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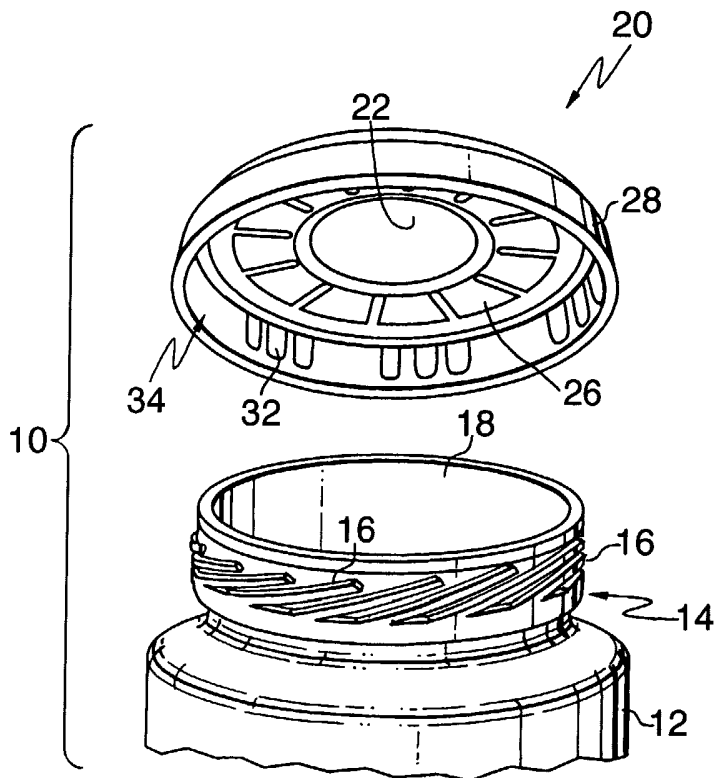
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(54) Title: GASKET FOR PRESS-ON TWIST-OFF CLOSURE



(57) Abstract: A container assembly including a container (12) with a finish portion (14) with at least one external thread (16) and a press-on, twist-off closure (20) mounted on the container (12). The closure (20) includes a panel (22) and a skirt (14) which together define a generally cylindrical interior recess (26). A deformable gasket (28) with a thread engaging portion (30) is mounted within the interior recess (26). The thread engaging portion (30) has a inwardly extending raised flutes (32) which are circumferentially spaced irregularly about the thread engaging portion (30). The length of each external thread (16) which is spanned by points of contact with one or more flutes (32) is known as the span length. As a result of the irregular spacing of the flutes (32), the sum of the span lengths of all of the external threads (16) is less than it would be were the flutes (32) spaced regularly. Accordingly, the amount of torque which is necessary to remove the closure (20) is reduced.

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GASKET FOR PRESS-ON TWIST-OFF CLOSURE

This invention relates to a closure of the type which may be applied to a helical threaded finish of a glass or rigid plastic container by a press-on action, but which may be normally removed from the finish of the container only by a twisting action. More particularly, this invention relates to a press-on, twist-off closure which is constructed and arranged to optimise torque which is required to remove the closure.

Closure caps of the press-on twist-off variety for glass or hard plastic containers are known and are in wide commercial use. Such closure caps provide an hermetic seal with the container for packing and holding hot-fill or cool food or beverage products such as baby food. Typically, such closure caps have a metallic body including a top panel and a depending skirt portion, both of which are lined with a deformable gasket material. This construction permits the closure caps to be pressed vertically downwardly onto the mouths of glass containers which are provided with circumferential bands of thread formations. The gaskets are formed of suitable plastomeric compounds such as plastisols, which are capable of taking cold flow sets under compression and thereby form thread formations which compliment or mate with those on the neck of the containers. The closure cap may then be removed by a consumer by twisting it like an ordinary twist off closure to unscrew it from the container.

Conventional closure caps of the press-on twist-off variety tend in many cases to be difficult to open for some consumers because of the amount of torque which is required to remove the closure cap from the container. In an attempt to address this issue, certain closure caps which are in commercial use are provided with equally spaced flutes of raised gasket material on the inside of the depending skirt portion of the closure, which is intended to reduce the amount of contact surface between the gasket and the container threads. In actual practice, however, such closures do not always provide the desired removal torque.

