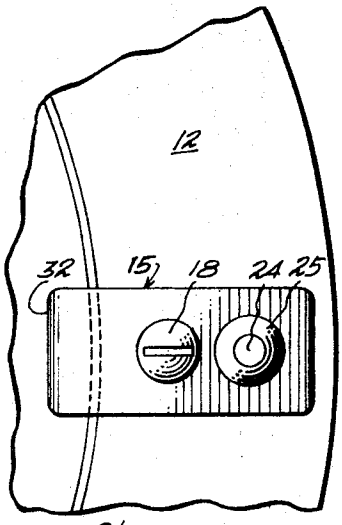


Fig. 5

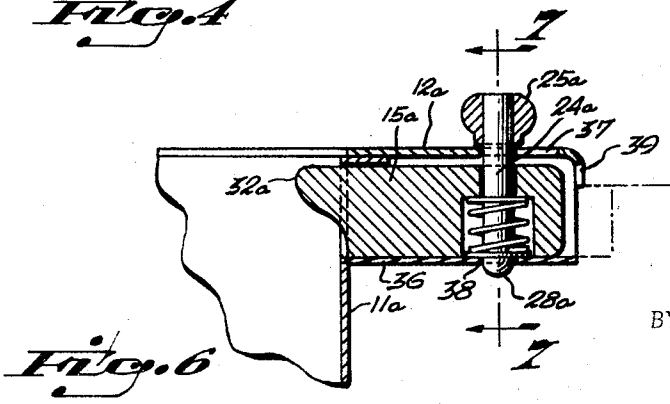


Fig. 6

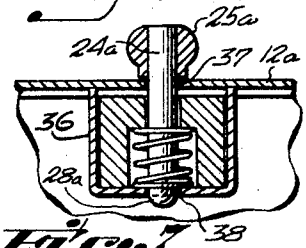


Fig. 7

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PLATE SEPARATOR FOR SELF-LEVELING PLATE DISPENSERS

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Int. Cl. A47f 1/06

U.S. Cl. 221—279 5 Claims

ABSTRACT OF THE DISCLOSURE

A plate separator for use with disposable paper or plastic plates being dispensed from a self-leveling well-type plate dispenser is described. A body member having a convex undersurface portion projecting radially into the dispensing well opening presses reactively against a plurality of the uppermost plates of an inverted stack in the dispenser well, at one side thereof, to separate them in fan-like fashion at the other side for easy withdrawal in a dispensing operation.

This application is a continuation-in-part of patent application Ser. No. 35,771, filed May 8, 1970, entitled Combination Hold-Down Finger and Plate Separator for Self-Leveling Plate Dispensers.

This invention relates to self-leveling plate or dish dispensers of the type used in cafeterias and restaurants, for example, and is directed particularly to a plate separator device for use in such dispensers as an aid in presenting, for convenient withdrawal, the plates being dispensed, particularly disposable formed paper or formed sheet plastic plates.

The use of self-leveling plate dispensers in the form of cylindrical wells for receiving stacked plates to be dispensed and comprising spring mechanism operative to push the stacked plates upwardly in the well to a level at the top of the stack from which the uppermost plate can readily be grasped for use is well known. With the use of china plates, their thickness and rigidity is such that the top plate can readily be grasped and separated from the remainder of the stack in a dispensing operation. However, with the use of comparatively thin, light-weight, disposable plates, such as of pressed paper-board or formed sheet plastic material, it is very often difficult to separate the top plate from the stack. This is due not only to the thinness of the plates, but also because they are so tightly packed that atmospheric pressure tends to make them adhere to one another.

It is, accordingly, the principal object of this invention to provide a plate separator device for plate dispensers which serves to vertically "fan out" or separate paper or plastic plates at the top of the dispenser stack so that the uppermost plate can readily be grasped and removed in a dispensing operation.

A more particular object is to provide a plate separator device for disposable paper or plastic plates comprising a reactive body member arranged at one side of the dispensing well opening rim and having a convexly-arcuate undersurface portion adapted to abuttingly engage marginal underside portions of upside-down stacked plates, and thereby compress such plate portions in clamping relation against the resilient leveling spring pushing the plate stack upwardly from underneath, whereby a plurality of the top most plates being dispensed will be spread out in fan-like disposition in the vertical direction at the opposite side of the reactive body member for ready grip and removal one at a time of the top plate in the stack.

