United States Patent

Berger et al.

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[54] BAG HOLDER AND EXPANDER UNIT

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[52] **U.S. Cl.** **53/384**, 53/390, 93/36.01

[51] **Int. Cl.** **B31b 7/00**, B65b 43/26

[58] **Field of Search** ..... 53/175, 384, 381 R, 390; 93/36.01

[56] **References Cited**

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2,900,779	8/1959	Baxter et al.	53/381
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[57] **ABSTRACT**

A bag expander is provided for mounting an open ended flexible bag positioned thereon on to a hollow, reusable holder which terminates in an annular edge. The expander has a base member and a head member which are adapted to move axially with respect to each other. A plurality of fingers are housed in the base member and biased toward the head member such that the head member provides a camming action on the fingers when axial movement takes place. A bag is placed over the head member and ends of the fingers of the expander, which is positioned on the holder and depressed, thereby camming the fingers outwardly and thus folding the bag outwardly and over the edge of the holder. Excursion limitation means are provided to limit the relative movement between the head member and base member of the expander to prevent the fingers from contacting the bag at the edge of the holder during the bag seating operation to prevent tearing of the bag, especially if the expander is rotated during the seating operation. In a preferred embodiment the excursion limitation means is comprised of a skirt extension of the head member which is of a predetermined length and prevents further movement when the skirt reaches the base member. The skirt is preferably of such a configuration so as to perform the additional function of supporting the fingers on their initial movement. An improved base construction is provided having compartments which seat the fingers for pivotal movement therein, as well as preventing lateral movement of the fingers, which simplifies the fabrication of the expander.