This invention aims to provide an improved closure cap of the press-on twist-off variety which is configurable so as to permit a significant reduction in the amount of torque which is required to remove the closure cap from a container, without compromising the quality of the hermetic seal which is formed with the container during packaging.

5 According to the present invention, there is provided a press-on, twist-off closure for a container having at least one external thread on a finish portion thereof, the closure comprising: a panel, a skirt depending downwardly from the panel, the skirt and the panel together defining a generally cylindrical interior recess; and a deformable gasket having a thread engaging portion and being mounted within the skirt, the thread engaging portion comprising a plurality of raised
10 flutes which are integral with the deformable gasket; in which the raised flutes are arranged in a plurality of separate groups about an inner circumference of the thread engaging portion, each of the separate groups containing at least two flutes; and in which a circumferential distance between any two adjacent groups is greater than a circumferential distance between any two adjacent flutes within a group, so that when mounted on a container, the total span of contact of
15 the flutes across individual external threads of the container will be less than if the flutes were evenly spaced.

 According to a further aspect of the present invention, there is provided a container assembly comprising: a container having a finish portion with at least one external thread defined thereon; and a press-on, twist-off closure including a panel and a skirt depending downwardly
20 from the panel, the skirt and panel together defining a generally cylindrical interior recess, and a deformable gasket mounted within the interior recess, the deformable gasket having a thread engaging portion which is deformed so as to at least partially conform to the external threads of the finish portion of the container; in which the thread engaging portion has a plurality of inwardly extending raised flutes, at least some of which contact external threads of the container,
25 such that the contact points between each external thread and the flutes extend over a span length

along the surface of the thread; and in which the sum of the span lengths of all the external threads is less than the internal circumference of the thread engaging portion.

It is believed that by avoiding equal and symmetrical spacing of the flutes, the closure of the present invention limits contact with the embedded glass container threads to that required to form an hermetic seal, whilst significantly reducing opening torque requirements.

The flutes may be irregularly spaced around the circumference of the thread engaging portion. The flutes may be arranged in a plurality of groups, each of the groups containing more than one flute. A circumferential distance between any two adjacent groups is preferably greater than a circumferential distance between any two adjacent flutes within a group. Typically, a plurality of the groups contain at least three flutes.

In an alternative aspect of the invention, there is provided a container assembly comprising a container having a finish portion with at least one external thread defined thereon; and a press-on, twist-off closure including a panel and a skirt depending downwardly from the panel, the skirt and panel together defining a generally cylindrical interior recess, and a deformable gasket mounted within the interior recess, the deformable gasket having a thread engaging portion which is deformed so as to at least partially conform to the external threads of the finish portion of the container; in which the thread engaging portion has a plurality of inwardly extending raised areas, at least some of which contact external threads of the container, such that the length of the contact between each raised area and external thread corresponds to a span length along the surface of the thread; and in which the sum of the span lengths of all the external threads is less than the internal circumference of the thread engaging portion.

According to yet another aspect of the present invention, there is provided a method of making a container assembly comprising steps of (a) providing a container having a finish portion with at least one external thread defined thereon; (b) providing a press-on, twist-off type closure including a panel and a skirt, which together define a generally cylindrical interior recess, and a deformable gasket mounted within the interior recess, the gasket having a thread engaging

portion with a plurality of inwardly extending raised flutes; and (c) pressing the closure onto the container so that at least some of the flutes contact external threads of the container, such that contact points between each external thread and flutes extend over a span length along the surface of the thread, and the sum of the span lengths of all the external threads is less than the
5 internal circumference of the thread engaging portion.

Preferred embodiments of the invention are now described, by way of example only, with reference to the drawings, in which:

FIGURE 1 is a fragmentary perspective view of a container assembly which is constructed according to a first embodiment of the invention;

10 FIGURE 2 is a fragmentary cross-sectional view depicting one area of the container assembly which is shown in FIGURE 1;

FIGURE 3 is a fragmentary perspective view of a container assembly which is constructed according to a second embodiment of the invention; and

15 FIGURE 4 is a diagrammatic view depicting advantageous operation of the container assembly which is depicted in FIGURE 1.

