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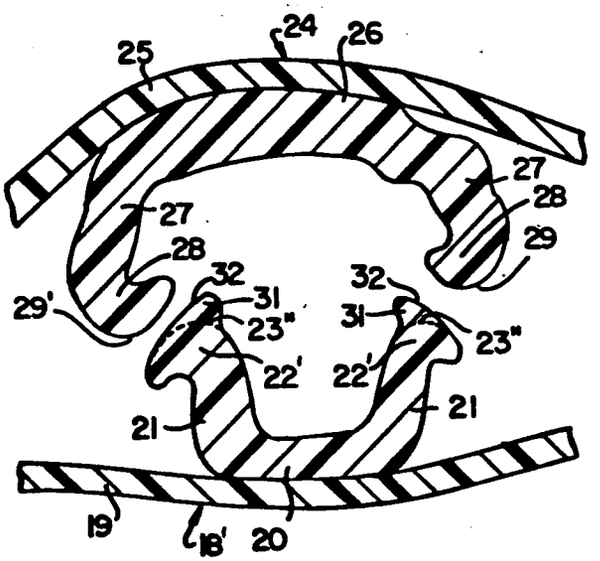
(71) Applicant: **UNION CARBIDE CORPORATION, Old Ridgebury Road, Danbury Connecticut 06817 (US)**

(72) Inventor: **Cisek, Ronald Joseph, 125 Meadow Court Lane, Hinsdale (60521), Ill. (US)**
Inventor: **Lewkow, Algis Stephen, 6437 West 164th Place, Tinley Park (60477) Ill. (US)**

(74) Representative: **Schwan, Gerhard, Dipl.-Ing., Elfenstrasse 32, D-8000 München 83 (DE)**

(54) Interlocking closure device having improved ease of occlusion.

(57) A male closure element comprising a U-shaped channel element including a profile portion (18) comprising a base portion (20) having a pair of spaced-apart, parallelly disposed webs (21) attached to the base portion (20) and extending therefrom, the webs (21) terminating in hooks (22) comprising hook portions (23) facing away from each other and hook projections (31) facing toward each other. The closure element may be employed with interlocking fastening devices to provide thereto improved ease of occlusion characteristics.



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INTERLOCKING CLOSURE DEVICE HAVING IMPROVED EASE OF OCCLUSION

Cross Reference to Related Application

This application is related to copending application Serial No. (D/13768) filed _____ for Interlocking Closure Device Having Controlled Separation and Improved Ease of Occlusion.

BACKGROUND OF THE INVENTION

Field of the Invention

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

Discussion of the Prior Art

Generally, closure fastening devices for use with plastic bags and the like are well-known. In addition, manufacturing methods for closure devices made of plastic material are generally known.

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.

Summary of the Invention

In accordance with this invention, generally speaking, there is provided an interlocking closure fastening device having an occluded height of between about 60 mils and about 85 mils, preferably about 70 mils, and a corresponding occluded width of between about 95 mils and about 125 mils, preferably about 110 mils, comprising a female closure element and a male closure element, formed such that the male and female closure elements engage in interlocking relationship, wherein the male closure element includes 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 facing away from each other. The female closure element includes a profile portion comprising a base portion with a pair of spaced-apart, parallelly disposed webs integrally attached to the base portion and spaced to pass over the webs on the male closure

element, wherein the webs on the female closure element terminate in hooks facing toward each other to engage the hooks on the male closure element.

More specifically, in accordance with this invention, the male closure element comprises a U-shaped channel 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 facing away from each other. The hook portion on each web of the male closure element comprises a hook portion and a hook projection. The two hook portions face away from each other, and the two hook projections face 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.

A further embodiment of this invention is the aforedescribed male closure element having a base portion which is resiliently bendable.

Another embodiment of this invention is a container including the aforedescribed male closure element.

This invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in a construction hereinafter set forth.

Brief Description of the Drawings

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 non-occluded closure fastening device in accordance with the prior art in a straddled position;

Fig. 3 is a sectional view of the closure fastening device of Fig. 2 in a misaligned position;

Fig. 4 is a sectional view of the closure fastening device of Fig. 2 in a properly aligned position just prior to occlusion;

Fig. 5 is a sectional view of the closure fastening device of Fig. 2 in an occluded position;

Fig. 6 is a sectional view of a male closure element in accordance with this invention.