12 Claims, 10 Drawing Figures

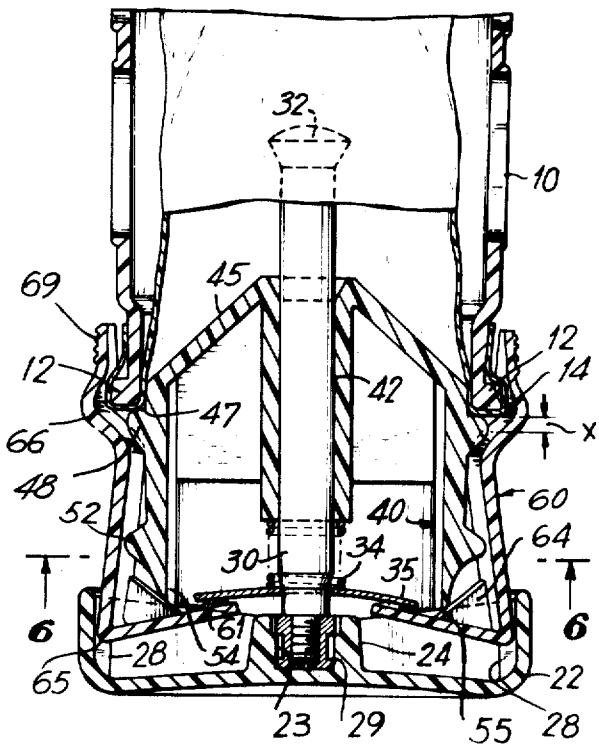


FIG. 1

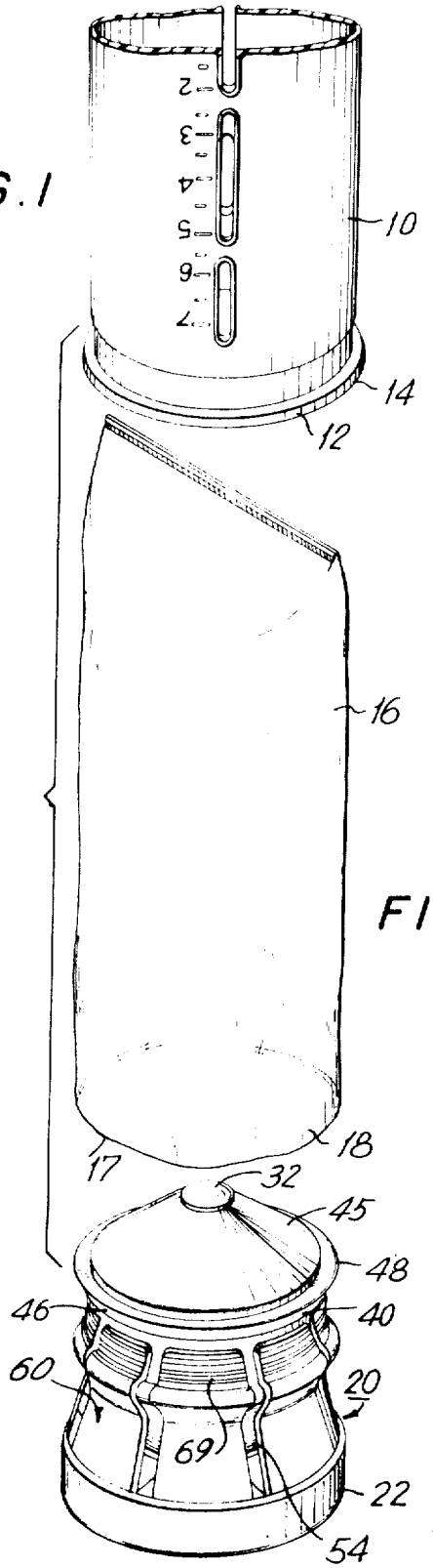
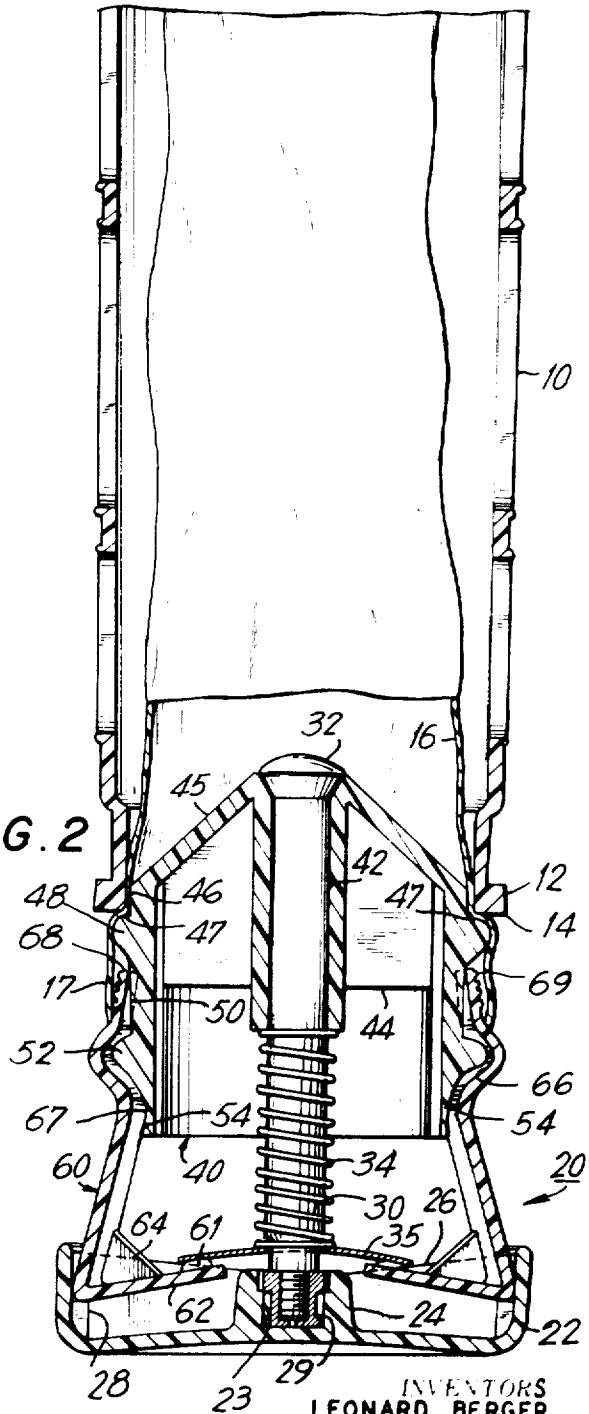


FIG. 2



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FIG. 3

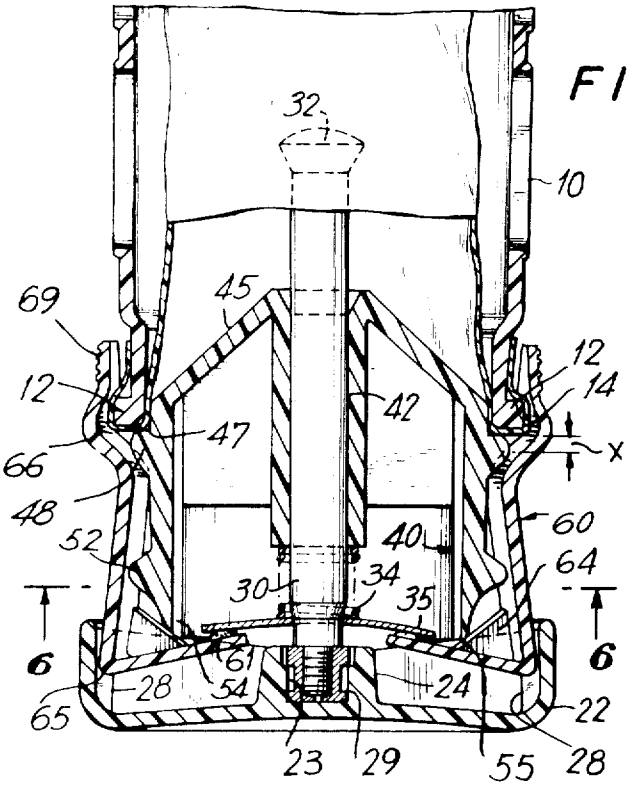


FIG. 2(a)

