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PCT
ENTRADA EN FASE NACIONAL

21 oct 2007

SOLICITUD DE:

1

☒

Patente de Invención

☐ Patente de Modelo de Utilidad

☐ Capítulo I.

☒

Capítulo II.

2

SOLICITANTE
(71)

Nombre: **INDUSTRIE ILPEA S.P.A.**
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Nombre: **DE GIORGI, Marco**
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Nacionalidad o Domicilio: **ITALIA**

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Solicitud Internacional No. **PCT/EP2006/060876**
Publicación Internacional No. **WO 2006/100220 A1**

Fecha: **20 MARZO 2006**
Fecha: **28 SEPTIEMBRE 2006**

6

Título (54)

JUNTA DE SELLO DOBLE PARA GABINETES DE REFRIGERADOR CON PROPIEDADES DE AISLAMIENTO DE CALOR ALTO

7

Clasificación Internacional (51): **F25D 23/08 (2006.01)**

8

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ITALIA

21/03/2005

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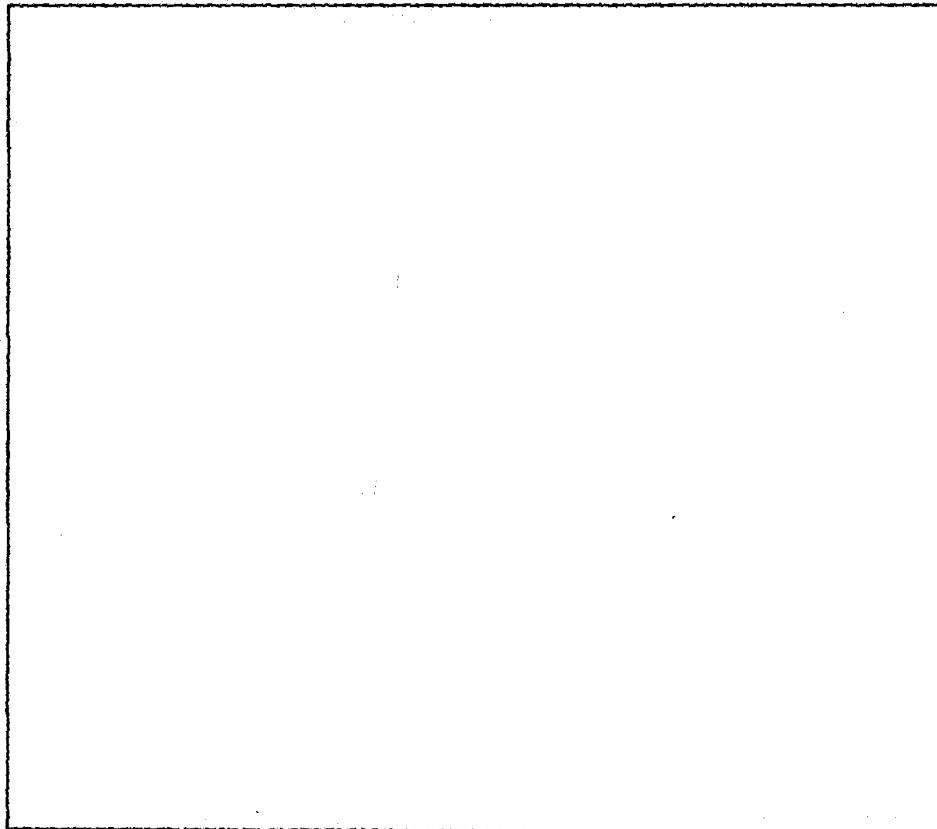
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Fecha: **OCTUBRE 18/2007**

11/877,094

- ☒ Comprobante de pago de la tasa de presentación de la solicitud **\$482.000.00**
- ☒ Comprobante de pago por reivindicación de prioridad **\$135.000.00**
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica
- ☐ Poderes, si fuere el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
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- ☐ Arte final 12x12
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante. relacionadas parcial o totalmente con la invención de esta solicitud
- ☐ De ser el caso, modificaciones efectuadas a la solicitud internacional
- ☐ Otros

11

FIGURA CARACTERISTICA:

12

Solicito la concesión de la Patente, NOMBRE: DORA MARIA GOMEZ DIAZ

FIRMA:

C.C.: 52'145.354 Bogotá

T.P.: 95.718 C.S.J.



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21 oct 2008

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***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
DORA MARIA GOMEZ	CONSIGNACION	BANCO POPULAR	050-00110-6	57477993	18/10/2007	482,000.00
DORA MARIA GOMEZ	CONSIGNACION	BANCO POPULAR	050-00110-6	57477994	18/10/2007	135,000.00

***** CONCEPTO *****

NT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	482,000.00
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SON: CUATROCIENTOS OCHENTA Y DOS MIL PESOS

RESPONSABLE :

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NIT : 800176089-2

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FECHA : OCTUBRE 18 DE 2007

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DORA MARIA GOMEZ	CONSIGNACION	BANCO POPULAR	050-00110-6	57477994	18/10/2007	135,000.00

***** CONCEPTO *****

CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	82 INVOCACION DE UNA PRIORIDAD EN NU
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SON: CIENTO TREINTA Y CINCO MIL PESOS

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DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU,
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LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ,
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US, UZ, VC, VN, YU, ZA, ZM, ZW.

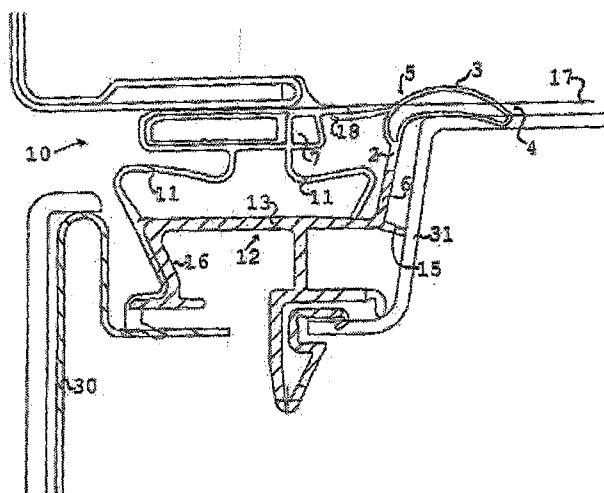
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ZM, ZW), Patente Eursiática (AM, AZ, BY, KG, KZ, MD, RU,
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- Con reporte de búsqueda internacional.
- Antes de la expiración del tiempo límite para enmendar las
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enmiendas.

Para códigos de dos letras y otras abreviaciones, consulte "Notas
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cada emisión regular de la Gaceta del PCT.

(54) Título: JUNTA DE SELLO DOBLE PARA GABINETES DE REFRIGERADOR CON PROPIEDADES DE AISLAMIENTO DE CALOR ALTO



(57) Resumen: Se describe una junta para gabinetes de refrigerador del tipo que incluye una porción tipo fuelle para sellar el área entre un gabinete y la puerta, extendiéndose así desde una porción base capaz de acoplar una puerta externa y/o una puerta interna del gabinete de refrigerador, en donde la porción base es sustancialmente rígida y en donde en un extremo de ésta, hay un medio hecho de material sustancialmente suave, que se extiende hacia la puerta interna, el material tiene buenas características flexibles y de recuperación elástica cuando se expone a las temperaturas del refrigerador y del congelador, capaz de sellar adicionalmente, preferiblemente por compresión, el espacio ubicado entre el gabinete y la puerta interna en un área más interna del gabinete de refrigerador, en donde el medio de sellado es independiente y libre de dificultades con respecto a la porción tipo fuelle suave.

