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⑤④ **Interlocking closure device having improved ease of occlusion.**

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⑤① References cited:  
**GB-A-1 307 672**  
**GB-A-2 017 813**

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## Description

This application is related to copending European Patent Application Nos. 84 107 591.4 (Publication No. 0130602) and 84107589.8 (Publication No. 0130600).

This invention relates to closure fastening devices, and more particularly, to interlocking closure fastening devices having improved occlusion characteristics.

An interlocking closure fastening device comprising a female closure element and a male closure element formed such that the male closure element and the female closure element engage in interlocking relationship; the male closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to the base portion and extending therefrom, the webs terminating in hooks comprising hook portions facing away from each other; the female closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to the base portion and spaced to pass over the webs on said male closure element, wherein the webs on the female closure element terminate in hooks extending toward each other to engage the hooks on the male closure element, is known from GB-A-2 017 813.

Closure fastening devices for use with plastic bags should be relatively easy to open and close and also provide a satisfactory seal. However, it has been found that some prior art interlocking closure fastening devices suffer from a tendency of the male and female closure elements to straddle each other and to not occlude during attempted occlusion as opposed to a normally occluded position. Such a non-occluded, and also straddled condition of the male and female closure elements on a plastic bag precludes occlusion of the closure elements and results in the bag contents not being securely contained within the bag. Consequently, it would be desirable to provide more positive guidance of the opposing closure elements such that the elements engage more repeatedly into the normally occluded condition, and that the elements be inhibited from engaging into a non-occluded and straddled condition.

Therefore, there is a continuing need to provide closure fastening devices which overcome the above-noted disadvantages.

In conformity with the present invention an interlocking closure fastening device comprising a female closure element and a male closure element formed such that the male closure element and the female closure element engage in interlocking relationship; the male closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to the base portion and extending therefrom, said webs terminating in hooks comprising hook portions facing away from each other; the female closure element

including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to the base portion and spaced to pass over the webs on said male closure element, wherein the webs on the female closure element terminate in hooks extending toward each other to engage the hooks on the male closure element, is characterized in that the hooks on the male closure element further comprise hook projections facing toward each other.

The two hook projections facing toward each other reduce the width of the transverse opening between the webs of the male closure element in the area of the hooks, thereby inhibiting the tendency for either of the webs of the female closure element to enter the opening between the webs of the male closure element. The male closure element of this invention thus reduces the potential for straddling when occluding an interlocking closure fastening device comprising a male closure element and a female closure element, thereby resulting in greater ease of occlusion and the obtainment of secure occlusion.

Preferably the interlocking closure fastening device of the present invention has an occluded height of between about 1.52 mm (60 mils) and about 2.16 mm (85 mils), most preferably about 1.78 mm (70 mils), and a corresponding occluded width of between about 2.41 mm (95 mils) and about 3.18 mm (125 mils), most preferably about 2.79 mm (110 mils).

Furthermore the base portion of the male closure element preferably is resiliently bendable.

One embodiment of the invention is described in detail below with reference to the drawings, in which:

Fig. 1 is a perspective view of a flexible container including a closure fastening device in accordance with the invention;

Fig. 2 is a sectional view of a male closure element in accordance with this invention;

Fig. 3 is a sectional view of a closure fastening device in accordance with this invention in a misaligned position;

Fig. 4 is a sectional view of a closure fastening device in accordance with this invention in a properly aligned position just prior to occlusion;

Fig. 5 is a sectional view of a closure fastening device in accordance with this invention in an occluded position.

Fig. 1 shows a typical flexible container 10 formed from a plastic film which is folded at bottom portion 11 and is heat sealed along the side edges 12 to form a pouch or bag. The sidewalls 13 may extend beyond a closure fastening device 14 to provide grasping sections 16 and 17 to simplify the opening of the closure fastening device 14.

