Description

The present invention relates to a device for dispensing a liquid from a collapsible container. The invention is particularly useful for dispensing infusion liquids, and is therefore described below with respect to this application, but it will be appreciated that the invention could advantageously be used in other applications as well.

Infusion devices, as commonly used in the medical field, frequently require that the infusion liquid be dispensed at a substantially constant pressure. One of the disadvantages of many known types of such devices, particularly the simpler ones, such as described in US—A—4 337 769 having a collapsible bag sandwiched between a pair of pads of compressed flexible cellular material and disposed with the pads in a rigid housing, is that the infusion pressure does not remain substantially constant, but rather changes with the change in volume of the infusion bag occurring during the infusion operation. The known infusion assemblies, wherein such a substantially constant pressure is maintained, are generally of relatively complicated construction and therefore costly to produce.

An object of the present invention is to provide a device of simple construction for dispensing a liquid from a collapsible container, and particularly useful for dispensing an infusion liquid at a substantially constant pressure throughout the infusion operation.

According to a broad aspect of the present invention, there is provided a device for dispensing a liquid from a collapsible container, comprising: a pair of elastic plates hingedly mounted to each other along one edge permitting them to be pivoted to an open position or to a closed position; a sleeve of flexible material secured to the pair of elastic plates along their hinged edges for receiving a liquid-filled collapsible container; each of the pair of elastic plates being pre-formed with a curve which is convex from the side facing the flexible sleeve such that when the liquid-filled collapsible container is received within the flexible sleeve and the two curved elastic plates are pivoted to their closed positions, they apply, due to their elasticity, a continuous force to the collapsible container for dispensing the liquid therefrom; and retainer means for releasably retaining the pair of elastic plates in their closed position.

According to another feature of the present invention, each of the elastic plates is sectioned along parallel lines perpendicular to their hinged edges such as to permit compact folding of the assembly when not in use.

Further features and advantages of the invention will be apparent from the description below.

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a three-dimensional view illustrating one form of device constructed in accordance with the invention for dispensing a liquid from a collapsible container, the assembly illustrated in Fig. 1 being shown in its open position and being partly sectioned;

Fig. 1a is a fragmentary sectional view along lines a—a of Fig. 1; and

Fig. 2 illustrates the elastic assembly of Fig. 1 in its closed position.

The elastic assembly illustrated in the drawings comprises two elastic plates 2, 4, hingedly mounted to each other along their inner edges 6 to permit them to pivot to an open position, as shown in Fig. 1, or to a closed position as shown in Fig. 2. The assembly further includes a sleeve 8 of flexible material secured to the two curved elastic plates 4 along their hinged edges 6 for receiving a collapsible container 10 containing the liquid to be dispensed. For example, container 10 may be an infusion bag as used in the medical field and containing an infusion to be dispensed via an outlet tube 12.

Each of the two elastic plates, 2, 4 is pre-formed with a curve which is convex from the side facing the sleeve 8 (Fig. 1), and which extends continuously from its hinged edge to its outer edge. The arrangement is such that when the liquid-filled collapsible container 10 is received within the flexible sleeve 8, and the two curved elastic plates are pivoted to their closed position as shown in Fig. 2, they apply, due to their elasticity, a continuous squeezing force to the container 10 for dispensing the liquid therefrom through its outlet tube 12. The two elastic plates are retained in their closed position by retainer means including a strap 14 fixed centrally of the free edge of plate 2 and receivable within a buckle 16 fixed centrally of the free edge of plate 4. These retainer elements further include clasps 18 and 20 fixed to the outer edges of plate 2 on opposite sides of strap 14, and co-operable with clasps 22 and 24 fixed to the outer edge of plate 4 on opposite sides of its buckle 16.

The two elastic plates 2, 4 are each pre-formed with a curve which preferably follows the arc of a circle. In the illustrated embodiment, the curve of each elastic plate defines substantially a 90° arc.

As shown particularly in Figs. 1 and 1a, each of the elastic plates 2, 4 is sectioned along parallel lines 30 perpendicular to their hinged edges 6. This is to permit compact folding of the assembly along lines 30 when not in use. To provide this collapsible arrangement, each of the two elastic plates 2, 4 comprises an outer flexible covering constituted of two layers of flexible material 32, 34 (such as fabric), and a plurality of precurved elastic plate section 36 (such as spring steel) in side-by-side relationship but spaced from each along the fold lines 30, thereby permitting the assembly to be folded along these fold lines for compact storage or handling when not in use.