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JUNTA DE SELLO DOBLE PARA GABINETES DE
REFRIGERADOR CON PROPIEDADES DE AISLAMIENTO DE
CALOR ALTO

5 **Campo de la Invención**

La presente invención se refiere a una junta para gabinetes de refrigerador del tipo que incluye una porción tipo fuelle suave para sellar el área entre un gabinete y una puerta, así como una porción base capaz de ajustar la puerta externa y/o la puerta
10 interna del gabinete de refrigerador, en donde la cubierta es definida por la puerta externa y la puerta interna se rellena con material termoaislante.

Antecedentes de la Invención

Las juntas de tal clase, por ejemplo, se describen en los
15 documentos EP 146994, EP 319087 y EP 1129319 del Solicitante de la presente. Por ejemplo, con referencia a lo anterior, una junta conocida capaz de sellar el área entre la puerta externa 30 y el gabinete 17 de un refrigerador, es del tipo representado en la figura A de los dibujos anexos, comprenden un extremo de
20 porción de sellado del tipo fuelle suave con una sección de expansión con un perfil magnético conectado a una base proporcionada con una pata de aseguramiento que se coloca dentro de un receptáculo especial de la puerta interna 31. El
aislamiento de calor en este tipo de junta, usado actualmente en
25 refrigeradores, se logra a través del contacto del perfil magnético

de la junta a lo largo del perímetro entero del gabinete de refrigerador 17 y a través de la cámara tubular, o globo (también parte del fuelle), con la puerta interna 31 y el gabinete 17.

Sin embargo, especialmente con los congeladores o refrigeradores combinados que operan a temperaturas bajas de 0°C, las juntas conocidas del tipo descrito en la figura A tienen desventajas serias, puesto que la operación de los fuelles es alterada por la pérdida de flexibilidad de su estructura plástica, PVC normalmente plastificado, debido al aire a presión baja (que puede disminuir a aproximadamente -25°C) que entra directamente en contacto con la junta a través del espacio localizado entre el gabinete y la puerta interna que, en el área al lado de la junta, se indica con 4 en la figura A.

Por otra parte, la posible falta de nivelación de la zona del gabinete de refrigerador, en la cual la parte magnética de los sellos de junta puede causar pérdidas de energía y formaciones de hielo en el caso de que no haya contacto entre la junta y el gabinete del mismo.

Breve Descripción de la Invención

Comparando tales sistemas de sellado conocidos, la presente invención ofrece mejorar considerablemente la eficacia térmica de la aplicación refrigerante, mediante la reducción de su consumo de energía y de la formación de hielo dentro de ella, reduciendo drásticamente la transmisión de calor entre la parte fría exterior e interior que puede ocurrir alrededor del perímetro

de sellado entero entre la puerta y el gabinete. El propósito de la invención también es mantener una funcionalidad ideal del elemento de sellado principal de la junta, es decir, el fuelle extensible, permitiendo que opere a temperaturas elevadas comparadas a las del refrigerador.

Para lograr tales objetivos, así como otras ventajas que se describirán más adelante, la presente invención proporciona una junta para los gabinetes de refrigerador del tipo que incluye una porción del tipo fuelle suave para sellar el área entre el gabinete y la puerta, extendiéndose desde una porción base capaz de acoplar la puerta externa y/o la puerta interna del gabinete de refrigerador, en donde la porción base es sustancialmente rígida y en un extremo de ella opuesto a la puerta interna 31, un medio hecho de material sustancialmente suave se extiende para sellar el espacio ubicado entre el gabinete y la puerta interna, en donde el medio de sellado están independiente y libre de dificultades con respecto a la porción del tipo fuelle suave.

En la junta de acuerdo a la invención, la porción de tipo fuelle suave, que funciona preferiblemente, pero no necesariamente, expandida por extractor magnético, permite que la puerta se cierre para comprimir el medio hecho sustancialmente de material suave, de tal modo se sella el espacio ubicado entre el gabinete y la puerta interna.

Para entender mejor las características y ventajas de la invención, los ejemplos no limitantes de las modalidades

prácticas serán descritos de aquí en adelante con referencia a las figuras en los dibujos anexos. Se aclara que en estos dibujos la junta de la invención está, sin limitación, de tipo magnético y se muestra en una posición de operación trabajando junto con el gabinete, la puerta externa y la puerta interna del refrigerador.

Breve Descripción de los Dibujos

Las figura A, según lo mencionado anteriormente, se aplica a la técnica anterior.

La figura 1 muestra una vista en sección transversal de una junta de acuerdo a la invención.

Las figuras 2-8 muestran una sección transversal similar de un número correspondiente de las modalidades de la junta de acuerdo a la invención.

La figura 9 muestra una vista en sección transversal de una encarnación de acuerdo a la invención, de una junta monoextruída, que se extruye en un material.

Descripción Detallada de la Invención

Con referencia a tales dibujos, la junta 10 de la invención incluye una porción de fuelle suave 11, por ejemplo PVC plastificado o similares, coextruída con una porción base 12 hecha de, por ejemplo, PVC rígido. La porción de fuelle 11 es preferiblemente de tipo magnético, terminada en la parte superior con una hendidura 8 capaz de contener una tira o sección hecha de material magnético. En todas las modalidades descritas previamente, a excepción de una de la figura 8, en la porción de

fuelle 11 desde la hendidura 8, hay una cámara sellada por compresión tubular, o en forma de globo 7 colocada al lado y hacia la puerta interna 31. En las modalidades (las figuras 1, 2, 3, 4, 5), la porción base 12 de la junta 10 tiene una sección con forma de U invertida según lo descrito en la Solicitud de Patente MI2005A000121 del Solicitante en la presente. Tal sección es definida por una sección horizontal 13 y por un par de secciones verticales, una de las cuales es operacionalmente externa 16 para acoplar la puerta externa 30, un extremo de metal de lamina doblado con una superficie plana 9, mientras que la otra es operacionalmente interna 19 para acoplar la puerta interna 31. Con este propósito, la sección 16 termina con una pata 20 usada para acoplar la superficie plana 9 en la puerta externa 30, mientras que la sección 19 termina con una pata 21, desde la cual una sección vertical 22 se extiende internamente con un medio de aseguramiento de cierre por presión 23, por interposición de un codo suave 24, con el extremo de la puerta interna 31, por ejemplo según lo descrito en los documentos EP 146994 y EP 319087 del Solicitante de la presente.

En la junta 10, el material suave de la porción 11 se coextruye con el material rígido de la porción 12 a lo largo de la longitud completa de la sección 16 y finaliza con un reborde 25 que es conveniente para sellar operacionalmente la superficie plana 9 de la puerta externa 30 para prevenir la fuga de material termoaislante, por ejemplo espuma de poliuretano, en la fase de

relleno final de la cubierta de la puerta. Para tales propósitos de sellado, se requieren rebordes coextruídos suaves adicionales, es decir 27 en el medio de aseguramiento 23 y 28 en la pata 21 de la base de la junta. En la modalidad mostrada en la figura 6, la junta 10 tiene una porción base 12 que consiste sustancialmente de una sección en forma de T en la cual una sección vertical 32, que termina con rebordes 33 hechos de material suave coextruído, se extiende hacia la puerta interna desde una sección horizontal 13. Tal estructura consiste de un medio de aseguramiento para la puerta interna 31, que se hace específicamente en la forma de un receptáculo hueco 34 para alojar la sección vertical 32 y para acoplarla firmemente debido a la acción de los rebordes suaves 33 que se doblan, de tal modo se sella firmemente las paredes del receptáculo hueco 34. Incluso en tal modalidad, en la junta 10, el material suave de la porción 11 está coextruído con el material rígido de la porción 12 a lo largo de toda la longitud de la sección 16 y finaliza con un reborde 25 que es conveniente para sellar operacionalmente la superficie plana 9 de la puerta externa 30 a modo de prevenir la fuga de material termoaislante en la fase de relleno final de la cubierta de la puerta.