As shown in Fig. 2, the closure fastening device 14 comprises a male profile portion 18' which is connected to a flange portion 19 and includes a base portion 20, a pair of spaced-apart, parallelly disposed webs 21 extending in a generally normal direction from the base portion 20, and male

hooks 22' extending from webs 21 and facing away from each other. A female profile portion 24 (Fig. 3) of a female closure element is connected to flange portion 25 and includes a base portion 26, a pair of spaced-apart, parallelly disposed webs 27 extending in a generally normal direction from the base portion 26 and female hooks 28 extending from webs 27 and facing towards each other. The female hooks each have a rounded crown surface 29, and 29', which serve to guide the hooks for occlusion with the male hooks of a mating male closure element. Profile portions 18' and 24 may be separately formed and thereafter connected to a film which forms sidewalls 13, or they may be integrally formed with sidewalls 13 as shown in Fig. 1.

In accordance with this invention, when outside surfaces 32 of the male hooks 22' are contoured as shown in Figs. 2 to 5, it has been found that such a construction is forgiving to misalignment and provides positive guidance of the mating closure elements, and the elements engage easily and accurately into the desired occluded position.

In Fig. 2, the male profile portion 18' in accordance with this invention is disclosed in detail wherein hook projections 31 on hooks 22' can be seen extending from the broken lines 23'' shown therein to form a reduced gap between hook portions 22' to thereby physically hinder the straddling of a male closure element and a female closure element. Accordingly, the desired hindrance of the straddle position that could occur between a male closure element and a female closure element is obtained, and likewise, the other desired characteristic of ease of occlusion is enabled by providing a guiding action for the hook surfaces of the female closure element to slide along the outside surfaces 32 of hooks 22' of the male closure element. Such guidance helps direct the male and female closure elements into their proper occluded position. As will be appreciated by those skilled in the art, hook projections 31 may be any suitable length so as to virtually close the gap or void between them and preclude entrance therein of the hook and web portions of the female closure element, thereby virtually insuring occlusion and eliminating the possibility of straddling between the male and female closure elements.

Manufacturing considerations may limit the extent to which the hook projections 31 are brought close together thereby reducing the guidance effect between the male closure element of this invention and a conventional interlocking female closure element. Satisfactory results have been obtained when the hook projections 31 have lengths, on a proportionate scale to the occluded height and occluded width of the interlocking closure fastening device, of between about 0.13 mm (5 mils) and about 0.20 mm (8 mils) as measured between the dotted lines 33 shown in Fig. 2. However, it is preferred that hook projections 31 have lengths, on a proportionate scale to the occluded height and occluded width of the interlocking closure fastening device, of between about 0.13 mm (5 mils) and about 0.51 mm (20

mils), as such lengths provide the aforementioned desired characteristics to interlocking closure fastening devices.

In accordance with a preferred embodiment of this invention, certain parts of the hooks 22' of the male closure element of this invention have lengths, on a proportionate scale to the occluded height and occluded width of the interlocking closure fastening device, of between about 0.13 mm (5 mils) and about 0.25 (10 mils) as measured between the dotted lines 34 shown in Fig. 2.

As employed herein, the term "proportionate" is to indicate the relative proportions of the closure elements of the interlocking closure fastening device when the male and female closure elements are occluded. Thus, when the interlocking closure fastening device of this invention has an occluded height of between about 1.52 mm (60 mils) and about 2.16 (85 mils), and an occluded width of between about 2.41 mm (95 mils) and about 3.18 mm (125 mils), the lengths of the hook of the male closure element are between about 0.13 mm (5 mils) and about 0.25 mm (10 mils), and the lengths of the hook projections of the male closure element are between about 0.13 mm (5 mils) and about 0.51 mm (20 mils) on a proportionate scale to the occluded height and occluded width of the interlocking closure fastening device. Accordingly, when the occluded height and occluded width of the interlocking closure fastening device of this invention are either increased or decreased, then the lengths of the hooks and hook projections of the male closure element should be proportionately increased or decreased to maintain the relative proportions of the closure elements.

Fig. 3 shows a male closure element in accordance with this invention in a misaligned position with respect to a female closure element just prior to occlusion therewith. It can be seen from Fig. 3 that even though the male closure element and the female closure element are misaligned, they will be guided into the desired occluding alignment by hook projections 31 extending toward each other from male hooks 22' for ultimate interlocking occlusion.