Another object of the invention is to provide a combination plate separator device of the character described

that can readily be displaced from its projecting position with respect to the top opening of the dispensing well to permit refilling of the well with a new stack of plates without obstruction, whenever necessary.

Yet another object of the invention is to provide a plate separator device of the character described which will be simple in construction, compact, easy to install and operate, and fool-proof, effective and durable in operation.

Other objects, features and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

FIG. 1 is a partial oblique view, as seen from above, of a cabinet structure housing a self-leveling plate dispenser equipped with a plate separator device embodying the invention;

FIG. 2 illustrates, in side elevation and with portions broken away to show interior structure, a self-leveling plate dispenser equipped with the plate separator device, illustrating the operation thereof in separating the uppermost plates of a stack being dispensed;

FIG. 3 is a partial vertical cross-sectional view of a typical plastic plate of the type suitable for use with a plate separator device embodying the invention;

FIG. 4 is a partial vertical cross-sectional view taken along the line 4—4 of FIG. 1 in the direction of the arrows, illustrating constructional and operational details of the plate separator mechanism;

FIG. 5 is a partial top view of a self-leveling plate dispenser equipped with the plate separator device;

FIG. 6 illustrates, in vertical cross-section, a modified form of the plate separator device, arranged below the dispenser well flange instead of on top thereof; and

FIG. 7 is a vertical cross-sectional view taken along the line 7—7 of FIG. 6 in the direction of the arrows.

Referring now in detail to the drawings, reference numeral **10** in FIGS. 1 and 2 designates, generally, a plate separator device embodying the invention applied to the cylindrical well **11** of a typical self-leveling plate dispenser. The plate separator device **10** is adjustably attached to the peripheral flange **12** at the upper end of the cylindrical dispenser well **11**, which flange, as is illustrated in FIGS. 1 and 4, seats down upon a marginal annular portion about a receiving opening in the top wall of a housing **14**, within which the well **11** is supportingly suspended.

As best illustrated in FIGS. 4 and 5, the plate separator device **10** comprises an oblong, substantially rectangular body member **15**, which may be of stainless steel, for example. The body member **15** is formed along its length with a first vertical bore **16** slidingly received within which is a cylindrical pivot sleeve **17** of slightly greater length than the top-to-bottom thickness of said body member. A bolt **18** received through the pivot sleeve **17** extends through an opening **19** in the well flange **12**. A lockwasher **20** and nut **21** applied to the bolt **18** against the underside of the well flange **12** secures the pivot sleeve **17** firmly in place with respect to the well flange **12**. In this connection it is to be noted that the inner diameter of the pivot sleeve **17** is slightly greater than the bolt opening **19** in the well flange **12** whereby, in its secured position, the lower end of said pivot sleeve abuts against a top surface portion of said well flange. Since, as described above, the vertical thickness of the body member **15** is slightly less than the overall length of the pivot sleeve **17**, unless otherwise constrained said body member can be rotated or pivoted with respect thereto.

Means is provided for selectively securing the body member **15** so that its longitudinal axis extends radially into the cylindrical well **11** with which it is associated. To this end, a second bore **22** is provided in the rectangular body member **15**, in spaced relation to the rear of the

first vertical bore **16**. The lower end opening of the second through bore **22** is counter-sunk to provide an upwardly-extending, increased-diameter portion **23**. Slidingly received in the second bore **22** and extending through the increased-diameter portion **23** thereof is a detent pin **24** the upper end of which has secured thereto a handle knob **25** the lower end of which is seatable against the top surface of the body member **15**. Circumjacently disposed with respect to the detent pin **24** and constrained at its upper end against the annular shoulder defined by the juncture of the second vertical bore **22** with its increased diameter portion **23**, and at its lower end, against an abutment washer **26** affixed near the outer end of said detent pin, is a helical compression spring **27**. As illustrated in FIG. 4 the undersurface of abutment washer **26** normally lies approximately in the same plane as that of the undersurface of the rectangular body member **15**; and the lower end of the detent pin **24** extends slightly beyond said abutment washer to terminate in a rounded, downwardly and outwardly-extending terminal end portion **28**. The well flange **12** is provided with a second flange opening **29**, in radial alignment with the pivot bolt opening **19**, for receiving the downwardly-projecting terminal end portion **28** of the detent pin **24**. Thus, as best illustrated in FIGS. 4 and 5 the rectangular body member **15** is removably retained, by detent action, with its longitudinal axis extending in the radial direction with respect to the cylindrical well to which it is cooperatively assembled. As illustrated in FIG. 4, the rectangular body member **15**, at its front or inwardly-projecting end, is concavely recessed to provide an arcuate cam surface portion **30** the upper end of which merges with a relatively shallow convex surface portion **31** extending into an arcuately rounded front nose portion **32** merging with the top surface of said body member. As is further illustrated in FIG. 4, the assemblage is such that the lower edge of the cam surface portion **30** is substantially in register with the inner edge of the well flange **12**, which flange inner edge portion will normally be slightly outwardly offset from the upper end opening of the cylindrical well **11**.