Fig. 7 is a sectional view of a closure fastening device in accordance with this invention in a misaligned position;

Fig. 8 is a sectional view of a closure fastening device in accordance with this invention in a properly aligned position just prior to occlusion;

Fig. 9 is a sectional view of a closure fastening device in accordance with this invention in an occluded position.

Detailed Description Of the Invention

In carrying the invention into effect, certain embodiments have been selected for illustration in the accompanying drawings and for description in this specification, reference being had to Figs. 1 to 9.

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.

A prior art closure device is shown in the straddled, misaligned, properly aligned, and occluded positions in Figs. 2, 3, 4 and 5, respectively.

As shown in Fig. 2, a male profile portion 18 is connected to a flange portion 19 and includes a base portion 20, a pair of spaced-apart, parallelly disposed first webs 21 extending in a generally normal direction from the base portion 20, and male hook portions 22 extending from webs 21 and facing away from each other. The male hook portions each have a rounded crown surface 23, and 23', which generally serve to guide the hook portions for occlusion with the female hook portions of a mating closure element. A female profile portion 24 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 hook portions 28 extending from webs 27 and facing towards each other. The female hook portions each have a rounded crown surface 29, and 29', which serve to guide the hook portions for occlusion with the male hook portions of a mating closure element. Profile portions 18 and 24, shown in Fig. 2, 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.

As can be seen from Fig. 2, when a non-occluded closure fastening device in accordance with the prior art is in a straddle position, just prior to attempted occlusion, the web and hook portions of one of the closure elements will drop into the void or open channel between the web and hook portions of the other closure element and occlusion of the mating closure elements does not occur. This straddle position of the channel closure elements on a plastic bag results in the bag contents not being securely contained within the bag.

Fig. 3 depicts the non-occluded closure fastening device of Fig. 2 in a misaligned position just prior to attempted occlusion. When male profile portion 18 is misaligned with female profile portion 24 just prior to attempted occlusion of the interlocking closure fastening device, surface 23' of one of the two male hook portions 22 and surface 29' of one of the two female hook portions 28 are in a balance such that surface 23' and surface 29' can

slide either into an occluding position, as shown in Fig. 4, or into a straddling position, as shown in Fig. 2.

To assure occlusion of prior art interlocking closure fastening devices, the male profile portion 18 and female profile portion 24 must always be in proper transverse alignment just prior to attempted occlusion of the closure devices as shown in Fig. 4. That is, surfaces 23 and 23' of both male hook portions 22 should be in a laterally inward position with respect to surfaces 29 and 29' of both female hook portions 28. When contacting pressure is applied to interlocking closure fastening devices aligned in the position shown in Fig. 4, the male profile portion 18 and the female profile portion 24 are interlocked in the normally occluded position shown in Fig. 5.

In accordance with this invention, when outside surfaces 32 of the male hook portions 22' are contoured as shown in Figs. 6, 7, 8 and 9, it has been found that such a construction is more forgiving to misalignment and provides more positive guidance of the mating closure elements, and the elements engage more easily and accurately into the desired occluded position compared to prior art interlocking closure fastening devices.

In Fig. 6, the male profile portion 18' in accordance with this invention is disclosed in detail wherein hook projections 31 on hook portions 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 as previously shown in Fig. 2. 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 hook portions 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 5 mils and about 8 mils as measured between the dotted lines 33 shown in Fig. 6. 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 5 mils and about 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 hook portions 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 5 mils and about 10 mils as measured between the dotted lines 34 shown in Fig. 6.

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 60 mils and about 85 mils, and an occluded width of between about 95 mils and about 125 mils, the lengths of the hook portions of the male closure element are between about 5 mils and about 10 mils, and the lengths of the hook projections of the male closure element are between about 5 mils and about 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 hook portions and hook projections of the male closure element should be proportionately increased or decreased to maintain the relative proportions of the closure elements.

Fig 7 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. 7 that even though the male closure element and the female closure element are misaligned, as much as shown in Fig. 3, they will be guided into the desired occluding alignment by hook projections 31 extending toward each other from male hook portions 22' for ultimate interlocking occlusion.

In Fig. 8 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 inventive male profile portion 18' and the female profile portion 24 in the normally occluded position shown in Fig. 9.