En la modalidad mostrada en la figura 7, la junta 10 de acuerdo a la invención se proporciona con una base rígida 12, coextruída con una porción de tipo fuelle suave 11 del tipo descrito en las Patentes EP0905464 y PCT/EP02/00668 del

Solicitante de la presente, que se incorporan por referencia. La base rígida es sustancialmente una sección en forma de C que se puede extender hacia fuera y puede ajustar la puerta interna en sistemas de montaje automatizados.

En la modalidad mostrada en la figura 8, la junta 10 de acuerdo a la invención se proporciona con una base rígida 12, coextruída con una porción de tipo fuelle 11 según lo descrito en la Patente PCT/EP02/10606 del Solicitante de la presente, que es incorporada por referencia. Es sustancialmente una base rígida con una sección Omega hembra complementaria a una sección macho similar obtenida en la puerta interna para el ajuste por compresión e interferencia.

En la modalidad mostrada en la figura 9, la junta 10 de acuerdo a la invención es similar estructuralmente a la de la figura 6, proporcionada con un medio de aseguramiento para la puerta interna 31 hecha específicamente en la forma de un receptáculo hueco 34 para alojar la sección vertical 32, pero se logra en la presente por extrusión en un material suave (por lo tanto monoextruído), del tipo usado para la porción de fuelle 11, así se aumenta convenientemente el espesor de la porción base 12 para que la anterior se pueda obtener suficiente rigidez debido al espesor de gran tamaño en las secciones verticales 16 y 6 y en la sección horizontal 13.

De acuerdo a la presente invención, sin importar la modalidad específica, la porción base rígida 12 - en el extremo de

la sección horizontal 13, opuesta operacionalmente a la puerta interna 31 – se curva vertical u oblicuamente de acuerdo a una sección 6 que sigue sustancialmente el perfil de la puerta interna, donde hay un medio 5 hecho de material sustancialmente suave capaz de sellar el espacio 4 ubicado entre el gabinete 17 y la
5 puerta interna 31, el medio de sellado es independiente y libre de limitaciones con respecto a la porción de tipo fuelle suave 11, según lo especificado mejor de aquí en adelante con la descripción de cada modalidad única.

10 En el área en la cual la base rígida 12 se forma de acuerdo a la sección 6, hay un reborde 15 hecho de material suave usado como un medio de sellado adicional, que se extiende operacionalmente hacia la puerta interna 31 que ayuda a la colocación de la junta u, opcionalmente, a contener la espuma de
15 poliuretano en caso de que haya pasado a través de la cámara ubicada debajo de ella.

En la modalidad mostrada en la figura 1, el medio de sellado 5 está coextruído en el material suave con respecto a la sección 6 de la base 12 y comprende una sección de extensión 2 de la
20 sección rígida 6 donde hay una cámara tubular, o en forma de globo, 3 con una sección alargada sustancialmente complementaria a la del espacio 4 para sellar tal espacio, deformándose a través de la compresión en el borde del gabinete 17 cuando la puerta, y la puerta interna 31, se cierran. El medio
25 de sellado 5 es completado por un elemento de sellado tubular 14

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que se extiende desde la sección 2 hacia la puerta interna.

En la modalidad mostrada en la figura 2, el medio de sellado 5 difiere de la modalidad anterior debido a la presencia de un reborde de sellado 18 que se extiende operacionalmente hacia el
5 fuelle 11.

En la modalidad mostrada en la figura 3, el medio de sellado 5 comprende nuevamente una cámara tubular, o en forma de globo, 3 con una sección alargada sustancialmente complementaria a la del espacio 4 que se sellará - que en este
10 caso se extiende desde un elemento de aseguramiento 35, hecho preferiblemente de un material rígido en forma de U, capaz de acoplarse por interferencia en combinación con la sección 6 de la base rígida en la cual se ajusta.

En las modalidades en las figuras 1, 2, 3, la porción de tipo
15 fuelle 11 está coextruída en un lado a lo largo de la pared 16 con la porción base rígida 12 y en el otro lado, la que está colocada operacionalmente hacia la puerta interna, con la sección horizontal 13.

En la modalidad de la figura 4, la porción de tipo fuelle 11
20 está coextruída con la porción base rígida 12 en un lado a lo largo de la pared 16 y en el otro lado, la operacionalmente hacia la puerta interna, con la sección vertical 6. En tal modalidad, el medio de sellado 5 comprende nuevamente una cámara tubular, o en forma de globo, 3 con una sección alargada sustancialmente
25 complementaria a la del espacio 4 que se sellará, y un reborde de

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sellado 18 que se extiende operacionalmente hacia el fuelle 11.

En la modalidad mostrada en la figura 5, el medio de sellado 5 comprende un elemento de sellado tubular 14 que se extiende desde la sección 2 hacia la puerta interna, la sección 2 está reducida hasta un reborde de sellado extendido 34 con una
5 sección acanalada, formada convenientemente para sellar el espacio 4 en la posición de operación de sellado de la puerta, según lo mostrado en la figura.

En la modalidad de la figura 6, la porción de tipo fuelle 11
10 está coextruída con la porción base rígida 12 en un lado a lo largo de la pared 16 y en el otro lado, la operacionalmente hacia la puerta interna, en la sección vertical 6. En tal modalidad, el medio de sellado 5 aún comprende una cámara tubular, o en forma de globo, 3 con una sección alargada sustancialmente
15 complementaria a la del espacio 4 que se sellará, y un reborde de sellado 18 que se extiende operacionalmente hacia el fuelle 11, para entrar en contacto con él en el globo 7, según lo mostrado en la figura, debido a su deformación después de la compresión.

En la modalidad mostrada en la figura 7, la forma del medio
20 de sellado 5 es sustancialmente similar a la de la modalidad mostrada en la figura 6, la cámara tubular, o en forma de globo, 3 tiene en este caso una sección más grande que la que está en las otras modalidades mostradas, así también entra en contacto con el globo 7, después de la compresión, de tal modo se sella todo el
25 espacio adyacente, sin un reborde 18 según lo incluido en la

modalidad de la figura 6.

En la modalidad mostrada en la figura 8, el medio de sellado 5 aún comprende una cámara tubular, o en forma de globo, 3 con una sección alargada sustancialmente complementaria a la del espacio 4 que se sellará - que se logra desde una sección de extensión 2 de la sección 6 de la base rígida que sigue sustancialmente el perfil de la puerta interna. En este caso, la sección 6 no está coextruída con la sección 2 pero es recibida por interferencia mientras que se forma convenientemente de acuerdo a una sección en forma de U 6-6' en cuya sección 2 se puede ajustar firmemente por presión, por ejemplo, pestañas mediante las cuales se adapta en la superficie. Tal modalidad permite acoplar el fuelle 11 con el medio de sellado 5 que puede tener diferentes alturas de la sección 2 o diferentes formas del globo 3, dependiendo de la adaptación de la puerta interna con la cual se acopla la junta.