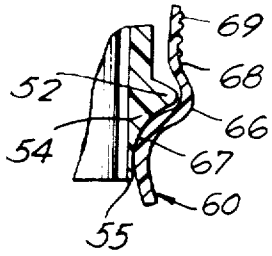
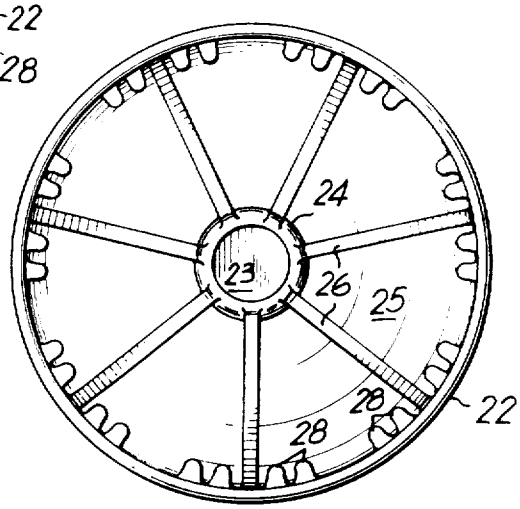


FIG. 4



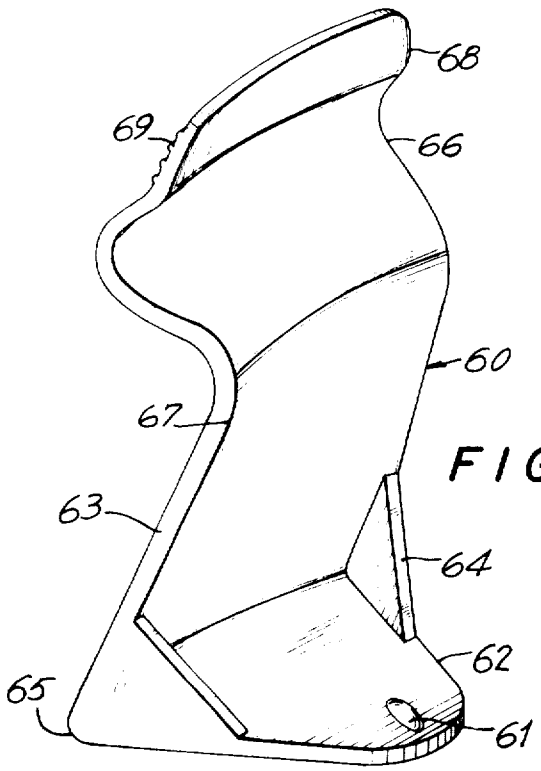
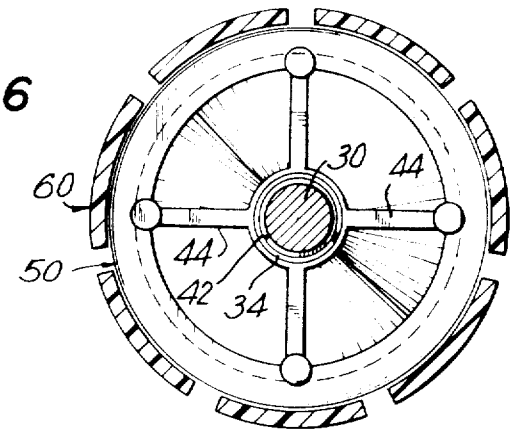