The illustrated device is used in the following manner: First, the device is opened, as shown in Fig. 1, and the collapsible bag 10, containing the liquid (e.g., an infusion liquid) to be dispensed, is inserted within flexible sleeve 8 secured to the hinged edges 6 of the two elastic plates 2, 4. The

two elastic plates are then closed by passing strap 14 through buckle 16 and pulling on the strap to draw the two elastic plates 2, 4 together and to enclose the collapsible bag 10 within sleeve 8 of the assembly. This closing operation stresses the two elastic plates 2, 4, deforming them in the direction opposite to their curvatures. The two plates, due to their elasticity, thus apply a compressive force to the collapsible bag 10 within sleeve 8. To apply the maximum force, strap 14 is drawn until the outer edge of elastic plate 2 is brought to the outer edge of elastic plate 4, whereupon the strap is secured within buckle 16. Clasps 18 and 20 at the opposite ends of elastic plate 2 are then pivoted so as to engage clasps 22 and 24 at the opposite ends of elastic plate 4, thereby firmly retaining the assembly in its closed position with the collapsible container 10 under compressive pressure by the stresses produced in the pre-curved elastic plates 2 and 4.

With the arrangement illustrated in the drawings, the pressure applied to the collapsible container 10 remains substantially constant throughout the dispensing operation, even as the volume of the container decreases with the dispensing of the liquid material therefrom.

When the illustrated assembly is not in use, for example, during storage or handling, it may be folded into a compact form along fold lines 30.

While the invention has been described with respect to dispensing infusion liquids, it will be appreciated that it could also be used in other applications, for example in dispensing fire-extinguisher liquids, creams, or other materials in fluid form. The above-described embodiment of the invention is therefore to be considered purely for purposes of example, it being appreciated that many other variations, modifications, and applications of the invention may be made.

Claims

1. A device for dispensing a liquid from a collapsible container, comprising: a pair of elastic plates (2, 4), hingedly mounted to each other along one edge (6) permitting them to be pivoted to an open position or to a closed position; a sleeve (8) of flexible material secured to the pair of elastic plates along their hinged edges for receiving a liquid-filled collapsible container (10); each of said pair of elastic plates (2, 4) being pre-formed with a curve which is convex from the side facing said flexible sleeve (8) such that when the liquid-filled collapsible container (10) is received within said flexible sleeve (8) and the two curved elastic plates (2, 4) are pivoted to their closed positions, they apply, due to their elasticity, a continuous force to the collapsible container (10) for dispensing the liquid therefrom; and retainer means (14, 16, 18, 20, 22, 24) for releasably retaining said pair of elastic plates (2, 4) in their closed position.

2. The device according to claim 1, wherein said pair of elastic plates (2, 4) are each pre-formed with a curve substantially following the arc of a circle.

3. The device according to claim 2, wherein said pair of elastic plates (2, 4) are each pre-formed with a curve substantially following a 90° arc of a circle.

4. The device according to any one of claims 1 to 3, wherein each of said elastic plates (2, 4) is sectioned along parallel lines (30) perpendicular to their hinged edges (6), such as to permit compact folding of the assembly when not in use.

5. The device according to claim 4, wherein each of said sectioned elastic plates (2, 4) comprises an outer flexible covering (32, 34) enclosing a plurality of precurved elastic plate sections (36) in spaced side-by-side relationship to permit compact folding of the assembly when not in use.

6. The device according to either of claims 4 or 5, wherein each of said elastic plates (2, 4) comprises three sections.

7. The device according to any one of claims 1 to 3, wherein each of said elastic plates (2, 4) includes an outer flexible covering (32, 34).

8. The device according to any one of claims 1 to 7, wherein said retainer means includes a strap (14) fixed to the center of the outer edge of one of said elastic plates (2, 4) and receivable in a buckle (16) fixed to the center of the outer edge of the other of said elastic plates (2, 4) for drawing the two elastic plates together when closing the assembly.

9. The device according to claim 8, wherein said retainer means further includes a clasp (18, 20) at each of the outer ends of one elastic plate (2) cooperable with a clasp (22, 24) at each of the opposite ends of the other of said elastic plates (2, 4) to retain the two elastic plates in their closed positions when drawn together by said strap (14).