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 manufacturing of the device but it also contributes to the physical flexiblity 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 passageway 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.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for alternative embodiments will occur to a person skilled in the art.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent is as follows:

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CLAIMS

1. A male closure element for an interlocking closure fastening device, said male closure element comprising a U-shaped channel element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs integrally attached to said base portion and extending therefrom, said webs terminating in hooks, said hooks comprising hook portions facing away from each other and hook projections facing toward each other.

2. A male closure element for an interlocking closure fastening device having an occluded height of between about 60 mils and about 85 mils, and a corresponding occluded width of between about 95 mils and about 125 mils, said male closure element comprising a U-shaped channel element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs integrally attached to said base portion and extending therefrom, said webs terminating in hooks, said hooks comprising hook portions facing away from each other and hook projections facing toward each other.

3. A male closure element in accordance with claim 2 wherein said hook projections have lengths, on a proportionate scale to the occluded height and occluded width of said interlocking closure fastening device, of between about 5 mils and about 20 mils, and preferably of between about 5 mils and about 8 mils.

4. A male closure element in accordance with claim 2 or 3 wherein said hook portions have lengths, on a proportionate scale to the occluded height and occluded width of said interlocking closure fastening device, of between about 5 mils and about 10 mils.

5. A male closure element in accordance with any one of the preceding claims wherein said base portion is resiliently bendable.

6. A male closure element in accordance with any one of the preceding claims wherein at least one of said webs is resiliently bendable.

7. A male closure element in accordance with any one of the preceding claims wherein at least one of said hooks is resiliently bendable.

8. A male closure element in accordance with any one of the preceding claims wherein said base portion is attached to a flange portion.

9. 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 comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to said base portion and extending therefrom, said webs terminating in hooks comprising hook portions facing away from each other and hook projections facing toward each other; said female closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly

disposed webs attached to said base portion and spaced to pass over said webs on said male closure element, wherein said webs on said female closure element terminate in hooks extending toward each other to engage said hooks on said male closure element.

10. An interlocking closure fastening device having an occluded height of between about 60 mils and about 85 mils, and a corresponding occluded width of between about 95 mils and about 125 mils, said 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 comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to said base portion and extending therefrom, said webs terminating in hooks comprising hook portions facing away from each other and hook projections facing toward each other; said female closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs attached to said base portion and spaced to pass over said webs on said male closure element, wherein said webs on said female closure element terminate in hooks extending toward each other to engage said hooks on said male closure element.

11. An interlocking closure fastening device in accordance with claim 10 wherein said hook projections have lengths, on a proportionate scale to the occluded height and occluded width of said interlocking closure fastening device, of between about 5 mils and about 20 mils, and preferably of between about 5 mils and about 8 mils.

12. An interlocking closure fastening device in accordance with claim 10 or 11 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 5 mils and about 10 mils.

13. An interlocking closure fastening device in accordance with any one of claims 9 to 12 wherein said base portion of said male closure element is resiliently bendable.

14. An interlocking closure fastening device in accordance with any one of claims 9 to 13 wherein said base portion of said female closure element is resiliently bendable.

15. An interlocking closure fastening device in accordance with any one of claims 9 to 14 wherein at least one of said webs of said male closure element is resiliently bendable.

16. An interlocking closure fastening device in accordance with any one of claims 9 to 15 wherein at least one of said webs of said female closure element is resiliently bendable.

17. An interlocking closure fastening device in accordance with any one of claims 9 to 16 wherein at least one of said hooks of said male closure element is resiliently bendable.

18. An interlocking closure fastening device in accordance with any one of claims 9 to 17 wherein at least one of said hooks of said female closure element is resliently bendable.

19. A container including two sidewalls and an interlocking closure fastening device comprising a female closure element and a male closure element formed to engage said female closure element in interlocking relationship, said male closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs integrally attached to said base portion and extending therefrom, said webs terminating in hooks comprising hook portions facing away from each other and hook projections facing toward each other; said female closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs integrally attached to said base portion and spaced to pass over said webs on said male closure element, wherein said webs on said female closure element terminate in hooks extending toward each other to engage said hooks on said male closure element.