In Fig. 4 it can be seen that when the male closure element in accordance with this invention is properly aligned with a female closure element just prior to occlusion, such will not only lead to greater ease of occlusion therebetween, but will also inhibit the movement of the male closure element and the female closure element into a non-occluded straddle position.

Contacting pressure applied to interlocking closure fastening devices aligned in the position shown in Fig. 8 will interlock the male profile portion 18' and the female profile portion 24 in the normally occluded position shown in Fig. 5.

It should be noted that during the occlusion operation of female profile portion 24 and male profile portion 18', at least one of the base portions 26 and 20 flexes, or the webs 27 and 21 flex, or the hooks 28 and 22' flex, or a combination of these parts flex to achieve occlusion.

Generally, the closure fastening device of this invention may be formed from thermoplastic materials such as polyethylene, polypropylene, nylon, or the like, or from a combination thereof. Thus, resins or mixtures of resins such as high density polyethylene, medium density polyethylene and low density polyethylene may be employed to prepare the novel closure device of this invention.

The closure fastening device of the invention may be manufactured by extrusion, or other known methods of producing such devices. The closure fastening device can be manufactured as individual closure elements for later attachment to a film, or the closure profile portions can be manufactured integral with a film. In addition, the closure fastening device can be manufactured with or without flange portions on one or both of the closure elements depending upon intended use or expected additional manufacturing operations.

In the practice of the instant invention, the closure fastening device may be integrally formed with the sidewalls of a container, or connected to a container, or to a film to be formed into a container, by the use of any of many known methods. A thermoelectric device can be applied to a film in contact with a flange portion of a closure element or the thermoelectric device can be applied to a film in contact with the base portion of a closure element having no flange portion, to cause a transfer of heat through the film to produce melting at the interface of the film and the flange portion or base portion of the closure element. On cooling, the interface region joins the film and the closure element. The thermoelectric device can be heated rotary discs, or resistance heated slide wires, or traveling heater bands, or the like. The connection between the film and the closure element can also be established by the use of hot melt adhesives, or hot jets of air to the interface, or ultrasonic heating, or other known methods. Generally, the closure fastening device and films can be made from a heat sealable material so that a container can be formed economically by heat sealing the aforementioned components to form the container.

The closure fastening device of this invention provides many advantages for use in containers to be used by consumers. For example, the closure device is easy to occlude and does not tend to twist and distort during attempted occlusion as in the case of some prior art devices such as the arrowhead-shaped device employed with a container available under the tradename ZIPLOC® from Dow Chemical Company of Midland, Michigan. This provides convenience in the occluding operation.

In addition, the closure fastening device is more difficult to deocclude from the inside of the containers than from the outside of the containers thereby providing more secure containment of goods such as food products. The profile portions of the closure device have approximately uniform

cross-sections. This not only simplifies the manufacture of the device but it also contributes to the physical flexibility of the device, which is a desirable property.

A closure fastening device in accordance with this invention can also be used as a flexible straw because a good seal at the engaged surfaces is possible and a compartment defined by the occluded closure elements provides a passage-way which does not collapse when the closure fastening device is bent moderately.

Generally, the closure fastening device of this invention can be manufactured in a variety of forms to suit the intended use. In addition, the male and female closure elements can be positioned on opposite sides of a film. Such an embodiment would be suited for enwrapping an object or a collection of objects such as wires. Generally, the male and female closure elements on a film should be parallel to each other, but this would depend on the intended use.

### Claims

1. An interlocking closure fastening device comprising a female closure element and a male closure element formed such that said male closure element and said female closure element engage in interlocking relationship; said male closure element including a profile portion (18') comprising a base portion (20) having a pair of spaced-apart, parallelly disposed webs (21) attached to said base portion and extending therefrom, said webs terminating in hooks (22') comprising hook portions facing away from each other; said female closure element including a profile portion (24) comprising a base portion (26) having a pair of spaced-apart, parallelly disposed webs (27) attached to said base portion and spaced to pass over said webs (21) on said male closure element, wherein said webs on said female closure element terminate in hooks (28) extending toward each other to engage said hooks (22') on said male closure element, characterized in that said hooks (22') on said male closure element further comprise hook projections (31) facing toward each other.