En la modalidad mostrada en la figura 9, la rigidez requerida es en este caso dada a la sección 6 de la base 12 así como al resto de la base de la misma debido al espesor de la sección monoextruída y no debido a las características intrínsecas del material plástico usado. El medio de sellado 5 aún comprende una cámara tubular, o en forma de globo, 3 con una sección alargada sustancialmente complementaria a la del espacio 4 que se sellará. El espesor del globo 3 puede ser similar al del fuelle 11, por lo tanto los dos elementos de sellado suaves tienen

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extensión (preferiblemente debido a la extracción lograda a través de un perfil magnético), los medio de sellado que se hacen para eliminar todas las interferencias mutuas, haciéndolos independientes estructural y funcionalmente, así se elimina
5 simultáneamente el efecto de enfriamiento negativo sobre la funcionalidad de la porción del sello magnético, provocando así que se pueda obtener con un material más económico.

Esto se obtiene debido a que los dos medios de sellado en cuestión, hechos de material suave, se extienden desde la misma
10 base y son capaces de acoplar la puerta y la puerta interna del gabinete de refrigerador sin dificultades mutuos directas. Es decir, se unen independientemente a la misma base rígida, y definitivamente no entre sí.

Con este fin, el reborde de sellado 18 mostrado en las
15 modalidades de las figuras 4 y 6, aunque su posición de operación es opuesta al globo 7 de los fuelles, es independiente del anterior debido a que sus estructuras suaves están libres de dificultades mutuas.

Por lo tanto, los dos elementos de sellado suaves operan y
20 se mueven independientemente entre sí, de tal modo se asegura un sello perfecto en el gabinete bajo una carga diferente, y por lo tanto, bajo condiciones de ubicación en las cuales opera la puerta del refrigerador al usar el refrigerador de la misma, mientras que la porción base en común continúa permitiendo una instalación
25 fácil de la junta en la puerta de refrigerador.

Además, tal porción de base rígida de la junta que separa los dos medios de sellado independientes suaves, trabaja como una barrera térmica debido a que mejora el aislamiento, de tal modo hace la transmisión de calor más difícil de una zona a otra.

5 Si el material de la base de junta es rígido en el sitio en forma de T, tal sección de separación no sufrirá mecánicamente ningún efecto de enfriamiento progresivo entre el interior y el exterior, de tal modo se elimina cualquier otra posibilidad de interferencia entre los dos medios de sellado.

10 De acuerdo a la presente invención, los medios hechos sustancialmente de material suave, que sellan el espacio localizado entre el gabinete y la puerta interna, mantienen buenas características flexibles y de recuperación elástica incluso cuando las temperaturas son inferiores a 0°C, así se sella, por
15 compresión, un área más interna del refrigerador con respecto a en la cual se ubica la porción de tipo fuelle suave.

El medio de sellado 5, o por lo menos su porción 3, se puede hacer de un material diferente del de la porción de tipo fuelle suave 11, material del medio 5 tiene características
20 flexibles que permitan la torsión fácil y buenas características de recuperación elástica a temperaturas bajas usadas comúnmente con los refrigeradores y congeladores, seleccionados entre los que tienen una temperatura de transición vítrea (T_g) más baja que la temperatura de operación mínima del refrigerador.

25 En la mayoría de las aplicaciones críticas, es decir

REIVINDICACIONES

1. La junta para gabinetes de refrigerador del tipo que incluye una porción de tipo fuelle para sellar el área entre un gabinete y una puerta del mismo, se extiende desde una porción base capaz de acoplar una puerta externa y/o una puerta interna del gabinete de refrigerador, caracterizada porque la porción base es sustancialmente rígida y porque en el extremo de ésta, que hace frente a la puerta interna, el medio hecho de material sustancialmente suave se extiende para sellar el espacio ubicado entre el gabinete y la puerta interna, el medio de sellado que es independiente y libre de dificultades con respecto a la porción de tipo fuelle suave.

2. La junta de acuerdo a la reivindicación 1, en donde la sección de la porción rígida base incluye una sección horizontal y, en el extremo de la sección horizontal enfrente operacionalmente a la puerta interna, se curva vertical u oblicuamente de acuerdo a una sección rígida que sigue sustancialmente el perfil de la puerta interna hacia el espacio, por lo cual el medio se extiende desde la sección.

3. La junta de acuerdo a la reivindicación 2, en donde desde la sección el medio se extiende por interposición de una sección, se coextruye en el material suave, extendiendo la sección rígida.

4. La junta de acuerdo a la reivindicación 1, en donde el medio comprende una cámara tubular, o en forma de globo, con una

sección alargada sustancialmente complementaria a la del espacio para sellar tal espacio deformándose a través de la compresión en el borde del gabinete cuando la puerta, y la puerta interna correspondiente se cierran.

5 5. La junta de acuerdo a la reivindicación 3, en donde el medio comprende la sección que se reduce a un reborde de sellado extendido con una sección acanalada, formada convenientemente para sellar el espacio, deformándose, a través de la compresión, en el borde del gabinete cuando la puerta, y la puerta interna correspondiente, se cierran.

10 6. La junta de acuerdo a la reivindicación 2, en donde el medio se extiende desde un medio de aseguramiento que tiene una forma de U, capaz de acoplarse por interferencia en combinación con la sección de la base rígida sobre la cual se ajusta.

15 7. La junta de acuerdo a la reivindicación 3, en donde, el medio comprende la sección capaz de acoplarse por interferencia con la sección rígida formada de acuerdo a una sección en forma de U en cuya sección puede ajustar firmemente por presión.

20 8. La junta de acuerdo a la reivindicación 1, caracterizada porque está hecha en un material suave, del tipo usado para la porción de fuelle, aumentando convenientemente el espesor de la porción base para que la anterior pueda lograr una rigidez suficiente.

25 9. La junta de acuerdo a la reivindicación 1, en donde el medio comprende un reborde de sellado que se extiende operacionalmente hacia el fuelle.

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10. La junta de acuerdo a la reivindicación 3, en donde el medio comprende un elemento de sellado tubular que se extiende desde la sección hacia la puerta interna.

11. La junta de acuerdo a la reivindicación 2, en donde en el
5 área en la cual la base rígida se forma de acuerdo a la sección, se proporciona un reborde suave como un sello adicional que se extiende operacionalmente hacia la puerta interna. x1/2

12. La junta de acuerdo a la reivindicación 2, en donde la
10 porción suave de fuelle-tipo está coextruída con la porción rígida baja en un lado y, en el otro lado, se coloca operacionalmente hacia la puerta interna, con la sección horizontal.

13. La junta de acuerdo a la reivindicación 2, en donde las
15 porción de tipo fuelle suave está coextruída con la porción rígida base en un lado y, en el otro lado, se coloca operacionalmente hacia la puerta interna, con la sección vertical.

14. La junta de acuerdo a la reivindicación 1, en donde el medio de sellado se hace por lo menos en parte de un material
20 diferente del de la porción de tipo fuelle suave, seleccionado entre los que tienen una T_g más baja que la temperatura de operación mínima del refrigerador. x1/2

15. La junta de acuerdo a la reivindicación 4, en donde la
cámara tubular, o en forma de globo, se hace de un material
diferente del de la porción de tipo fuelle suave, seleccionado entre
los que tienen una T_g más baja que la temperatura de operación
25 mínima del refrigerador.