FIG. 5

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FIG. 6



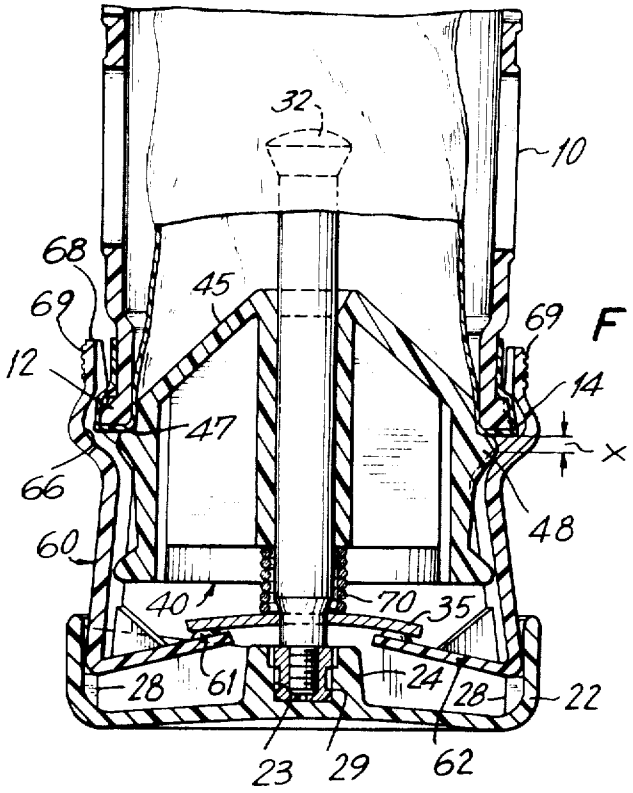


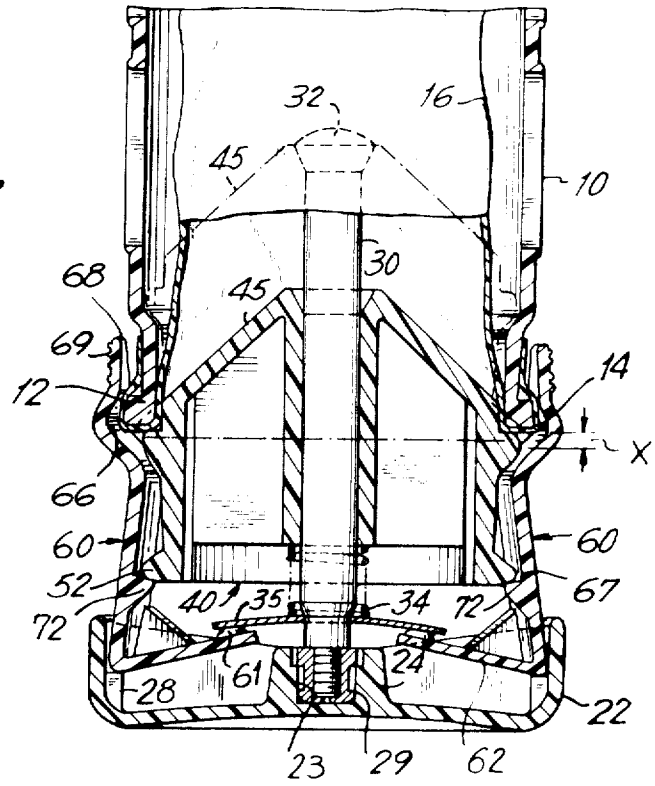
FIG. 9

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FIG. 7



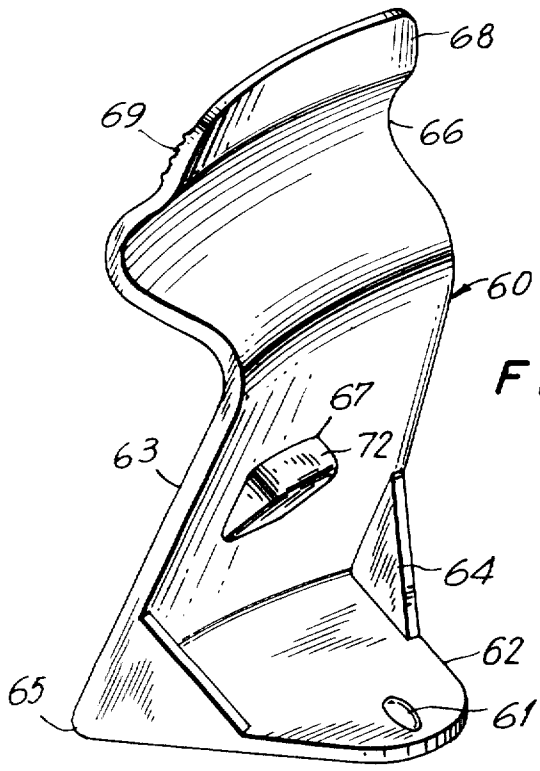


FIG. 8

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BAG HOLDER AND EXPANDER UNIT

BACKGROUND OF THE INVENTION

This invention relates to a bag holder and expander unit for mounting a disposable bag in a reusable holder.

The present invention provides improvements over the structure shown in U.S. Pat. No. 2,900,779 granted Aug. 25, 1959 to T. R. Baxter et al. and entitled "Tool for Opening and Expanding the Mouth of a Flexible Receptacle." In the aforesaid patent, the open end of a thin walled flexible plastic bag-like container is positioned on an expander device and inserted in the open end of a reusable rigid holder whose opening terminates in an annular edge to form the top edge of the bottle holder. The expander functions when in operative contact with the bag and holder to expand the open end of the bag outwardly and over the edge of the holder, thereby attaching the bag to the holder for subsequent filling and use. When used as a nurser unit, a nipple fits over the bag and top edge of the bottle holder, for example as shown and described in U.S. Pat. No. 3,075,666. The expander was characterized by having a base member housing a plurality of radial pivoting fingers and a head member mounted thereon in a manner to provide relative axial movement between the head and base members. The fingers were biased inward on the head member and axial movement between the head and base member caused the free ends of the fingers to be cammed outward by the head member. Thus, with the bag placed over the head member and the free ends of the radial pivoting fingers, with the head of the expander positioned on the open end of the holder, on depression, the fingers folded the bag outwardly and over the outer edge of the holder and came to rest on the bag bearing against the outer edge of the holder. The propensity of some users at this point is to rotate the expander to make sure the bag is properly seated. Although unnecessary, such rotation by the user caused the outer portions of the fingers to grip and tear the bag along the outer edge of the holder. Such a result is particularly undesirable when the unit is used as a nurser since the formula could leak out.