Referring now to the drawings, in which like reference numerals designate corresponding structures throughout the views, and referring in particular to FIGURE 1, a container assembly 10 which is constructed according to a first embodiment of the invention includes a container 12 which is conventional in construction and which includes a finish portion
20 14 having at least one external thread 16 integrally moulded into an external surface thereof. The finish portion 14 defines an opening 18 which provides access to the container 12.

Container assembly 10 further includes a closure 20 which has an upper panel 22 and, as is best shown in FIGURE 2, a skirt 24 which depends downwardly from the upper panel 22 and together with the upper panel 22 defines a generally cylindrical internal recess 26 which is
25 sized and shaped to receive the threaded finish or neck 14 of the container 12. As may be seen in FIGURES 1 and 3, a deformable gasket 28, which is preferably fabricated from a material such

as plastisol, is mounted within the recess 26 and includes a thread engaging portion 30 which is attached to an internal surface of the skirt 24.

In the first embodiment of the invention which is depicted in FIGURE 1, the thread engaging portion 30 has integrally moulded therein a plurality of inwardly extending raised flutes 32, which are arranged in groups 34. In the illustrated embodiment, six groups 34 of flutes are evenly spaced about the inner circumference of the thread engaging portion 30, each group 34 containing three flutes 32. As may be seen in FIGURE 1 and in FIGURE 4, the circumferential distance between the adjacent groups 34 of flutes 32 is greater than the circumferential distance between any of the flutes 32 within any of the groups 34. Looking briefly to FIGURE 4, which is a diagrammatic depiction in which circumferential distance about the inner surface of the thread engaging portion 30 is represented as a horizontal linear distance, it will be seen that the various flutes 32 make contact with the different threads 16 on the finish portion 14 of the container 12 at a number of different contact points 50. Each external thread has a total distance which is spanned by these points of contact within the thread 16. According to one advantageous aspect of the invention, it has been found that removal torque is reduced to an optimal level when the aggregate distance spanned which is a sum of the total distance spanned for all of the external threads 16 is less than the internal circumference of the thread engaging portion 30.

This aspect of the invention will become more apparent as a result of the description of one prototype which is described below.

A prototype of the container assembly 10 was fabricated with a container 12 which had a nominal industry sizing of 51 mm. Accordingly, the inner circumference of the thread engaging portion 30 of the closure 20 was about 160 mm. As may be seen in FIGURE 4, the prototype was provided with a thread engaging portion 30 which included six groups 34 of flutes 32, which are respectively numbered as groups 1-6. The container 12 at a finish portion 14 which had 10 different threads 16 defined thereon. A first thread contacted all three flutes 32 and the first group 34, and had a span length 52 of 16 mm along the surface of the first thread 16. A second

thread contacted only the second two flutes 32 of the second group and spanned a distance (span length) 54 of 9 mm. A third thread contacted the second two flutes 32 in the second group, spanning a distance 56 of 9 mm. A fourth thread contacted all three flutes in the third group, spanning a distance 58 of 16 mm. A fifth thread contacted the last flute of the third group and the first flute of the fourth group, and spanned a distance 60 of 14 mm. A sixth thread contacted all three flutes within the fourth group, spanning a distance 62 of 16 mm. A seventh thread contacted only the second two flutes within the fifth group, spanning a distance 64 of 9 mm. An eighth thread contacted the last two flutes in the fifth group, spanning a distance 66 which was also 9 mm. A ninth thread contacted all three flutes in the sixth group, spanning a distance 68 of 16 mm. A tenth thread contacted the last flute in the sixth group and the first flute in the first group, spanning a distance 70 of 14 mm.

For this prototype, the aggregate distance spanned, which is a sum of the total span lengths of all of the external threads 16, was about 128 mm, or an average of 12.8 mm per thread. In contrast, it has been determined that a closure of identical construction but with the flutes 32 evenly spaced about the inner periphery of the thread engaging portion would create a total distance spanned about 175 mm, which is an average of 17.5 mm per thread. Accordingly, spacing the flute members 32 in groups according to the invention permits a significant reduction in the total distance spanned, which has been found to correlate with a significant reduction in the torque which is necessary for a consumer to open the container assembly 10.