RESUMEN

Se describe una junta para gabinetes de refrigerador del tipo que incluye una porción tipo fuelle para sellar el área entre un gabinete y la puerta, extendiéndose así desde una porción base capaz de acoplar una puerta externa y/o una puerta interna del gabinete de refrigerador, en donde la porción base es sustancialmente rígida y en donde en un extremo de ésta, hay un medio hecho de material sustancialmente suave, que se extiende hacia la puerta interna, el material tiene buenas características flexibles y de recuperación elástica cuando se expone a las temperaturas del refrigerador y del congelador, capaz de sellar adicionalmente, preferiblemente por compresión, el espacio ubicado entre el gabinete y la puerta interna en un área más interna del gabinete de refrigerador, en donde el medio de sellado es independiente y libre de dificultades con respecto a la porción tipo fuelle suave.

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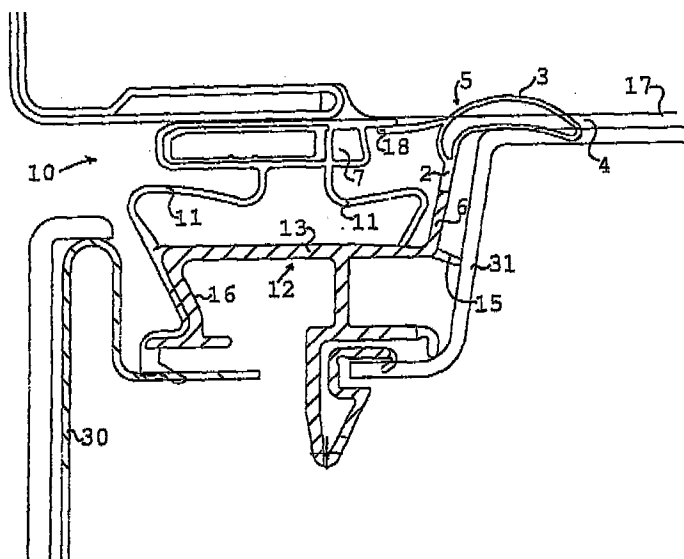
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(54) Title: **DOUBLE-SEAL GASKET FOR REFRIGERATOR CABINETS WITH HIGH HEAT INSULATION PROPERTIES**



(57) Abstract: Gasket for refrigerator cabinets of the kind including a soft bellows-type portion used for sealing the area between the cabinet and the door, thus extending from a base portion able to match the outer door and/or inner door of the refrigerator cabinet, wherein said base portion is substantially rigid and that at one end of it there is a means made of substantially soft material extending toward said inner door, said material having good flexible and spring back features when exposed to refrigerator and freezer temperatures, able to further seal, preferably by compression, the space located between said cabinets and inner door in a more internal area of the refrigerator cabinet, wherein said sealing means is independent and free from constraints with respect to said soft bellows-type portion.

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DOUBLE-SEAL GASKET FOR REFRIGERATOR CABINETS WITH HIGH HEAT INSULATION PROPERTIES

Field of the invention

The present invention relates to a gasket for refrigerator cabinets of the type including a soft bellows-type portion for sealing the area between a cabinet and a door, as well as a base portion able to fit the outer door and/or inner door of the refrigerator cabinet, wherein the shell is defined by the outer door and inner door filled with thermal-insulation material.

Prior art

10 Gaskets of such kind are, for instance, described in EP 146994, EP 319087 and EP 1129319 of the Applicant hereof. For instance, with reference to the latter, a known gasket able to seal the area between the outer door 30 and the cabinet 17 of a refrigerator is of the type represented in fig. A of the attached drawings, comprising a soft bellows-type sealing portion ending with an expanding section with a magnetic profile connected to a base provided with a securing foot which is placed inside a special socket of the inner door 31. The heat insulation in this type of gasket, currently used in refrigerators, is achieved both through the contact of the magnetic profile of the gasket along the whole perimeter of the refrigerator cabinet 17 and through the tubular chamber, or balloon (also part of the bellows), with the inner door 31 and cabinet 17.

However, especially with combined freezers or refrigerators which operate at temperatures lower than 0 °C, known gaskets of the type described in fig. A have serious drawbacks inasmuch as the operation of the bellows is altered by the loss of flexibility of its plastic structure, normally plasticized PVC, due to the air at low pressure (which may drop to about -25°C) which comes directly into contact with the gasket through the space located between said cabinet and the inner door which, in the area next to the gasket, is indicated with 4 in fig. A.

30 Moreover, the possible non-levelness of the refrigerator cabinet zone in which the magnetic part of the gasket seals can cause losses of energy and

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formations of ice in case there is no contact between the gasket and the cabinet thereof.

Summary of the invention

Compared to such known sealing systems, the present invention intends to considerably improve the thermal efficiency of the refrigerating appliance, by reducing its consumption of energy and the formation of ice inside of it, by drastically reducing the heat transmission between the outside and the inside cold part which may occur around the entire sealing perimeter between the door and the cabinet. The purpose of the invention is also to maintain an ideal functionality of the main sealing element of the gasket, i.e. the extendible bellows, allowing it to operate at higher temperatures compared to those of the refrigerator.

In order to achieve such aims, as well as other advantages which will be described in the following, the present invention provides a gasket for refrigerator cabinets of the type including a soft bellows-type portion for sealing the area between the cabinet and the door, extending from a base portion able to match the outer door and/or inner door of the refrigerator cabinet, wherein said base portion is substantially rigid and at one end of it which faces the said inner door 31 a means made of substantially soft material extends to seal the space located between said cabinet and inner door, wherein said sealing means is independent and free from constraints with respect to said soft bellows-type portion.

In the gasket according to the invention, said soft bellows-type portion, which functions preferably, but not necessarily, in expansion by magnetic pull, allows the door to close so as to compress said means substantially made of soft material, thereby sealing the space located between said cabinet and inner door.

In order to better understand the features and advantages of the invention, non limiting examples of practical embodiments will be described hereinafter with reference to the figures in the attached drawings. It is clarified that in these drawings the gasket of the invention is, non-limitatively, of the magnetic type and is shown in an operating position working together with the cabinet,

the outer door and the inner door of the refrigerator.

Brief description of the drawings

Fig. A, as mentioned above, applies to the prior art.

Fig. 1 shows a cross section view of a gasket according to the invention.

- 5 Figures 2 - 8 show a similar cross section of a corresponding number of embodiments of the gasket according to the invention.

Fig. 9 shows a cross section view of an embodiment according to the invention, of a monoextruded gasket, that is extruded in one material.