2. An interlocking closure fastening device in accordance with claim 1 having an occluded height of between about 1.52 mm (60 mils) and about 2.16 mm (85 mils), and a corresponding occluded width of between about 2.41 mm (95 mils) and about 3.18 mm (125 mils).

3. An interlocking closure fastening device in accordance with claim 2 wherein said hook projections (31) have lengths, on a proportionate scale to the occluded height and occluded width of said interlocking closure fastening device, of between about 0.13 mm (5 mils) and about 0.51 mm (20 mils), and preferably of between about 0.13 mm (5 mils) and about 0.20 mm (8 mils).

4. An interlocking closure fastening device in accordance with claim 2 or 3 wherein said hook portions of said male closure element have lengths, on a proportionate scale to the occluded

height and occluded width of said interlocking closure fastening device, of between about 0.13 mm (5 mils) and about 0.25 mm (10 mils).

5. An interlocking closure fastening device in accordance with any one of claims 1 to 4 wherein said base portion (20) of said male closure element is resiliently bendable.

6. An interlocking closure fastening device in accordance with any one of claims 1 to 5 wherein said base portion (26) of said female closure element is resiliently bendable.

7. An interlocking closure fastening device in accordance with any one of claims 1 to 6 wherein at least one of said webs (21) of said male closure element is resiliently bendable.

8. An interlocking closure fastening device in accordance with any one of claims 1 to 7 wherein at least one of said webs (27) of said female closure element is resiliently bendable.

9. An interlocking closure fastening device in accordance with any one of claims 1 to 8 wherein at least one of said hooks (22') of said male closure element is resiliently bendable.

10. An interlocking closure fastening device in accordance with any one of claims 1 to 9 wherein at least one of said hooks (28) of said female closure element is resiliently bendable.

11. An interlocking closure fastening device in accordance with any one of claims 1 to 10 wherein said female closure element is connected to a film forming one of two sidewalls (13) of a container (10), and said male closure element is connected to a film forming the other of said two sidewalls.

12. An interlocking closure fastening device in accordance with any one of claims 1 to 10 wherein said female closure element forms an integral part of one of two sidewalls (13) of a container (10), and said male closure element forms an integral part of the other of said two sidewalls.

13. An interlocking closure fastening device in accordance with claim 11 or 12 wherein said female closure element includes a flange portion (25) for attachment to one of said sidewalls (13).

14. An interlocking closure fastening device in accordance with any of claims 11 to 13 wherein said male closure element includes a flange portion (19) for attachment to the other of said sidewalls (13).

#### Patentansprüche

Druckverschlußvorrichtung mit einem Verschluß-Aufnahmeelement und einem Verschluß-Steckelement, die derart ausgebildet sind, daß das Verschluß-Steckelement und das Verschluß-Aufnahmeelement in verriegelnden Eingriff miteinander kommen; wobei das Verschluß-Steckelement ein Profilverteil (18') mit einem Basisteil (20) aufweist, das mit zwei parallel in Abstand voneinander liegenden Stegen (21) versehen ist, die an dem Basisteil angebracht sind, sich von diesem wegerstrecken und in Haken (22') mit voneinanderweggerichteten Hakenteilen enden; wobei das Verschluß-Aufnahmeelement ein Profilverteil (24) mit einem Basisteil (26) aufweist, das

mit zwei parallel in Abstand voneinander liegenden Stegen (27) versehen ist, die an dem Basisteil angebracht und derart in Abstand voneinander angeordnet sind, daß sie über die Stege (21) auf dem Verschluß-Steckelement gehen, und wobei die Stege auf dem Verschluß-Aufnahmeelement in Haken (28) enden, die aufeinanderzugerichtet sind, um mit den Haken (22') auf dem Verschluß-Steckelement in Eingriff zu kommen, dadurch gekennzeichnet, daß die Haken (22') auf dem Verschluß-Steckelement ferner mit Hakenvorsprüngen (31) versehen sind, die aufeinanderzuweisen.