In the aforesaid expander, the fingers were positioned in the base member on a plurality of upstanding molded pins which complicated the molding of the base element as well as requiring openings in the fingers to accommodate the pins. The above cited expander also offered no support for the intermediate portion of the fingers on their initial movement over the head surface, putting a substantial stress on the fingers. The fingers had to be made of a very strong material (e.g., steel), which in practice was difficult to fabricate.

Accordingly, it is an object of the present invention to provide an improved bag holder and expander unit which overcomes the aforesaid problems.

A further object of this invention is to provide an improved bag holder and expander unit which is easier to fabricate and less likely to inflict damage on the bag during installation.

Another object of this invention, in one illustrative embodiment thereof, is to provide an improved expander construction which supports the initial excursion of the fingers to remove undue stress thereon, and permits their manufacture from a more easily fabricated material.

SUMMARY OF THE INVENTION

In carrying out this invention in one illustrative embodiment thereof, an expander device is provided having a base member and a head member which are mounted to move axially with respect to each other. The base member carries a plurality of fingers which are biased toward the head member which provides the camming action on the fingers on relative axial movement between the head and the base members. Excursion limitation means are provided which predeterminedly limits the relative movement between the head and the base members, thereby preventing the fingers from contacting the upper outer edge of the holder on which the thin walled plastic bag has been interposed during the bag seating operation. If the expander is then inadvertently rotated in the bag seating operation, the fingers are prevented from contacting a bag along the outer edge of the holder, thus preventing the gripping of the bag by the fingers and the tearing which may result therefrom. In a preferred embodiment, an annular skirt of predetermined length depends from the head member for limiting the movement between the head member and the base member when the skirt contacts the base member. The annular skirt preferably also provides the additional function of supporting the fingers on an intermediate area thereof during their initial movement along the head against static friction. The base member is provided with side walls of sufficient height to form compartments for seating the fingers in the base for pivotal movement therein. The compartments are shaped to conform to the shape of the base of the fingers which are seated therein to prevent lateral movement of the fingers in the compartments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of the bag holder, bag, and expander device embodied in this invention.

FIG. 2 is a cross-sectional view of FIG. 1 which illustrates the bag holder and bag positioned on the expander during the initial step of inserting the bag on the holder.

FIG. 2*a* is a partial cross-sectional view of FIG. 2 showing a finger in contact with the annular skirt of the expander during the initial movement in the expander.

FIG. 3 is the cross-sectional view shown in FIG. 2 with the expander fully depressed, showing the bag being fully mounted on the holder.

FIG. 4 is a top view of the base of the expander device.

FIG. 5 is a perspective view of a pivotal finger utilized in the expanders of FIGS. 2 and 3.

FIG. 6 is a cross-sectional view taken along lines 6—6 of FIG. 3.

FIG. 7 is a cross-sectional view of the holder and expander unit similar to FIG. 3 showing another embodiment of an excursion limitation means.

FIG. 8 is a perspective view of a pivotal finger utilized in the embodiment shown in FIG. 7.

FIG. 9 is a cross-sectional view of the bag holder and expander unit showing another embodiment of an excursion limitation means.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following descriptions the bag holder and expander unit embodied in this invention may at times be described in connection with its use as part of a nursing unit, but it will be understood that the invention may be utilized in any application requiring a flexible bag to be mounted over the rigid end of a bag holder. In the following description, like elements will be identified by the same reference numerals.

Turning now to FIG. 1, the bag holder and expander unit are shown in perspective, comprising the three principal components, which are a receptacle or bag holder **10**, a flexible bag **16**, and an expander device **20**. The bag holder **10** is generally cylindrical and hollow, and terminates at its open end in an annular edge **14**. An annular flange **12** is provided to accommodate the mounting of a nipple thereon for a nurser bottle of the type shown and described in U.S. Pat. No. 3,075,666. Of course the flexible bag **16**, being mounted in the open end of the holder **10**, is also positioned over the annular flange **12**, but it will be appreciated that, although the invention is described in connection with the use of an annular flange, that it is not necessary, and that the flexible bag would be capable of being mounted over the open end of other types of holders which have an end surface on which the bag may be mounted. Flexible bag **16** is a thin walled disposable bag having an open end **18** formed by the edge **17** which is expanded and mounted on the annular edge **14** of the holder **10**.