Patentansprüche

1. Vorrichtung zur Abgabe einer Flüssigkeit aus einem zusammendrückbaren Behälter, mit: zwei elastischen Platten (2, 4), die längs eines Randes (6) schwenkbar aneinander befestigt sind, so daß sie in eine offene Position oder in eine geschlossene Position geschwenkt werden können; einer Hülse (8) aus flexiblem Material, die an den beiden elastischen Platten längs deren schwenkbar verbundenen Rändern befestigt ist, zum Aufnhemen eines mit Flüssigkeit gefüllten, zusammendrückbaren Behälters (10); wobei die beiden elastischen Platten (2, 4) jeweils eine vorgeformte Krümmung haben, die von der der flexiblen Hülse (8) zugewandten Seite aus konvex ist, so daß sie, wenn der mit Flüssigkeit gefüllte, zusammendrückbare Behälter (10) in der flexiblen Hülse (8) aufgenommen ist und die beiden gekrümmten elastischen Platten (2, 4) in ihre geschlossenen Positionen geschwenkt sind, aufgrund ihrer Elastizität eine ständige Kraft auf den zusammendrückbaren Behälter (10) ausüben, damit die Flüssigkeit aus demselben abgegeben wird; und einer Halteeinrichtung (14, 16, 18, 20, 22, 24) zum lösbaren Festhalten der beiden elastischen Platten (2, 4) in ihrer geschlossenen Position.

2. Vorrichtung nach Anspruch 1, wobei die beiden elastischen Platten (2, 4) jeweils mit einer Krümmung vorgeformt sind, die im wesentlichen

two elastic plates are then closed by passing strap 14 through buckle 16 and pulling on the strap to draw the two elastic plates 2, 4 together and to enclose the collapsible bag 10 within sleeve 8 of the assembly. This closing operation stresses the two elastic plates 2, 4, deforming them in the direction opposite to their curvatures. The two plates, due to their elasticity, thus apply a compressive force to the collapsible bag 10 within sleeve 8. To apply the maximum force, strap 14 is drawn until the outer edge of elastic plate 2 is brought to the outer edge of elastic plate 4, whereupon the strap is secured within buckle 16. Clasps 18 and 20 at the opposite ends of elastic plate 2 are then pivoted so as to engage clasps 22 and 24 at the opposite ends of elastic plate 4, thereby firmly retaining the assembly in its closed position with the collapsible container 10 under compressive pressure by the stresses produced in the pre-curved elastic plates 2 and 4.

With the arrangement illustrated in the drawings, the pressure applied to the collapsible container 10 remains substantially constant throughout the dispensing operation, even as the volume of the container decreases with the dispensing of the liquid material therefrom.

When the illustrated assembly is not in use, for example, during storage or handling, it may be folded into a compact form along fold lines 30.

While the invention has been described with respect to dispensing infusion liquids, it will be appreciated that it could also be used in other applications, for example in dispensing fire-extinguisher liquids, creams, or other materials in fluid form. The above-described embodiment of the invention is therefore to be considered purely for purposes of example, it being appreciated that many other variations, modifications, and applications of the invention may be made.

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1. A device for dispensing a liquid from a collapsible container, comprising: a pair of elastic plates (2, 4), hingedly mounted to each other along one edge (6) permitting them to be pivoted to an open position or to a closed position; a sleeve (8) of flexible material secured to the pair of elastic plates along their hinged edges for receiving a liquid-filled collapsible container (10); each of said pair of elastic plates (2, 4) being pre-formed with a curve which is convex from the side facing said flexible sleeve (8) such that when the liquid-filled collapsible container (10) is received within said flexible sleeve (8) and the two curved elastic plates (2, 4) are pivoted to their closed positions, they apply, due to their elasticity, a continuous force to the collapsible container (10) for dispensing the liquid therefrom; and retainer means (14, 16, 18, 20, 22, 24) for releasably retaining said pair of elastic plates (2, 4) in their closed position.

2. The device according to claim 1, wherein said pair of elastic plates (2, 4) are each pre-formed with a curve substantially following the arc of a circle.

3. The device according to claim 2, wherein said pair of elastic plates (2, 4) are each pre-formed with a curve substantially following a 90° arc of a circle.

4. The device according to any one of claims 1 to 3, wherein each of said elastic plates (2, 4) is sectioned along parallel lines (30) perpendicular to their hinged edges (6), such as to permit compact folding of the assembly when not in use.