A container assembly 40 which is constructed according to a second, alternative embodiment of the invention is depicted in FIGURE 3. Container assembly 40 is identical in all respects to the container assembly 10 described above except that it includes a closure 42 having a gasket 44 which includes a plurality of integrally moulded raised areas 46. The raised areas 46 may correspond in position to the groups 34 of flutes 32 in the previously described embodiment, and are constructed and arranged to contact at least one of the external threads 16 of the finish portion 14 of the container 12 at respective lengths of contact. Each external thread will thus

have a total distance spanned by a sum of such lengths of contact as well as distances spanned by adjacent raised areas on the thread. This may be thought of as conceptually corresponding to the total distance spanned in the previously described embodiment. Preferably, in this embodiment, the aggregate distance spanned which is a sum of the total distance spanned for all of the external
5 threads is less than an internal circumference of the thread engaging portion.

In a method according to the invention, a closure such as the closure 20 or the closure 42 described above will be pressed onto a container 12 in the conventional manner after the container 12 has been filled with product in a packaging facility.

CLAIMS:

1. A press-on, twist-off closure (20) for a container (12) having at least one external thread (16) on a finish portion (14) thereof, the closure comprising:
 - a panel (22);
 - a skirt (24) depending downwardly from the panel (22), the skirt (24) and the panel (22) together defining a generally cylindrical interior recess (26); and
 - a deformable gasket (28) having a thread engaging portion (30) and being mounted within the skirt (24), the thread engaging portion (30) comprising a plurality of raised flutes (32) which are integral with the deformable gasket (28);
 - in which the raised flutes (32) are arranged in a plurality of separate groups (34) about an inner circumference of the thread engaging portion (30), each of the separate groups (34) containing at least two flutes (32);
 - and in which a circumferential distance between any two adjacent groups (34) is greater than a circumferential distance between any two adjacent flutes (32) within a group, so that when mounted on a container the total span of contact of the flutes (32) across individual external threads (16) of the container (12) will be less than if the flutes (32) were evenly spaced.
2. A closure according to claim 1, in which the panel and skirt are of metal.
3. A container assembly (10), comprising:
 - a container (12) having a finish portion (14) with at least one external thread (16) defined thereon; and
 - a press-on, twist-off closure (20) including a panel (22) and a skirt (24) depending downwardly from the panel (22), the skirt and panel together defining a generally cylindrical interior recess (26), and a deformable gasket (28) mounted within the interior recess (26), the

deformable gasket having a thread engaging portion (30) which is deformed so as to at least partially conform to the external threads (16) of the finish portion (14) of the container;

in which the thread engaging portion (30) has a plurality of either inwardly extending flutes (32), at least some of which contact external threads (16) of the container, such that the length of the contact between each external thread and the flutes, extend(s) over a span length along the surface of the thread;

and in which the sum of the span lengths (52, 54, 56, 60, 62, 64, 66, 68, 70) of all the external threads is less than the internal circumference of the thread engaging portion (30).

4. A container assembly according to claim 3, in which the flutes (32) are irregularly spaced around the circumference of the thread engaging portion.
5. A container assembly according to claim 3 or claim 4, in which the flutes (32) are arranged in a plurality of groups (34), each of the groups containing more than one flute.
6. A container assembly according to claim 5, in which a circumferential distance between any two adjacent groups (34) is greater than a circumferential distance between any two adjacent flutes (32) within a group.
7. A container according to claim 5 or claim 6, in which a plurality of the groups contain at least three flutes.
8. A container assembly (10), comprising:
 - a container (12) having a finish portion (14) with at least one external thread (16) defined thereon; and

a press-on, twist-off closure (20) including a panel (22) and a skirt (24) depending downwardly from the panel (22), the skirt and panel together defining a generally cylindrical interior recess (26), and a deformable gasket (28) mounted within the interior recess (26), the deformable gasket having a thread engaging portion (30) which is deformed so as to at least partially conform to the external threads (16) of the finish portion (14) of the container;

in which the thread engaging portion (30) has a plurality of inwardly extending raised areas (46), at least some of which contact external threads (16) of the container, such that the length of the contact between each raised area (46) and external thread, corresponds to a span length along the surface of the thread;

and in which the sum of the span lengths (52, 54, 56, 60, 62, 64, 66, 68, 70) of all the external threads is less than the internal circumference of the thread engaging portion (30).