The expander **20**, as shown in FIGS. **1** and **2**, includes a base **22**, a head member **40** having a conical nose **45**, and radially pivotal fingers **60** which are seated in the base **22** and ride on

the head member **40**. The aforesaid parts are preferably of molded plastic, and preferably of the thermosetting variety for use in a nurser unit so that it may withstand boiling water temperatures for sterilization. The base **22** of the expander, as shown in FIG. **4**, has a central post **24** with an opening **23** therein, and is separated into pie-shaped compartments **25** by upstanding side walls **26**. These pie-shaped compartments have sufficient depth and a shape which conforms generally to the shape of the bases of the fingers **60**, such that when the fingers **60** are seated therein, minimum lateral movement of the fingers takes place. Each compartment **25** is provided with projections **28** which act as pivot points for the fingers **60**. As will be seen in FIG. **2**, the opening **23** of the central post **24** has a guide pin retainer means **29** firmly mounted therein. A guide pin **30** is mounted in the guide pin retainer means **29** by threading or another suitable means. The guide pin **30** extends through a channel **42** in the head member **40**, and has a pinhead **32** thereon for retaining the head member **40** on the guide pin **30**. The guide pin **30** carries a spring **34** which in its extended position biases the head member **40** against the guide pinhead **32**. The spring **34** is separated from the base member **22** by a bellville spring **35** which is also mounted on the guide pin **30** below the spring **34**. The bellville spring **35** rests on projections **61** of the fingers **60**, thereby transmitting the force of spring **34** to bias the fingers **60** inward toward the head member **40**. As will best be seen in FIG. **6**, the head member **40** is hollow, but is provided with reinforcing quadrature ribs **44**.

The head member **40**, as seen in FIG. **2**, has a conical nose **45** which terminates at its vertex in an opening of a shape to accommodate the pinhead **32** which retains the head member **40** on the guide pin **30**. The conical nose **45** terminates at its base end in an annular surface **46**. The annular surface **46** has a diameter slightly less than the opening of the bag holder **10**. The annular surface **46** forms a shoulder **47** with a first annular ridge **48** near the base of the conical nose **45**. The annular shoulder **47** is adapted to rest on the annular edge **14** of the bag holder **10** when the expander **20** is positioned on the holder **10** for performing the bag seating operation. The first annular ridge **48** is separated by neck portion **50** from a second annular ridge **52**, and the head member **40** terminates in an annular skirt **54**. The annular skirt **54** is of predetermined length with a free end **55** and provides support for the fingers in their initial movement, as will be more fully described hereinafter.

The radially pivotal fingers **60**, as best shown in FIG. **5**, have a base **62** with a configuration which conforms to the shape of the pie-shaped compartments **25** in which they are seated with a minimum of lateral play to prevent any lateral shifting or lateral movement therein. Prior expander structures, as disclosed in the U.S. Pat. No. 2,900,779 required molded pins which fit through openings in the base for positioning and seating the fingers on the base. The necessity for such pins complicated the molding of the base member. The side walls **26** of the compartments **25** have sufficient height to retain the bases **62** of the fingers **60** in the base member without the need for additional molded parts, which simplifies the fabrication of the base member.

Projections **61** on the ends of the base of the fingers **60** engage the bellville spring **35** which holds the fingers **60** in their compartments **25** by the force transmitted from the spring **34** against the bellville spring **35**. This force also biases the fingers about pivot projections **28** inward toward the head member **40**. The base members **62** of the fingers **60** meet with an upright body portion **63** to form a pivot surface **65**, forming a generally V-shaped configuration which sits on the base pivot projection **28**.

Reinforcing triangular shaped ribs **64** are provided to add rigidity to the fingers **60**. The free end portion of the fingers **60** have an intermediate surface **67**, a groove **66**, and an end portion **68** which are shaped generally to conform to the contour of the annular skirt **54**, the second annular ridge **52**, and the neck portion **50** of the head member **40** respectively.

With this configuration and the expander in its static, or extended position, as shown in FIG. **2**, the fingers **60** are positioned with their free ends **68** resting on the neck portion **50** of the head **40**. The groove **66** overlies the second annular ridge **52** with the intermediate surface **67** of the finger contacting the skirt **54** below the annular ridge **52**. On the initial depression of the expander, as shown in FIG. **2a**, support for an appreciable portion of the intermediate surface **67** of the fingers is provided by the annular skirt **54**, while the initial static friction is being overcome, to prevent any appreciable stress from being applied to the fingers which ride over the camming surface provided by the annular ridge **52**. The free ends **68** of the fingers **60** are also provided with a plurality of ridges **69** which perform a bag-gripping function during the seating operation.