5. The device according to claim 4, wherein each of said sectioned elastic plates (2, 4) comprises an outer flexible covering (32, 34) enclosing a plurality of precurved elastic plate sections (36) in spaced side-by-side relationship to permit compact folding of the assembly when not in use.

6. The device according to either of claims 4 or 5, wherein each of said elastic plates (2, 4) comprises three sections.

7. The device according to any one of claims 1 to 3, wherein each of said elastic plates (2, 4) includes an outer flexible covering (32, 34).

8. The device according to any one of claims 1 to 7, wherein said retainer means includes a strap (14) fixed to the center of the outer edge of one of said elastic plates (2, 4) and receivable in a buckle (16) fixed to the center of the outer edge of the other of said elastic plates (2, 4) for drawing the two elastic plates together when closing the assembly.

9. The device according to claim 8, wherein said retainer means further includes a clasp (18, 20) at each of the outer ends of one elastic plate (2) cooperable with a clasp (22, 24) at each of the opposite ends of the other of said elastic plates (2, 4) to retain the two elastic plates in their closed positions when drawn together by said strap (14).

Patentansprüche

1. Vorrichtung zur Abgabe einer Flüssigkeit aus einem zusammendrückbaren Behälter, mit: zwei elastischen Platten (2, 4), die längs eines Randes (6) schwenkbar aneinander befestigt sind, so daß sie in eine offene Position oder in eine geschlossene Position geschwenkt werden können; einer Hülse (8) aus flexiblem Material, die an den beiden elastischen Platten längs deren schwenkbar verbundenen Rändern befestigt ist, zum Aufnhemen eines mit Flüssigkeit gefüllten, zusammendrückbaren Behälters (10); wobei die beiden elastischen Platten (2, 4) jeweils eine vorgeformte Krümmung haben, die von der der flexiblen Hülse (8) zugewandten Seite aus konvex ist, so daß sie, wenn der mit Flüssigkeit gefüllte, zusammendrückbare Behälter (10) in der flexiblen Hülse (8) aufgenommen ist und die beiden gekrümmten elastischen Platten (2, 4) in ihre geschlossenen Positionen geschwenkt sind, aufgrund ihrer Elastizität eine ständige Kraft auf den zusammendrückbaren Behälter (10) ausüben, damit die Flüssigkeit aus demselben abgegeben wird; und einer Halteeinrichtung (14, 16, 18, 20, 22, 24) zum lösbaren Festhalten der beiden elastischen Platten (2, 4) in ihrer geschlossenen Position.

2. Vorrichtung nach Anspruch 1, wobei die beiden elastischen Platten (2, 4) jeweils mit einer Krümmung vorgeformt sind, die im wesentlichen

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dem Bogen eines Kreises folgt.

Vorrichtung nach Anspruch 2, wobei die beiden elastischen Platten (2, 4) jeweils mit einer Krümmung vorgeformt sind, die im wesentlichen einem Kreisbogen von 90° folgt.

4. Vorrichtung nach einem der Ansprüche 1 bis 3, wobei die elastischen Platten (2, 4) jeweils längs paralleler Linien (30), die zu ihren schwenkbar verbundenen Rändern (6) rechtwinkelig sind, unterteilt sind, so daß die Vorrichtung, wenn sie nicht in Gebrauch ist, kompakt zusammenlegbar ist.

5. Vorrichtung nach Anspruch 4, wobei die unterteilten elastischen Platten (2, 4) jeweils eine äußere flexible Bedeckung (32, 34) aufweisen, die mehrere vorgekrümmte elastische Plattenabschnitte (36) in gegenseitigem Abstand Seite an Seite umschließt, um das kompakte Zusammenlegen der Vorrichtung zu gestatten, wenn diese nicht in Gebrauch ist.

6. Vorrichtung nach Anspruch 4 oder 5, wobei die elastischen Platten (2, 4) jeweils drei \bschnitte aufweisen.

7. Vorrichtung nach einem der Ansprüche 1 bis 3, wobei die elastischen Platten (2, 4) jeweils eine äußere flexible Bedeckung (32, 34) aufweisen.