9. A method of making a container assembly (10), comprising steps of:

(a) providing a container (12) having a finish portion (14) with at least one external thread (16) defined thereon;

(b) providing a press-on, twist-off type closure (20) including a panel (22) and a skirt (24), which together define a generally cylindrical interior recess (26), and a deformable gasket (28) mounted within the interior recess (24), the gasket (28) having a thread engaging portion (30) with a plurality of inwardly extending raised flutes (32); and

(c) pressing the closure onto the container so that at least some of the flutes (32) contact external threads (16) of the container, such that contact points (50) between each external thread and flutes extend over a span length along the surface of the thread, and the sum of the span lengths (52, 54, 56, 60, 62, 64, 66, 68, 70) of all the external threads is less than the internal circumference of the thread engaging portion (30).

Fig. 1.

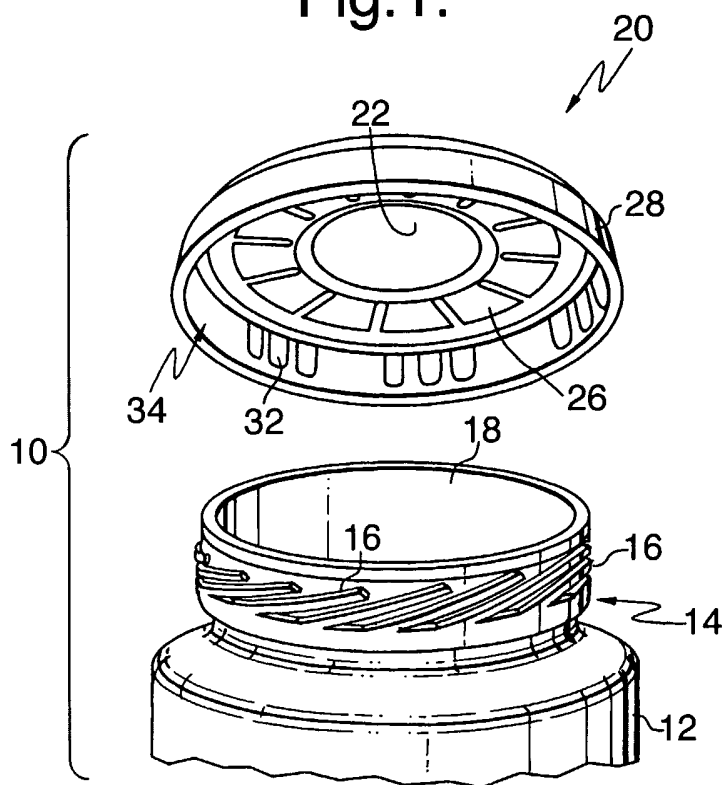


Fig.2.

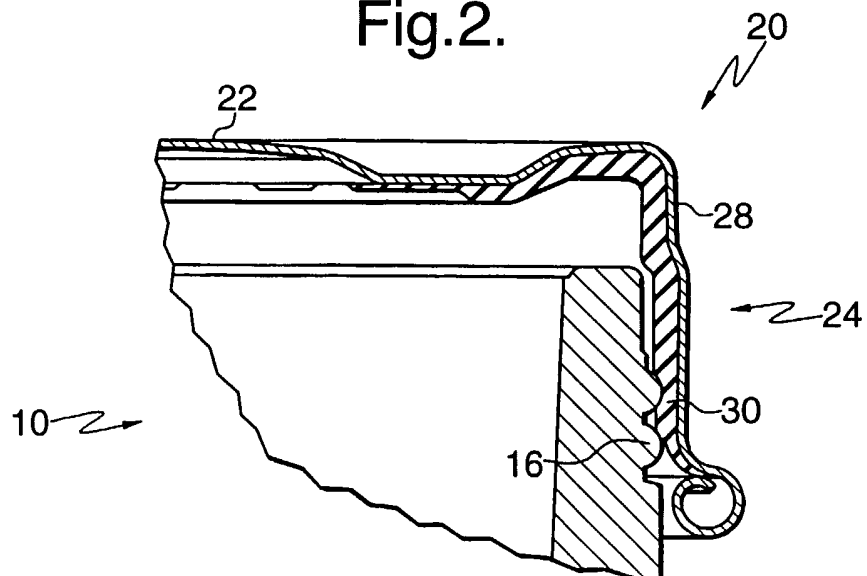


Fig.3.