In performing the bag seating and mounting operation, the open end **18** of the flexible bag **16** is positioned with its outer edges **17** extending over the conical nose **45**, the first annular ridge **48**, and the ridges **69** on the free ends **68** of the fingers **60**, as shown in FIG. **2**. The annular edge **14** of the bag holder **10** rests on the annular shoulder **47** of the head member **40**.

As is illustrated in the drawings, the holder **10**, bag **16**, and expander **20** are inverted to provide a horizontal surface for the base **22** of the expander **20**, but it will be understood that the reverse, or right-side-up configuration can be utilized if it is more convenient for the user. As initial downward pressure is applied to the bag holder, as was pointed out with respect to FIG. **2a**, the annular skirt **54** contacts the intermediate portion **67** of the fingers **60** to provide support while the static friction of the expander is being overcome. On full depression, as will be seen in FIG. **3**, the head member **40** has slide down the guide pin **30**, compressing the spring **34**. At the same time radial fingers **60** are pivoted radially outward by the camming action of the second annular ridge surface **52** on the head member **40**. The fingers **60** are pivoted about surface **65** on the projections **28** in the base **22**, with the projections **61** of the fingers bearing on the under side of the bellvile spring **35**, slightly forcing the spring **34** upward by still retaining the fingers in their compartments **25**. As the fingers are forced outward, the bag edge **17** is expanded and forced outwardly and over the annular edge **14** of the bag holder **10**. In the prior art expander, complete depression of the expander allowed the free end portions **68** of the fingers **60** to contact the bag **16** along the annular edge **14** of the holder **10**. It was found that after a user had reached this point, there was a propensity to rotate the expander to make sure that the bag was firmly seated, although this procedure was in fact unnecessary and undesirable because of the tendency of the fingers to grip and tear the bag along the edge **14** of the holder **10**. In accordance with the present invention, this undesirable contacting of the bag along edge **14** is prevented by the annular skirt **54**. The length of the annular skirt **54** is of a predetermined amount to closely control the extent of the relative movement between the head member **40** and the base **22**. The free end **55** of the skirt **54** coming into contact with the compartment sides **26** of the base **22** governs the extent of movement between the head member **40** and the base **22**, and accordingly the relative movement of the fingers **60** with respect to the holder **10** so that they are now allowed to contact the bag **16** on the annular edge **14** of the holder **10**. That is, the skirt acts as a camming stroke stop providing selective orientation between the fingers **60** and the head **40**. Note on FIG. **3** the distance marked "*x*" between bag **16** overlying the annular edge **14** of the holder **10** and the base of the groove **66** on the fingers. It should be pointed out that the bag edge **17** is expanded on the outward pivotal movement of the fingers as the fingers are moved over the camming surface formed by the second annular ridge **52** of the head member, and then moved inwardly by the bias provided by the spring **34** through the bellville spring **35**. This inward excursion releases the expanded bag and folds it over the annular flange **12** of the holder **10**. The contraction of the bag holds it firmly lapped over the flange **12** of the holder **10**. As has been pointed out previously herein, once the expander has been fully depressed, the tendency on the part of the user to

rotate the expander on the holder **10** no longer allows the fingers **60** to grip and tear the bag along the outer edge **14** of the holder **10**, as was the case in the prior art where the extent of the excursion of the fingers was not so limited.

FIGS. **7** and **8** show another embodiment of the excursion limitation means. In this embodiment the fingers **60** are provided with protrusions **72** on an intermediate portion **67** of the body **63** of the fingers **60**. The protrusions **72** are spaced a predetermined distance below the bottom ridge **52** of the head member to limit the relative movement between the head member **40** and the base **22** by the head member contacting the protrusions **72**. That is, the second annular ridge **52** of the head member **40** on its downward excursion contacts the protrusions **72** on the fingers **60** to define the extent of movement between the head member **40** and the base **22**. As in the case of the embodiment of FIG. **3**, it will be noted that the fingers do not contact the annular edge **14** along the area previously noted with an "*x*" with the bag mounted thereon to thus prevent tearing of the bag, which may result from such contact and rotation of the expander. Although the embodiment of FIG. **7** is illustrated without an annular skirt as shown in FIG. **3**, it should be appreciated that a shorter annular skirt could be provided as part of the head **40** to provide the support function for the fingers in their initial movement along the head **40**.

FIG. **9** shows another embodiment in which the stopping action is provided by a preselected spring **70** which in total compression has a predetermined length which serves to limit the extent of the movement of the head member **40** toward the base **20** so as to prevent the end portions **68** of the fingers **60** from contacting a bag which is mounted over the upper edge **14** of the holder **10**. Hence, the predetermined compression length of spring **70** serves as the excursion limiting means to present bag tearing, as in the case of the previous two embodiments.