20. A container including two sidewalls and an interlocking closure fastening device having an occluded height of between about 60 mils and about 85 mils, and a corresponding occluded width of between about 95 mils and about 125 mils, said interlocking closure fastening device comprising a female closure element and a male closure element formed to engage said female closure element in interlocking relationship, said male closure element including a profile portion comprising a base portion having a pair of spaced-apart, parallelly disposed webs integrally attached to said base portion and extending therefrom, said webs terminating in hooks comprising hook portions facing

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

21. A container in accordance with claim 20 wherein said hook projections have lengths, on a proportionate scale to the occluded height and occluded width of said interlocking closure fastening device, of between about 5 mils and about 20 mils, and preferably of between about 5 mils and about 8 mils.

22. A container in accordance with claim 20 or 21 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 5 mils and about 10 mils.

23. A container in accordance with any one of claims 19 to 22 wherein said base portion of said male closure element is resiliently bendable.

24. A container in accordance with any one of claims 19 to 23 wherein said base portion of said female closure element is resiliently bendable.

25. A container in accordance with any one of claims 19 to 24 wherein at least one of said webs of said male closure element is resiliently bendable.

26. A container in accordance with any one of claims 19 to 25 wherein at least one of said webs of said female closure element is resiliently bendable.

27. A container in accordance with any one of claims 19 to 26 wherein at least one of said hooks of said male closure element is resiliently bendable.

28. A container in accordance with any one of claims 19 to 27 wherein at least one of said hooks of said female closure element is resiliently bendable.

29. A container in accordance with any one of claims 19 to 28 wherein said female closure element is connected to a film forming one of said two sidewalls, and said male closure element is connected to a film forming the other of said two sidewalls.

30. A container in accordance with any one of claims 19 to 28 wherein said female closure element forms an integral part of one of said two sidewalls, and said male closure element forms an integral part of the other of said two sidewalls.

31. A container in accordance with any one of claims 19 to 28 wherein said female closure element includes a flange portion for attachment to one of said sidewalls.

32. A container in accordance with claims 19 to 28 or 31 wherein said male closure element includes a flange portion for attachment to the other of said side-walls.