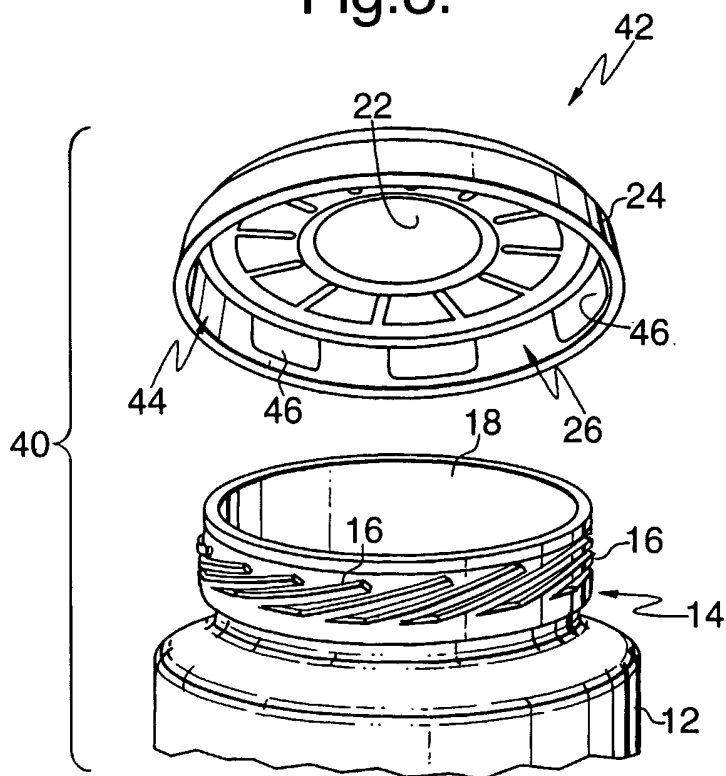
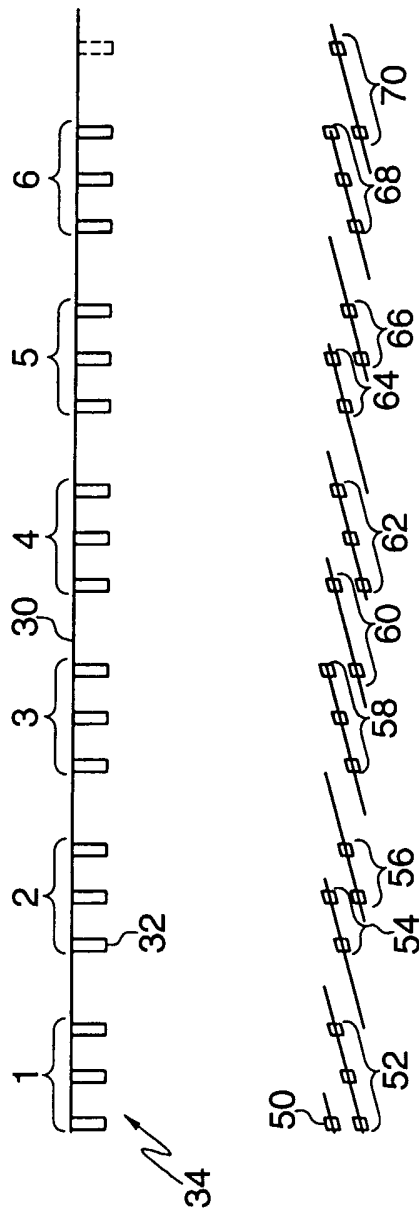


Fig.4.



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	FR 2 026 939 A (CONTINENTAL CAN CO) 25 September 1970 (1970-09-25) page 2, line 8 -page 3, line 33; figures -----	1-9

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search 6 September 2002	Date of mailing of the international search report 13/09/2002
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Olsson, B

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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