The bag holder and mounting unit as described above avoids the problem of damage to the bag during the seating operation, especially if the expander is inadvertently rotated during that procedure. This reliability is particularly important to the type of non-skilled user who is encountered when the bag holder and expander unit are utilized as a nurser unit. Further, the all-plastic construction of the fingers in addition to the base, and movable member, as well as the simplified molding of the base member and improved seating of the fingers in the base member, has reduced the expense of the expander device while increasing its reliability and improving its performance.

Since other modifications, varied to fit particular operating requirements and other environments will be apparent to those skilled in the art, this invention is not considered limited to the examples chosen for purposes of disclosure, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this invention.

We claim:

1. In combination, a supporting holder and expander unit for mounting the flexible open end of a container over the rigid open end of the supporting holder, comprising:

a hollow supporting holder terminating in an open end having a rigid annular edge;

a container formed of a material having a flexible open end, said container adapted to be mounted in said holder with its open end adapted to fit outwardly and over said annular edge;

an expander for mounting said container open end on said annular edge, said expander including;

a base member, a head member, and a plurality of radially movable fingers; said head member including a portion adapted to fit on said annular edge,

guide means between said head member and said base member slideably joining said head member and said base member for biased relative axial movement of said members towards and away from each other;

said plurality of radially movable fingers positioned between said base member and the outer periphery of said head member;

said fingers including free ends adapted to accept the flexible open end of said container;

means for biasing said fingers inwardly towards the periphery of said head member whereby said head member acts as a camming surface for said fingers during said relative axial movement between said head member and said base member; and

excursion limitation means for limiting the extent of relative axial movement between said base member and said head member towards each other, said excursion limitation means operatively limiting said extent of movement such that the free end portions of said fingers are spaced away from the annular edge of said holder and avoid contact with the underlying flexible material of the container open end at the point of greatest inward axial movement.

2. The combination set forth in claim **1** wherein said excursion limitation means comprises an annular skirt of predetermined length on said head member, the free end of said skirt normally spaced apart from said base member, said free end of the skirt contacting said base member at the extreme permissible excursion of said head member towards said base member to limit the extent of axial movement therebetween.

3. The combination as set forth in claim **1**, wherein said head member includes an annular skirt for supporting an appreciable intermediate portion of said fingers during initial movement of the fingers from a static condition.

4. The combination as set forth in claim **2**, wherein said annular skirt includes side walls for supporting an appreciable intermediate portion of said fingers during initial movement of the fingers from a static condition.

5. The combination as set forth in claim **1** wherein said excursion limitation means comprises a plurality of protrusions spaced equidistant a predetermined height above the base and along the inner surface of a plurality of said movable fingers for contacting said head member and limiting the relative axial movement between said base and said head member.

6. The combination set forth in claim **1** wherein said biasing means between said base member and said head member includes a compression spring and wherein said excursion limitation means comprises said spring having a predetermined length under full compression for limiting the extent of relative movement between said head and base members.

7. The combination set forth in claim **1** wherein said fingers are made of a thermosetting molded plastic material and have annular ridges on the outer surfaces of said free end portions.

8. The combination set forth in claim **1** wherein said base member has a plurality of upstanding side walls forming compartments which seat said fingers therein, and wherein each of said fingers include a base portion, said compartments having a shape which generally conforms to the shape of the base portions of said fingers and said side walls having sufficient height to minimize lateral movement of said fingers in said base.

9. The combination set forth in claim **6** wherein projections are provided in each of said compartments in said base member which act as pivot points for said fingers.

10. An expander unit for receiving the flexible open end of a container and mounting same outwardly and over the rigid annular edge of a supporting holder comprising:

a base member, a head member and a plurality of radially movable fingers,

guide means for operatively connecting said base member to said head member in axially spaced relationship,

biasing means for normally maintaining the axial spacing between said base and head members, with said members movable towards each other against the force of said biasing means

said radially movable fingers having a seated end mounted in said base member, and a free end biased against an outward surface of said head member,

said head member outward surface configurated to cam said fingers radially outward as said head member is moved towards said base member,

said head further including an excursion limiting skirt of a predetermined length extending towards said base member, said skirt including a free end which is normally spaced apart from said base member by a predetermined amount, said free end of the skirt contacting said base member at the extreme permissible excursion of said head member towards said base member to limit the extent of axial movement therebetween to said predetermined amount.

11. An expander unit as set forth in claim 10 wherein said annular skirt includes side walls for supporting an appreciable intermediate portion of said fingers during initial movement of the fingers from a static condition.

12. An expander unit as set forth in claim 10, wherein said base member has a plurality of side walls forming compartments which seat said fingers therein, said compartments having a shape which generally conforms to the shape of the seated end of said fingers and said side walls having sufficient height to minimize lateral movement of said fingers in said base.

* * * * *