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FIG. 1

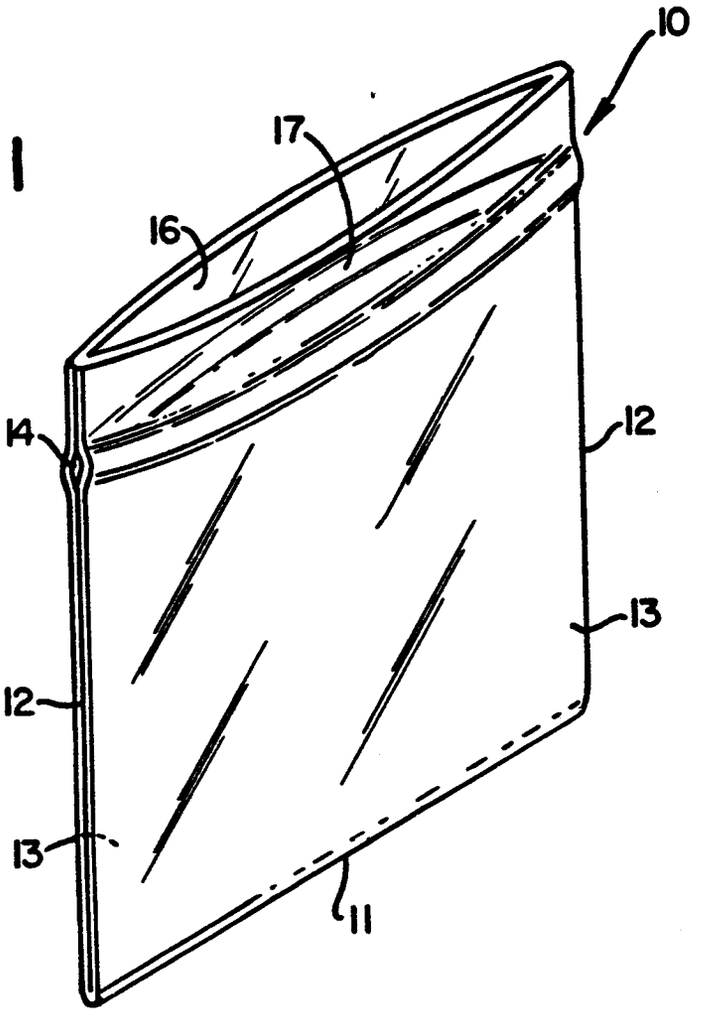
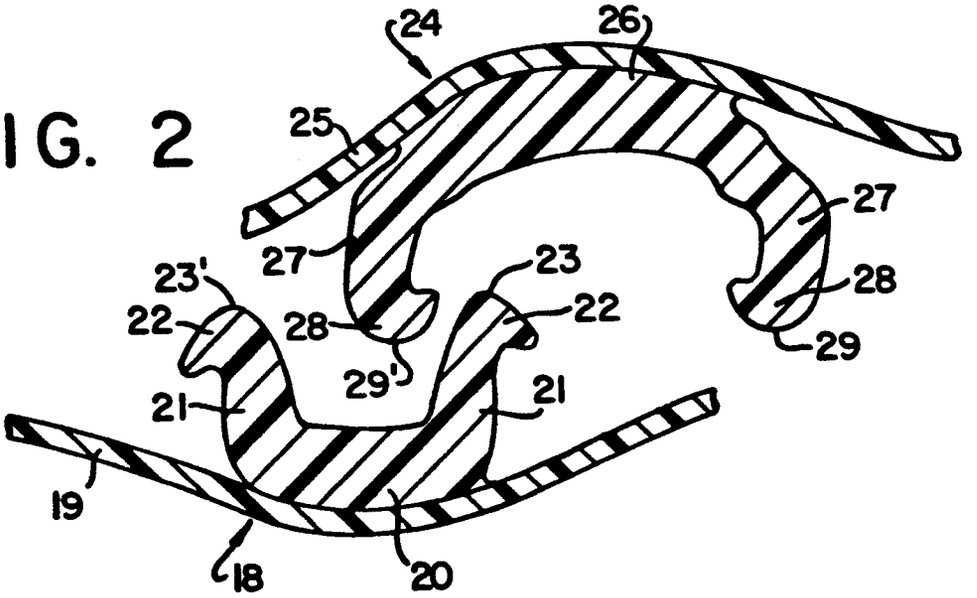