2. Druckverschlußvorrichtung nach Anspruch 1 mit einer eingeschlossenen Höhe zwischen etwa 1,52 mm (60 mils) und etwa 2,16 mm (85 mils) und einer entsprechenden eingeschlossenen Breite zwischen etwa 2,41 mm (95 mils) und etwa 3,18 mm (125 mils).

3. Druckverschlußvorrichtung nach Anspruch 2, wobei die Hakenvorsprünge (31) in proportionalem Maßstab zu der eingeschlossenen Höhe und der eingeschlossenen Breite der Druckverschlußvorrichtung Längen zwischen etwa 0,13 mm (5 mils) und etwa 0,51 mm (20 mils) und vorzugsweise zwischen etwa 0,13 mm (5 mils) und etwa 0,20 mm (8 mils) haben.

4. Druckverschlußvorrichtung nach Anspruch 2 oder 3, wobei die Hakenteile des Verschluß-Steckelements in proportionalem Maßstab zu der eingeschlossenen Höhe und der eingeschlossenen Breite der Druckverschlußvorrichtung Längen zwischen etwa 0,13 mm (5 mils) und etwa 0,25 mm (10 mils) haben.

5. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 4, wobei das Basisteil (20) des Verschluß-Steckelements nachgiebig biegsam ist.

6. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 5, wobei das Basisteil (26) des Verschluß-Aufnahmeelements nachgiebig biegsam ist.

7. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 6, wobei mindestens einer der Stege (21) des Verschluß-Steckelements nachgiebig biegsam ist.

8. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 7, wobei mindestens einer der Stege (27) des Verschluß-Aufnahmeelements nachgiebig biegsam ist.

9. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 8, wobei mindestens einer der Haken (22') des Verschluß-Steckelements nachgiebig biegsam ist.

10. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 9, wobei mindestens einer der Haken (28) des Verschluß-Aufnahmeelements nachgiebig biegsam ist.

11. Druckverschlußvorrichtung nach einem der Ansprüche 1 bis 10, wobei das Verschluß-Aufnahmeelement mit einem Film verbunden ist, der eine von zwei Seitenwänden (13) eines Behälters (10) bildet, und das Verschluß-Steckelement mit einem Film verbunden ist, der die andere der beiden Seitenwände bildet.

12. Druckverschlußvorrichtung nach einem der

Ansprüche 1 bis 10, wobei das Verschluß-Aufnahmeelement einen integralen Teil einer von zwei Seitenwänden (13) eines Behälters (10) bildet, und das Verschluß-Steckelement einen integralen Teil der anderen der beiden Seitenwände bildet.

13. Druckverschlußvorrichtung nach Anspruch 11 oder 12, wobei das Verschluß-Aufnahmeelement ein Flanschteil (25) zur Anbringung an einer der Seitenwände (13) aufweist.

14. Druckverschlußvorrichtung nach einem der Ansprüche 11 bis 13, wobei das Verschluß-Steckelement einen Flanschteil (19) zur Anbringung an der anderen der Seitenwände (13) aufweist.

### Revendications

1. Dispositif de fixation à fermeture par enclenchement comprenant un élément de fermeture femelle et un élément de fermeture mâle formés de manière que ledit élément de fermeture mâle et ledit élément de fermeture femelle s'enclenchent mutuellement; ledit élément de fermeture mâle comprenant une partie profilée (18') comportant une partie de base (20) ayant deux voiles espacés (21), disposés parallèlement, reliés à ladite partie de base et partant de celle-ci, lesdits voiles se terminant par des crochets (22') comprenant des parties de crochet tournées dans des directions s'éloignant l'une de l'autre; ledit élément de fermeture femelle comprenant une partie profilée (24) comportant une partie de base (26) ayant deux voiles espacés (27) disposés parallèlement, reliés à ladite partie de base et espacés de façon à passer au-dessus desdits voiles (21) dudit élément de fermeture mâle, lesdits voiles dudit élément de fermeture femelle se terminant par des crochets (28) s'étendant l'un vers l'autre pour entrer en prise avec lesdits crochets (22') dudit élément de fermeture mâle, caractérisé en ce que lesdits crochets (22') dudit élément de fermeture mâle comprennent en outre des saillies en crochet (31) tournées l'une vers l'autre.