Detailed description of the invention

- 10 With reference to such drawings, the gasket 10 of the invention includes a soft bellows portion 11, e.g. plasticized PVC or the like, coextruded with a base portion 12 made from, for instance, rigid PVC. The bellows portion 11 is preferably of the magnetic type, ending at the top with a recess 8 able to contain a strip or section made of magnetic material. In all the previously
- 15 described embodiments, with the exception of the one in fig. 8, in said bellows portion 11 from said recess 8, there is a tubular, or balloon 7, compression sealing chamber placed beside and towards the inner door 31. In the embodiments (figures 1, 2, 3, 4, 5), said base portion 12 of the gasket 10 has U-inverted shaped section as described in Patent application
- 20 MI2005A000121 of the Applicant hereof. Such section is defined by a horizontal section 13 and a couple of vertical sections, one of which is operationally external 16 for matching the outer door 30, a folded sheet metal ending with a plane surface 9, whereas the other is operationally internal 19 for matching the inner door 31. To this purpose, said section 16
- 25 ends with one foot 20 used for matching the plane surface 9 on the outer door 30, whereas said section 19 ends with one foot 21, from which a vertical section 22 extends inwardly with a securing snap-lock means 23, by interposition of a soft elbow 24, with the end of the inner door 31, e.g. as described in EP 146994 and EP 319087 of the Applicant hereof.
- 30 In the gasket 10 the soft material of portion 11 is coextruded with the rigid material of portion 12 along the entire length of the section 16 and ends with a lip 25 which is suitable for operationally sealing the plane surface 9 of the

outer door 30 so as to prevent leaking of thermal-insulation material, for instance polyurethane foam, in the final filling phase of the door shell. For such sealing purposes, additional soft coextruded lips are required, i.e. 27 on said securing means 23 and 28 on the said foot 21 of the base of the gasket.

5 In the embodiment shown in fig. 6, the gasket 10 has a base portion 12 substantially consisting of a T section in which a vertical section 32, ending with lips 33 made from coextruded soft material, extends towards the inner door from a horizontal section 13. Such structure consists of a securing means for the inner door 31, which is specifically made in the shape of a
10 hollow socket 34 to house the vertical section 32 and to firmly match it due to the action of the soft lips 33 which bend, thereby firmly sealing the walls of said hollow socket 34. Even in such embodiment, in the gasket 10, the soft material of portion 11 is coextruded with the rigid material of portion 12 along the entire length of the section 16 and ends with a lip 25 which is suitable for
15 operationally sealing the plane surface 9 of the outer door 30 so as to prevent leaking of thermal-insulation material in the final filling phase of the door shell.

In the embodiment shown in fig. 7, the gasket 10 according to the invention is provided with a rigid base 12, coextruded with a soft bellows-type portion
20 11 of the type described in patents EP0905464 and PCT/EP02/00668 of the Applicant hereof, which are incorporated by reference. The rigid base is substantially a C-section which can be splayed out and is able to fit the inner door in automated assembly systems.

In the embodiment shown in fig. 8, the gasket 10 according to the invention is
25 provided with a rigid base 12, coextruded with a soft bellows-type portion 11 as described in patent PCT/EP02/10606 of the Applicant hereof, which is incorporated by reference. It is substantially a rigid base with a female Omega section complementary to a similar male section obtained on the inner door for compression and interference fit.

30 In the embodiment shown in fig. 9, the gasket 10 according to the invention is structurally similar to the one in fig. 6, provided with a securing means for the inner door 31 specifically made in the shape of a hollow socket 34 to house

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the vertical section 32, but achieved here by extrusion in one soft material (hence monoextruded), of the type used for the bellows portion 11, thus suitably increasing the thickness of the base portion 12 so that the latter can obtain enough stiffness due to the oversized thickness both on the vertical sections 16 and 6 and on the horizontal section 13.

According to the present invention, regardless of the specific embodiment, said rigid base portion 12 – at the end of the horizontal section 13, operationally facing said inner door 31 – curves vertically or obliquely according to a section 6 which substantially follows the inner door profile, where there is a means 5 made of substantially soft material capable of sealing the space 4 located between said cabinet 17 and inner door 31, said sealing means being independent and free from constraints with respect to said soft bellows-type portion 11, as better specified hereinafter with the description of each single embodiment.

In the area in which the rigid base 12 is shaped according to said section 6, there is a lip 15 made of soft material used as an additional sealing means, which operationally extends toward the inner door 31 helping the positioning of the gasket or, optionally, to contain the polyurethane foam in case it has passed through the chamber located below it.

In the embodiment shown in fig. 1, the sealing means 5 is coextruded in soft material with respect to said section 6 of said base 12 and comprises an extending section 2 of said rigid section 6 where there is a tubular chamber, or balloon, 3 with a lengthened section substantially complementary to that of the said space 4 so as to seal such space, by deforming through squashing on the edge of the cabinet 17 when the door, and inner door 31, is closed. The sealing means 5 is completed by a tubular sealing element 14 which extends from said section 2 towards the inner door.

In the embodiment shown in fig. 2, the sealing means 5 differs from the previous embodiment due to the presence of a sealing lip 18 which operationally extends towards the bellows 11.

In the embodiment shown in fig. 3, the sealing means 5 again comprises a tubular chamber, or balloon, 3 with a lengthened section substantially

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complementary to that of the said space 4 to be sealed – which in this case extends from a securing element 35, preferably made of a U shaped rigid material, capable of mating by interference in conjunction with said section 6 of the rigid base onto which it is fitted.

- 5 In the embodiments in figures 1, 2, 3, the soft bellows-type portion 11 is coextruded on one side along the wall 16 with the rigid base portion 12 and on the other side, the one operationally placed towards the inner door, with the horizontal section 13.

10 In the embodiment in fig. 4, the soft bellows-type portion 11 is coextruded with the rigid base portion 12 on one side along the wall 16 and on the other side, the one operationally towards the inner door, with said vertical section 6. In such embodiment, the sealing means 5 again comprises a tubular chamber, or balloon, 3 with a lengthened section substantially complementary to that of the said space 4 to be sealed, and a sealing lip 18
15 which operationally extends towards the bellows 11.

In the embodiment shown in fig. 5, the sealing means 5 comprises a tubular sealing element 14 which extends from section 2 towards the inner door, said section 2 being reduced to an extended sealing lip 34 with a corrugated section, suitably shaped for sealing the space 4 in the sealing operating
20 position of the door, as shown in the figure.

In the embodiment in fig. 6, the soft bellows-type portion 11 is coextruded with the rigid base portion 12 on one side along the wall 16 and on the other side, the one operationally towards the inner door, at said vertical section 6. In such embodiment, the sealing means 5 still comprises a tubular chamber, or balloon, 3 with a lengthened section substantially complementary to that of
25 the said space 4 to be sealed, and a sealing lip 18 which operationally extends towards the bellows 11, so as to come into contact with it at the balloon 7, as shown in the figure, due to its deformation after compression.

In the embodiment shown in fig. 7, the shape of the sealing means 5 is
30 substantially similar to that of the embodiment shown in fig. 6, said tubular chamber, or balloon, 3 having in this case a larger section than the one in the other embodiments shown, thus coming into contact with the balloon 7 as

well, after compression, thereby sealing the entire adjacent space, without a lip 18 as included in the embodiment of fig. 6.

In the embodiment shown in fig. 8, the sealing means 5 still comprises a tubular chamber, or balloon, 3 with a lengthened section substantially complementary to that of the said space 4 to be sealed – which reaches out from an extending section 2 of section 6 of the rigid base which substantially follows the profile of the inner door. In this case, said section 6 is not coextruded with section 2 but receives it by interference as it is suitably shaped according to a U-section 6-6' in which section 2 can be firmly fitted by pressing due to, for instance, ribs whereby it is conformed at the surface. Such embodiment makes it possible to match the bellows 11 with a sealing means 5 which may have different heights of section 2 or different forms of the balloon 3, depending on the conformation of the inner door with which the gasket is matched.

In the embodiment shown in fig. 9, the stiffness required is in this case given to section 6 of the base 12 as well as to the rest of the base thereof because of the thickening of the monoextruded section and not because of the intrinsic features of the plastic material used. The sealing means 5 still comprises a tubular chamber, or balloon, 3 with a lengthened section substantially complementary to that of the said space 4 to be sealed. The thickness of the balloon 3 can be similar to that of the bellows 11, hence such two soft sealing elements have flexibility features, whereas the thickened base 12, including the vertical section 6, also has stiffness features although in a monoextruded section.