Considering now the operation of the plate separator device illustrated in FIGS. 1, 2, 4 and 5 it will be noted that the stack of disposable plastic plates P to be dispensed from the dispenser well **11** is supported from underneath by a pusher head **33**, constrained between the underside of which and the bottom of said well being a stressed compression spring **34**. The plates P are stacked in upside-down position, and the upwardly-curved, convex surface portion **31** of the plate separator device body member **15** extends just far enough inwardly of the top circular opening of the well as to abuttingly engage the concavely arcuate peripheral edge underportions **35** of the plates P being dispensed (see FIG. 3). This squeezing or clamping engagement of the stacked plates between the plate separator device **10** and the vertically-stressed pusher head **33** in the well **11** has the effect of "fanning out" or vertically separating a plurality of the uppermost plates in the stack at the side opposite said separator device so that they can readily be grasped one at a time from the top in dispensing operations. In this connection, it is to be noted that the spring rate of the helical spring **34**, which is governed by the characteristics of the spring wire, the number of coils per unit length and the diameter of the coils; and the head load, which is governed by the overall length of the helical spring, will be such as to apply a substantially constant force at the bottom of the stacked plates P in the dispenser no matter how many plates remain in the stack. With such operation the "fanning out" or spreading of the uppermost plates will always remain substantially uniform. It will be understood, of course, that the spring rate and head load in a given size dispenser will be substantially greater than that in an ordinary self-leveling dispenser, the extra spring

pressure being required in the present invention to provide the above-described clamping or squeezing at one side of the stack resulting in the desired "fanning out" at the opposite side. The concave cam surface portion **30** of the body member **15** serves to guide outermost edge under-portions of the uppermost plates P in a stack into position under the convex surface portion **31** (see FIG. 4), whereat the plates are clamped to effect "fanning out." The shape of the S curve thus provided at the underside of the body member **15** can be varied to best suit the particular shape of the peripheral edge of the plates to be dispensed. With reference to FIGS. 4 and 5 it is to be noted that whenever it becomes necessary to fill the dispenser with a new stack of plates to be dispensed, the rectangular body member can readily be rotated either to the right or to the left out of overlying or obstructing position with respect to the upper plate opening merely by lifting the knob **25** of the detent pin **24** to permit pivoting to one side or the other of said body member about the pivot sleeve **17**. In addition, if a filled dispenser is not to be used immediately for dispensing plates, or if it is to be transported to another location while filled, the body member **15** can be turned 180 degrees from the use position as illustrated in FIG. 4, whereat the normally rearwardly extending end thereof will project inwardly sufficiently to prevent "fanning out" of plates.