FIG. 2



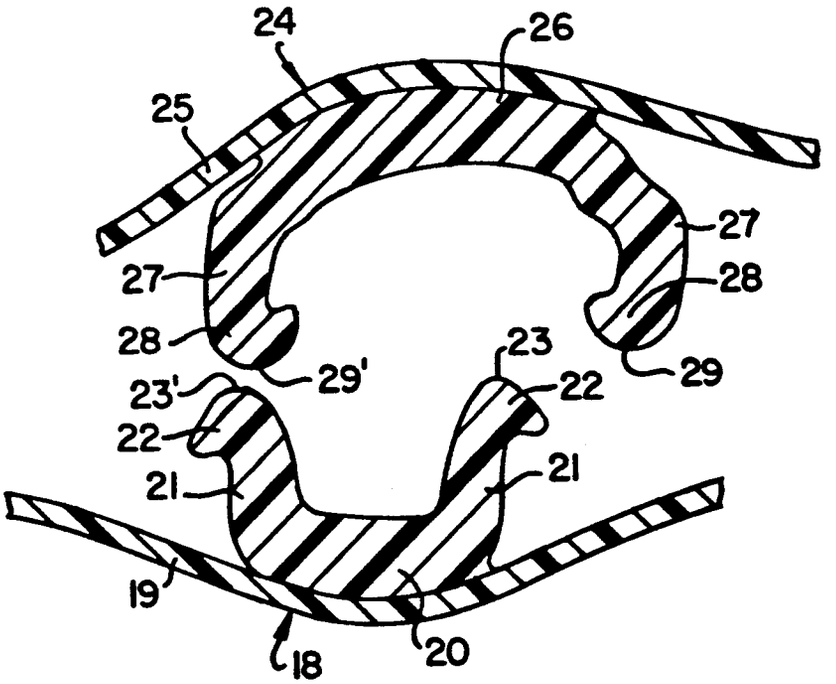

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FIG. 3

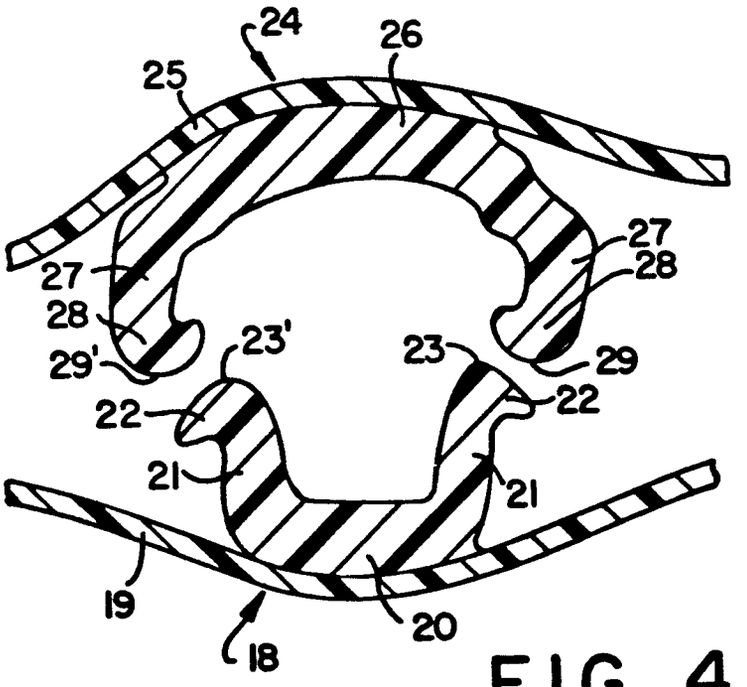
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FIG. 4

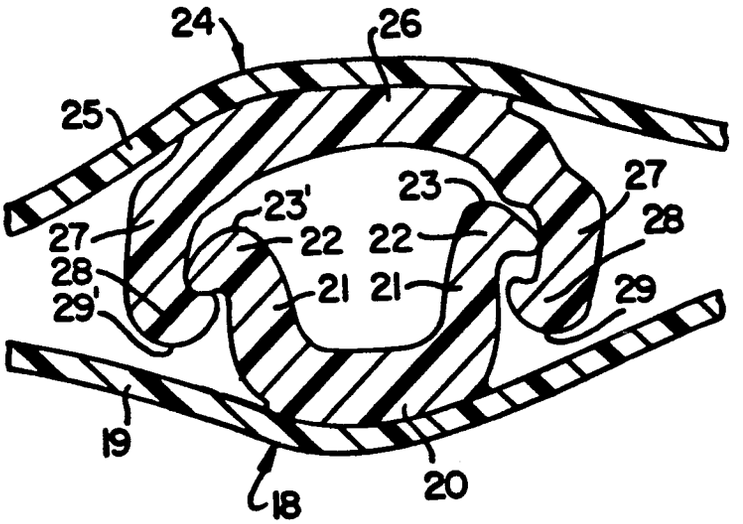
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FIG. 5

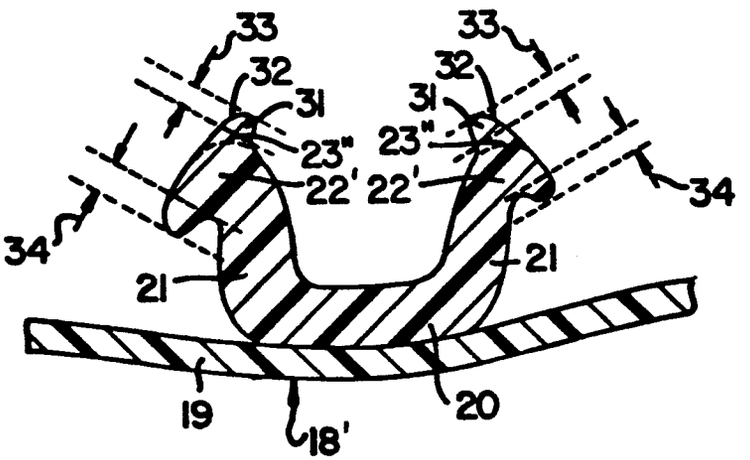
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FIG. 6