8. Vorrichtung nach einem der Ansprüche 1 bis 7, wobei die Halteeinrichtung einen Gurt (14) aufweist, der in der Mitte des äußeren Randes einer der elastischen Platten (2, 4) befestigt und in einer Schnalle (16) aufnehmbar ist, welche in der Mitte des anderen Randes der anderen der beiden elastischen Platten (2, 4) befestigt ist, zum Zusammenziehen der beiden elastischen Platten bei dem Schließen der Vorrichtung.

9. Vorrichtung nach Anspruch 8, wobei die Halteeinrichtung weiter einen Schließhaken (18, 20) an jedem der äußeren Enden einer elastischen Platte (2) aufweist, der mit einem Schließhaken (22, 24) an jedem der entgegengesetzten Enden der anderen der elastischen Platten (2, 4) in Eingriff bringbar ist, um die beiden elastischen Platten in ihren geschlossenen Positionen zu halten, wenn sie durch den Gurt (14) zusammengegen sind.

Revendications

1. Dispositif pour débiter un liquide provenant d'un récipient souple, caractérisé en ce qu'il comprend deux plaques élastiques (2, 4) qui s'articulent à charnière entre elles le long d'un bord (6), ce qui leur permet de pivoter vers une position d'ouverture ou vers une position de fermeture; un manchon (8) en matière souple, fixé aux deux plaques élastiques le long de leurs bords articulés et qui peut recevoir un récipient souple (10) rempli d'un liquide; chacune desdites plaques élastiques (2, 4) étant pré-formées avec une courbure qui est convexe à partir du côté faisant face au manchon souple (8), de telle sorte que, quand le récipient (10) rempli de liquide est logé dans le manchon souple (8) et les deux plaques élastiques (2, 4) sont amenées à pivoter vers leurs positions de fermeture, ces plaques exercent, en raison de leur élasticité propre, une pression continue sur le récipient souple (10) de manière à en expulser le liquide, des moyens de retenue (14, 16, 18, 20, 22, 24) étant prévus pour maintenir les deux plaques élastiques (2, 4) dans leur position de fermeture.

2. Dispositif selon la revendication 1, caractérisé en ce que lesdites plaques élastiques (2, 4) sont pré-formées chacune avec une courbure qui épouse sensiblement celle d'un arc de cercle.

3. Dispositif selon la revendication 2, caractérisé en ce que lesdites plaques élastiques (2, 4) sont préformées de façon à leur conférer une courbure épousant en substance un arc de cercle de 90 degrés.

4. Dispositif selon l'une quelconque des revendications 1 à 3, caractérisé en ce que chacune desdites plaques élastiques (2, 4) est divisée en sections par des traits parallèles (30) perpendiculaires à leurs bords articulés à charnière (6) afin de permettre le pliage sous forme compact de l'ensemble lorsqu'il n'est pas utilisé.

5. Dispositif selon la revendication 4, caractérisé en ce que chacune des plaques élastiques (2, 4) divisées en sections comprend un revêtement externe souple (32, 34) renfermant plusieurs sections pré-incurvées de plaque élastique (36) espacées côté-à-côte afin de permettre un pliage sous forme compact de l'ensemble lorsqu'il n'est pas utilisé.

6. Dispositif selon l'une quelconque des revendications 4 ou 5, caractérisé en ce que chaque des plaques élastiques (2, 4) se compose de trois sections.

7. Dispositif selon l'une quelconque des revendications 1 à 3, caractérisé en ce que chacune des plaques élastiques (2, 4) est pourvue d'un revêtement externe souple (32, 34).

8. Dispositif selon l'une quelconque des revendications 1 à 7, caractérisé en ce que lesdits moyens de retenue comprennent une sangle (14) fixé au centre du bord externe d'une des plaques élastiques (2, 4) et que l'on peut faire passer dans une boucle (16) fixée au centre du bord externe de l'autre plaque élastique (4, 2), pour rapprocher les deux plaques élastiques entre elles lorsqu'on ferme l'ensemble.

9. Dispositif selon la revendication 8, caractérisé en ce que lesdits moyens de retenue comprennent en outre un fermoir (18, 20) prévu sur chacune des extrémités externes d'une des plaques élastiques (2) et pouvant coopérer avec un fermoir (22, 24) prévu à chacune des extrémités opposées de l'autre plaque élastique (2, 4) afin de maintenir les deux plaques élastiques dans leur position de fermeture lorsqu'elles ont été rapprochées entre elles en tirant sur ladite sangle (14).

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