In another embodiment, said stiffness features can be given to said base 12 with any equivalent means.

In further embodiments, the various tubular elements or balloons such as 14 can also be made from an expandable material or from internally coextruded foamed material, so as to allow spring back and flexibility features to optimize the sealing.

In further embodiments, said soft section 2 or rigid section 6 can have different heights, depending on the side of the inner door they need to match.

The said balloon 3 can also have different forms depending on the side of the inner door it will match; furthermore, it can be welded or fixed to the rest of the gasket with different techniques.

By combining the above-mentioned, or equivalent, elements it is possible to obtain numerous other embodiments by combining the elements in a different way, provided that the fundamental structural feature is maintained according to the present invention, that is having two sealing means made of soft material, hence deformable, supported by the same rigid base, one of which - the sealing means 5 - works by compression at low temperatures in a more internal area of the refrigerator and the other - the extendible bellows 11 - works by extension (preferably due to the pull achieved through a magnetic profile), said sealing means being made so as to eliminate all mutual interferences, making them structurally and functionally independent, thus simultaneously eliminating the negative cooling effect on the functionality of the portion of magnetic seal, which can thus be obtained with more inexpensive material.

This is obtained because the two sealing means at issue, made of soft material, extend from the same base and are capable of matching the door and inner door of the refrigerator cabinet without direct mutual constraints. In other words, they are independently bound to the same rigid base, and definitely not between each other.

To this end, the sealing lip 18 shown in the embodiments in figures 4 and 6, although its operating position is against the balloon 7 of the bellows, is independent from the latter because their soft structures are free from mutual constraints.

Therefore, the two soft sealing elements operate and move independently from each other, thereby ensuring a perfect seal on the cabinet under different loading, and hence, positioning conditions in which the refrigerator door operates when using the refrigerator thereof, whereas the base portion in common continues to allow an easy installation of the gasket on the refrigerator door.

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Furthermore, such portion of rigid base of the gasket which separates the two soft independent sealing means works as a thermal barrier because it improves the insulation, thereby making the heat transmission more difficult from one zone to another.

- 5 If the material of the gasket base is rigid at room T, such separating section will not mechanically suffer from any progressive cooling effects between the inside and the outside, thereby eliminating any further possibility of interference between the two sealing means.

10 According to the present invention, said means substantially made of soft material, which seals the space located between said cabinet and the inner door, maintains good flexible and spring back features even when temperatures are lower than 0°C, thus sealing, by compression, a more internal area of the refrigerator with respect to that in which the soft bellows-type portion is located.

- 15 Said sealing means 5, or at least its portion 3, can be made from material different from that of said soft bellows-type portion 11, said material of said means 5 having flexible features which allow for easy twisting and good spring back features at the low temperatures commonly used with refrigerators and freezers, selected among those having a glass transition
20 temperature (T_g) lower than the minimum operating temperature of the refrigerator.

In most critical applications, i.e. freezers, the sealing means 5 according to the invention advantageously consists of a material with suitable elastic properties at low temperatures. To improve its spring back features, foamed
25 material inside the balloon 3 may also be considered.

The choice of the most suitable material, capable of maintaining the flexibility features under normal operating conditions, can be made by using the criterion of the glass transition temperature (T_g) of the material thereof, which must always be lower than the minimum operating T of the refrigerator (T_f).

- 30 The greater the ΔT , the better the elastic performance of the gasket. Preferably, the difference between the T_g and T_f shall be higher than 20°C.

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Hence the gasket can be achieved by monoextrusion with material suitable for operating at low temperatures, i.e. SEBS or PU, or by coextrusion of two, three or more materials, i.e. PVC and PP for the extendible bellows and the base, and more expensive materials, i.e. PU and SEBS, for the inner sealing

5 means. The choice will be made according to the cost of each single material as well as the conditions of use.

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Claims

- 1) Gasket (10) for refrigerator cabinets of the type including a soft bellows-type portion (11) for sealing the area between a cabinet (17) and a door thereof, extending from a base portion (12) able to match an outer door (30) and/or an inner door (31) of the refrigerator cabinet, characterised in that said base portion (12) is substantially rigid and that at the end of it which faces the said inner door (31) a means (5) made of substantially soft material extends to seal the space (4) located between said cabinet (17) and inner door (31), said sealing means (5) being independent and free from constraints with respect to said soft bellows-type portion (11).
- 2) Gasket according to claim 1, wherein the section of said base rigid portion (12) includes a horizontal section (13) and, at the end of the horizontal section (13) operationally facing said inner door (31), curves vertically or obliquely according to a rigid section (6) which substantially follows the profile of said inner door (31) towards said space (4), whereby said means (5) extends from section (6).
- 3) Gasket according to claim 2 wherein, from said section (6), the said means (5) extends by interposition of a section (2), coextruded in soft material, extending said rigid section (6).
- 4) Gasket according to claim 1 wherein said means (5) comprises a tubular chamber, or balloon, (3) with a lengthened section substantially complementary to that of the said space (4) so as to seal such space by deforming through squashing on the edge of the cabinet (17) when the door, and corresponding inner door (31), is closed.
- 5) Gasket according to claim 3 wherein said means (5) comprises said section (2) which is reduced to an extended sealing lip (34) with a corrugated section, suitably shaped for sealing the space 4, by deforming, through squashing, on the edge of the cabinet (17) when the door, and corresponding inner door (31), is closed.
- 6) Gasket according to claim 2, wherein said means (5) extends from a securing means (35) having a U shape, capable of mating by interference

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in conjunction with said section (6) of the rigid base (12) onto which it is fitted.

- 5 7) Gasket according to claim 3 wherein, said means (5) comprises said section (2) capable of mating by interference with said rigid section (6) shaped according to a U-section (6-6') in which section (2) can be firmly fitted by pressing.
- 10 8) Gasket according to claim 1 characterized in that it is made in one soft material, of the type used for the bellows portion (11), by suitably increasing the thickness of the base portion (12) so that the latter can achieve enough stiffness.
- 9) Gasket according to claim 1 wherein said means (5) comprises a sealing lip (18) which operationally extends towards the bellows (11).
- 15 10) Gasket according to claim 3, wherein said means (5) comprises a tubular sealing element (14) which extends from section (2) towards the inner door (31).
- 11) Gasket according to claim 2, wherein in the area in which the rigid base (12) is shaped according to said section (6), a soft lip (15) is provided as an additional sealing which operationally extends towards the inner door (31).
- 20 12) Gasket according to claim 2, wherein said soft bellows-type portion (11) is coextruded with the base rigid portion (12) on one side and, on the other side, the one operationally placed towards the inner door (31), with the horizontal section (13).
- 25 13) Gasket according to claim 2, wherein said soft bellows-type portion (11) is coextruded with the base rigid portion (12) on one side and, on the other side, the one operationally placed towards the inner door (31), with the vertical section (6).
- 30 14) Gasket according to claim 1, wherein said sealing means 5 is at least partly made from a material different from that of said soft bellows-type portion (11), selected among those having a Tg lower than the minimum operating temperature of the refrigerator.