FIGS. 6 and 7 illustrate a modified form of the invention wherein the plate separator device body member **15*a*** is arranged below the peripheral flange **12*a*** of a cylindrical well **11*a*** instead of on top as illustrated in above-described embodiment of FIGS. 1 through 5. To this end, a U-shaped guide member **36** is affixed along its upper edges to the underside of the dispenser well flange **12*a***, said guide member being open at each end and so arranged as to constrain said body member to radial movement with respect to the dispenser well **11*a***. The detent pin **24*a*** extends upwardly through a radial slot **37** in the dispenser flange **12*a***, the ends of which slot serve as abutment stops for the in and out sliding movement of the plate separator device body member **15*a***. A detent pin opening **38** receives the rounded end portion **28*a*** of the detent pin **24*a*** to normally maintain the plate separator body member **15*a*** at its inwardmost position (see FIG. 6), whereat, in the same manner as the body member **15**, as illustrated in FIG. 4 and as hereinabove described, it serves to "fan out" or vertically separate a plurality of the uppermost plates in the stack so that they can readily be grasped one at a time from the top in dispensing operations. It will be understood that the body member **15*a*** can readily be withdrawn from its inwardmost limit position merely by lifting the detent pin **24*a*** at its handle **25*a*** and then pulling outwardly to the outer limit position of the radial slot **37**, whereat the front nose portion **32*a*** of the body member **15*a*** will be completely withdrawn into its guide member **36** to facilitate reloadin gof the dispenser well **11** whenever necessary. If required, a downwardly-extending portion of the outer peripheral lip of the flange **12*a*** can be recessed, as indicated at **39**, to provide for rearward passage of the body member **15*a*** when in its withdrawn position. It is to be noted that, except for its lack of the vertical bore **16** as illustrated in FIG. 4, the body member **15*a*** of the modified form of the invention of FIGS. 6 and 7 may otherwise be of identical or substantially identical construction with the body member **15** of the first form of the invention illustrated in FIGS. 1 through 5.

While I have illustrated and described herein only two forms in which my invention can conveniently be embodied in practice, it is to be understood that these forms are presented by way of example only and not in a limiting sense. The invention, in brief, comprises all the embodimes and modifications coming within the scope and spirit of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. A plate separator for self-leveling plate dispensers of the type having a vertically-extending, open-top well, peripherally flanged at the top, for receiving stacked plates to be dispensed and including mechanism normally resiliently constraining the stacked plates therein in the upward direction from underneath for dispensing, comprising, in combination; a body member having at one end a convexly-arcuate undersurafec portion, mechanism for supporting said body member in a first position with respect to the top opening of the dispenser well so that its convexely-arcuate undersurface portion extends into said opening to clampingly engage end portions of the plate stack being dispensed with respect to the plate constraining mechanism for separating a plurality of uppermost plates in the stack in fan-like fashion at a position opposite said body member, said body member supporting mechanism comprising means for selectively moving said body member between said first position whereat said undersurface portion extends into said opening and a second position whereat said convexly-arcuate undersurface portion is removed from said inwardly-extending position, said body member supporting mechanism further comprising a pivot bolt extending through a top-to-bottom vertical opening in said body member, and means for securing the lower end of said pivot bolt with respect to said well flange.

2. A plate separator as defined in claim 1, wherein said body member supporting mechanism further comprises detent mechanism for removably securing said body member in said first position.

3. A plate separator as defined in claim 2, wherein said detent mechanism comprises a detent pin extending through a second vertical opening in said body member, and an opening in said well flange within which a lower end portion of said detent pin is receivable.

4. A plate separator for self-leveling plate dispensers of the type having a vertically-extending, open-top well, peripherally flanged at the top, for receiving stacked plates to be dispensed and including mechanism normally resiliently constraining the stacked plates therein in the upward direction from underneath for dispensing, comprising, in combination; a body member having at one end a convexly-arcuate undersurface portion, and

mechanism for supporting said body member in a first position with respect to the top opening of the dispenser well so that its convexly-arcuate undersurface portion extends into said opening to clampingly engage end portions of the plate stack being dispensed with respect to the plate constraining mechanism for separating a plurality of uppermost plates in the stack in fan-like fashion at a position opposite said body member, said body member supporting mechanism comprising means for selectively moving said body member between said first position whereat said undersurface portion extends into said opening and a second position whereat said convexly-arcuate undersurface portion is removed from said inwardly-extending position, said body member supporting mechanism further comprising detent mechanism for removably securing said body member in said first position, said body member supporting mechanism comprising a guide member affixed to the underside of said well flange and within which said body member is slidingly received in the direction normal to said well opening, and an opening in the well wall adjacent to said flange for the through passage of said convexly-arcuate undersurface portion of said body member.

5. A plate separator as defined in claim 4, wherein said detent mechanism comprises a detent pin extending through a vertical opening in said body member and through a slot in said well flange, said slot extending in the normal direction with respect to the well opening, the ends of said slot defining said first and second limit positions of said body member, and an opening in said guide member within which a lower end portion of said detent pin is receivable.

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U.S. Cl. X.R.

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