2. Dispositif de fixation à fermeture par enclenchement selon la revendication 1, ayant une hauteur fermée comprise entre environ 1,52 mm (60 mils) et environ 2,16 mm (85 mils) et une largeur fermée correspondante comprise entre environ 2,41 mm (95 mils) et environ 3,18 mm (125 mils).

3. Dispositif de fixation à fermeture par enclenchement selon la revendication 2, dans lequel lesdites saillies en crochet (31) ont des longueurs, proportionnellement à la hauteur fermée et à la largeur fermée dudit dispositif de fixation à fermeture par enclenchement, comprises entre environ 0,13 mm (5 mils) et environ 0,51 mm (20 mils), et avantageusement entre environ 0,13 mm (5 mils) et environ 0,20 mm (8 mils).

4. Dispositif de fixation à fermeture par enclenchement selon la revendication 2 ou 3, dans

lequel lesdites parties en crochet dudit élément de fermeture mâle ont des longueurs, proportionnellement à la hauteur fermée et à la largeur fermée dudit dispositif de fixation à fermeture par enclenchement, comprises entre environ 0,13 mm (5 mils) et environ 0,25 mm (10 mils).

5. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 4, dans lequel ladite partie de base (20) dudit élément de fermeture mâle peut être pliée élastiquement.

6. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 5, dans lequel ladite partie de base (26) dudit élément de fermeture femelle peut être pliée élastiquement.

7. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 6, dans lequel au moins l'un desdits voiles (21) dudit élément de fermeture mâle peut plier élastiquement.

8. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 7, dans lequel au moins l'un desdits voiles (27) dudit élément de fermeture femelle peut plier élastiquement.

9. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 8, dans lequel au moins l'un desdits crochets (22') dudit élément de fermeture mâle peut plier élastiquement.

10. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 9, dans lequel au moins l'un desdits crochets (28) dudit élément de fermeture femelle peut plier élastiquement.

11. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 10, dans lequel ledit élément de fermeture femelle est relié à un film formant l'une de deux parois latérales (13) d'un récipient (10) et ledit élément de fermeture mâle est relié à un film formant l'autre desdites deux parois latérales.

12. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 1 à 10, dans lequel ledit élément de fermeture femelle forme une seule pièce avec l'une de deux parois latérales (13) d'un récipient (10) et ledit élément de fermeture mâle forme une seule pièce avec l'autre desdites deux parois latérales.

13. Dispositif de fixation à fermeture par enclenchement selon la revendication 11 ou 12, dans lequel ledit élément de fermeture femelle comprend une partie à bride (25) pour la fixation à l'une desdites parois latérales (13).

14. Dispositif de fixation à fermeture par enclenchement selon l'une quelconque des revendications 11 à 13, dans lequel ledit élément de fermeture mâle comprend une partie à bride (19) pour la fixation à l'autre desdites parois latérales (13).