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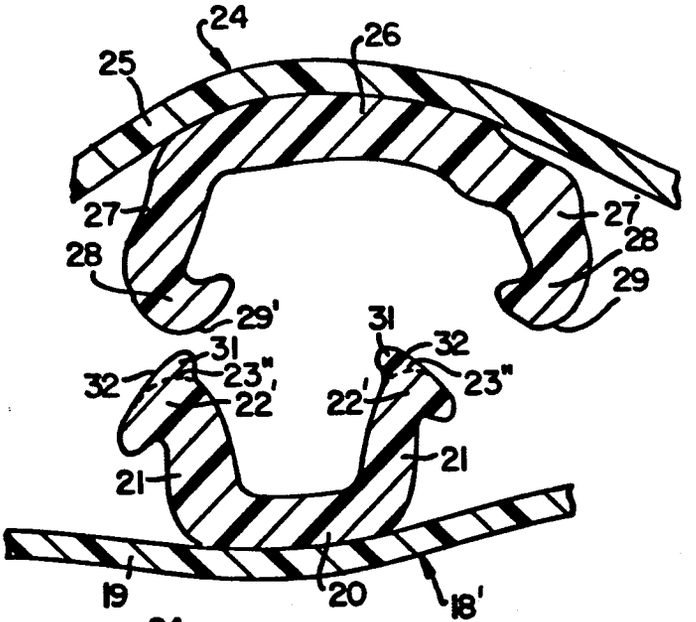
FIG. 7



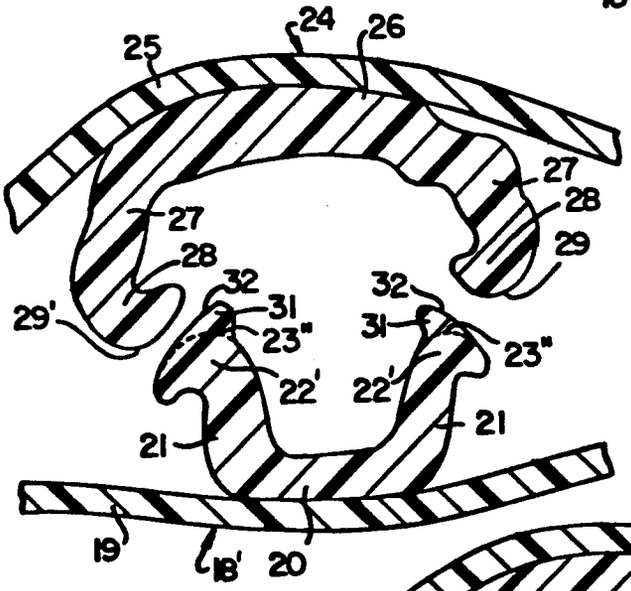
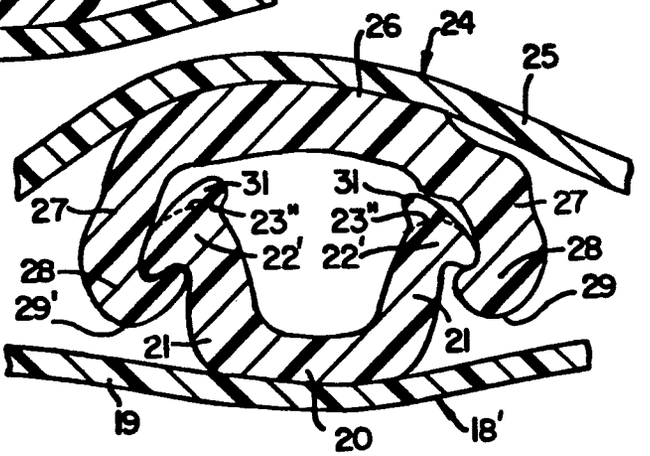


FIG. 8

FIG. 9



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Application number

EP 84 10 7590

European Patent Office

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	GB-A-2 017 813 (UNION CARBIDE) * claims 1,5-13,21,25-33; page 3, lines 4-10; figures 1-6c *	1,5-9, 13-19, 23-29, 30-32	B 65 D 33/16 // A 44 B 19/16
A	GB-A-1 307 672 (GOFFTON LTD.) * page 2, lines 37-55; page 3, lines 3-91; figures 1,2 *	1,6,7, 9,15-19,25-29	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 65 D
A 44 B
B 31 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	01-10-1984	BERRINGTON N.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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