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FIG. 1

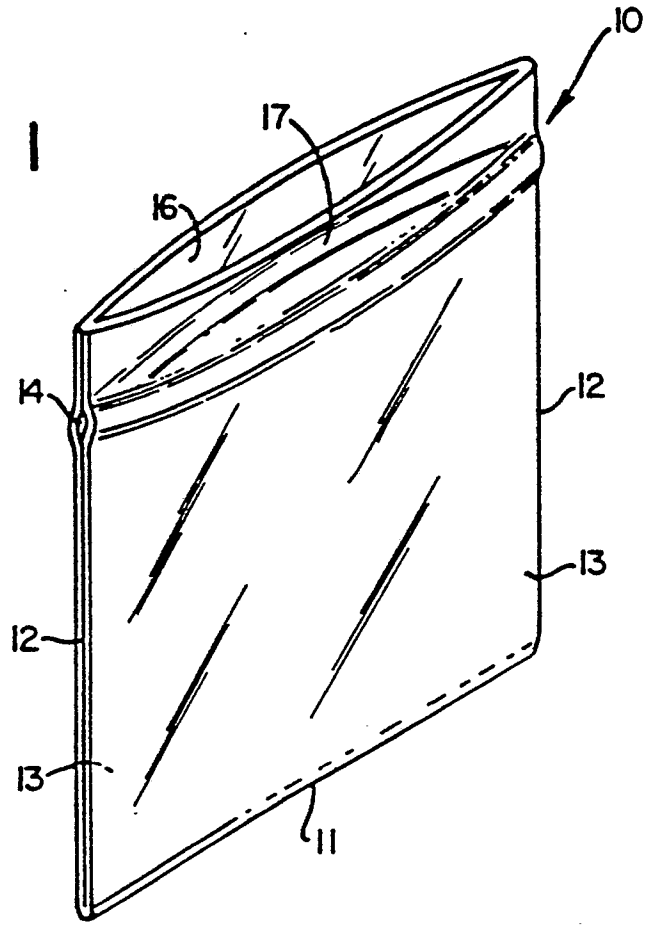


FIG. 2

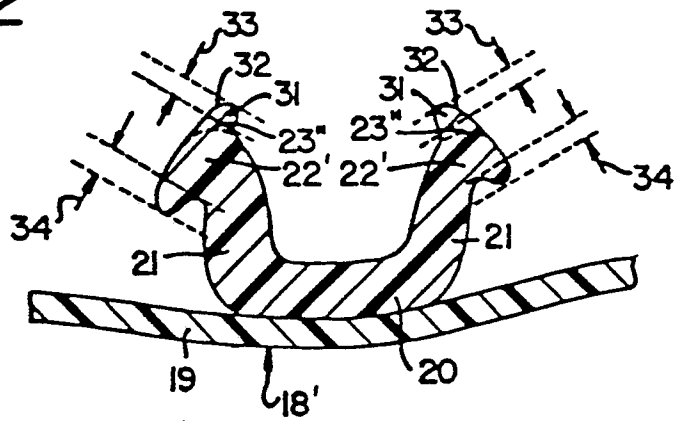


FIG. 3

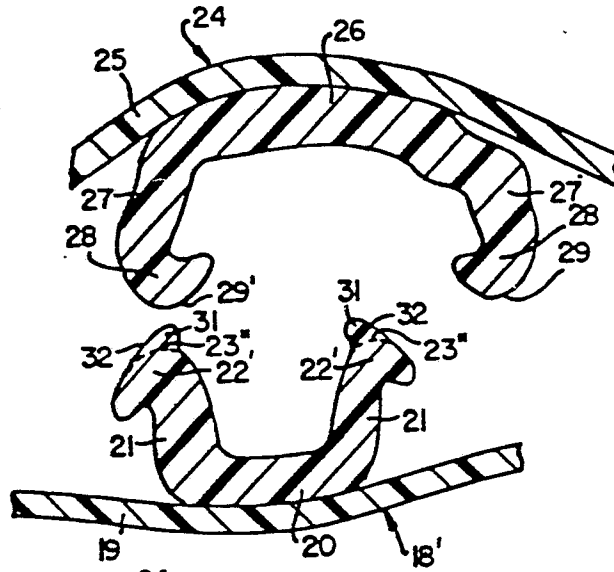


FIG. 4

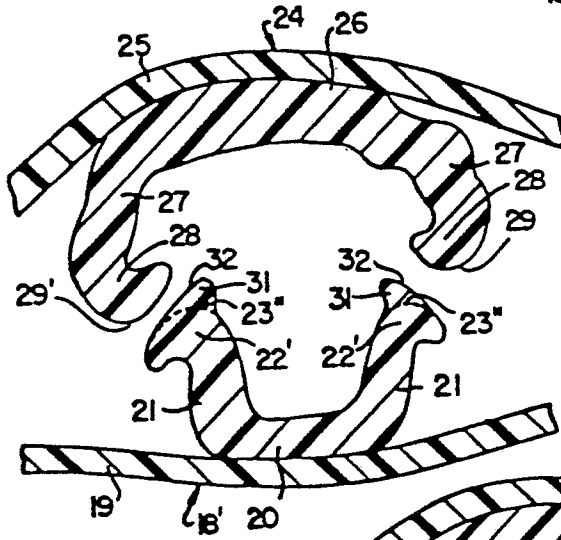


FIG. 5