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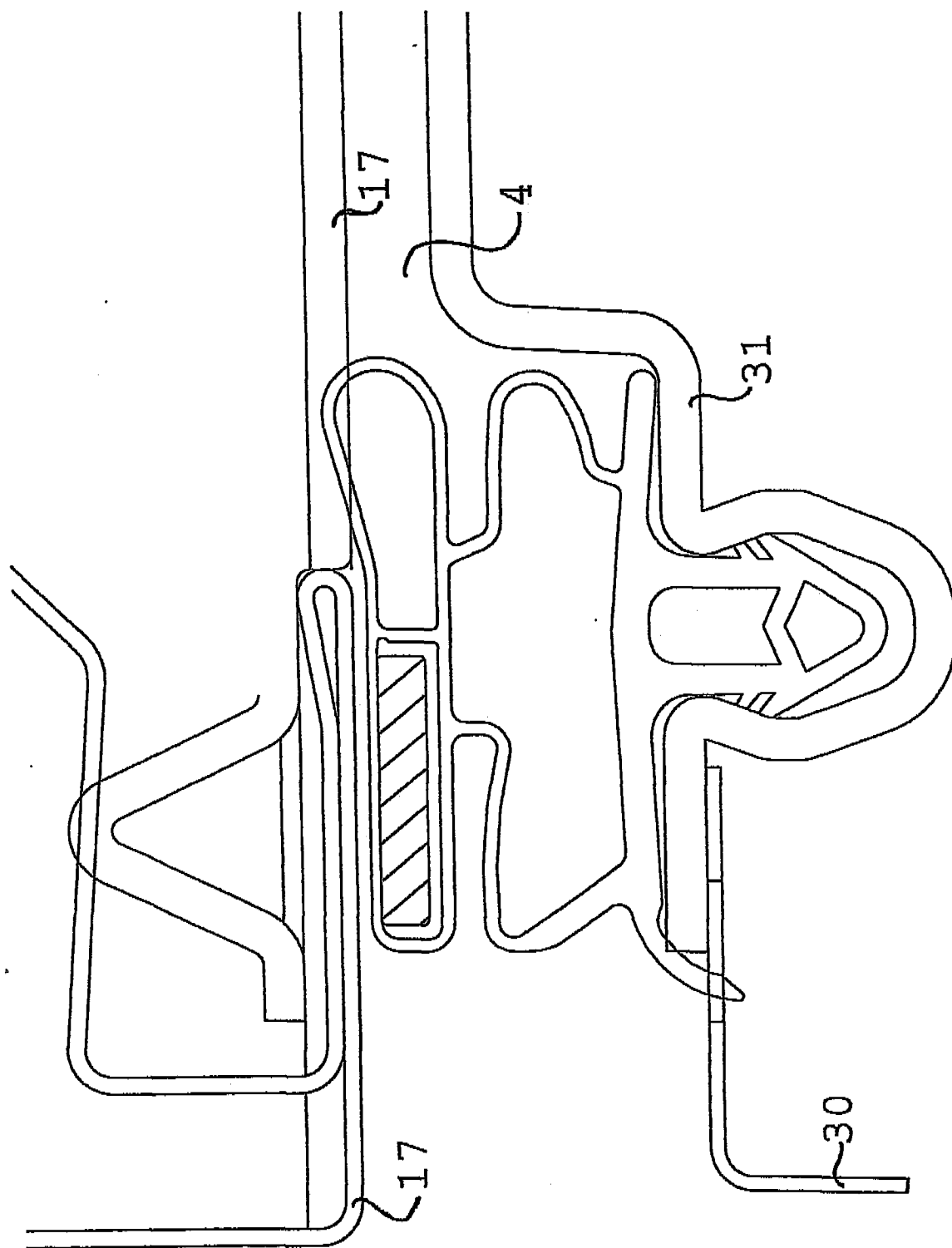


FIG. A

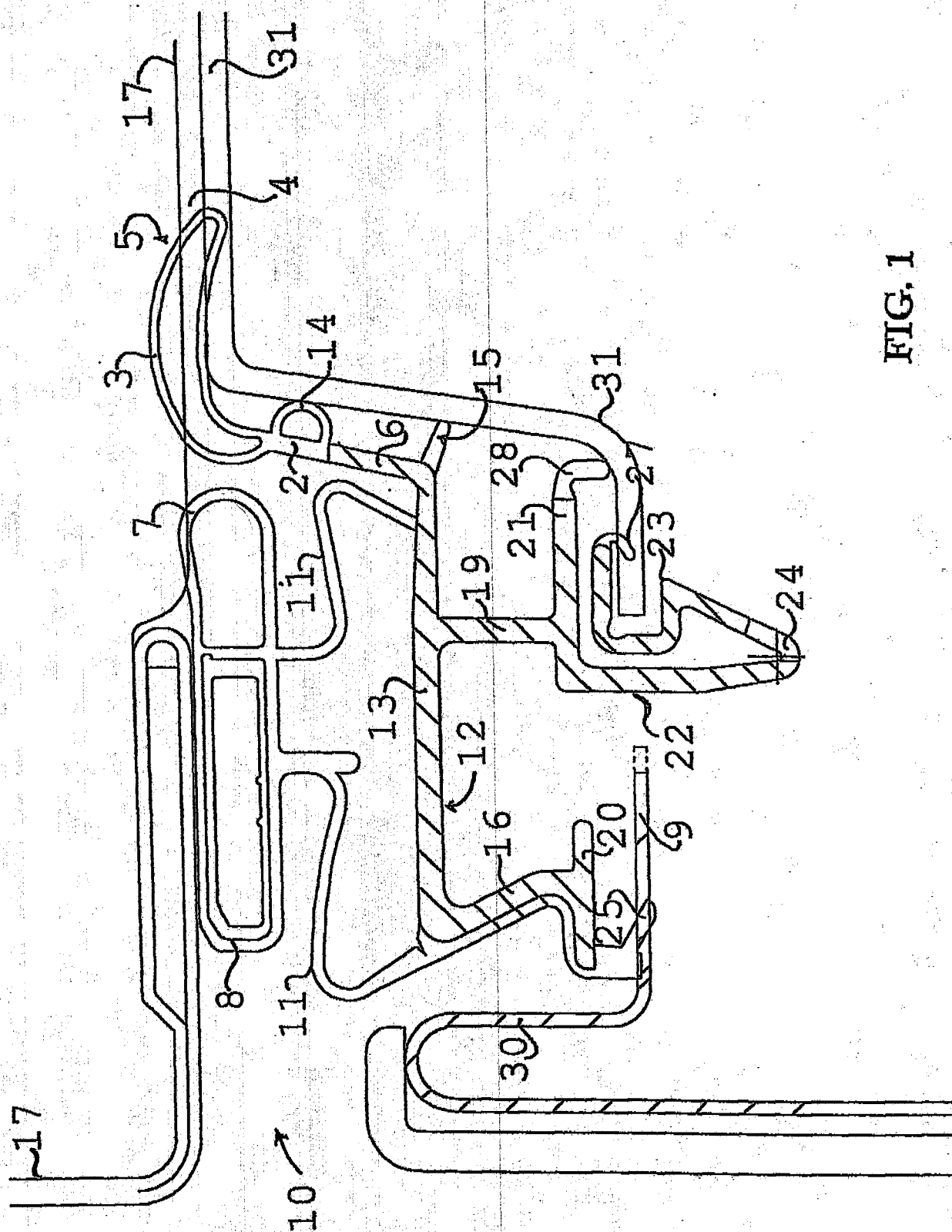


FIG. 1

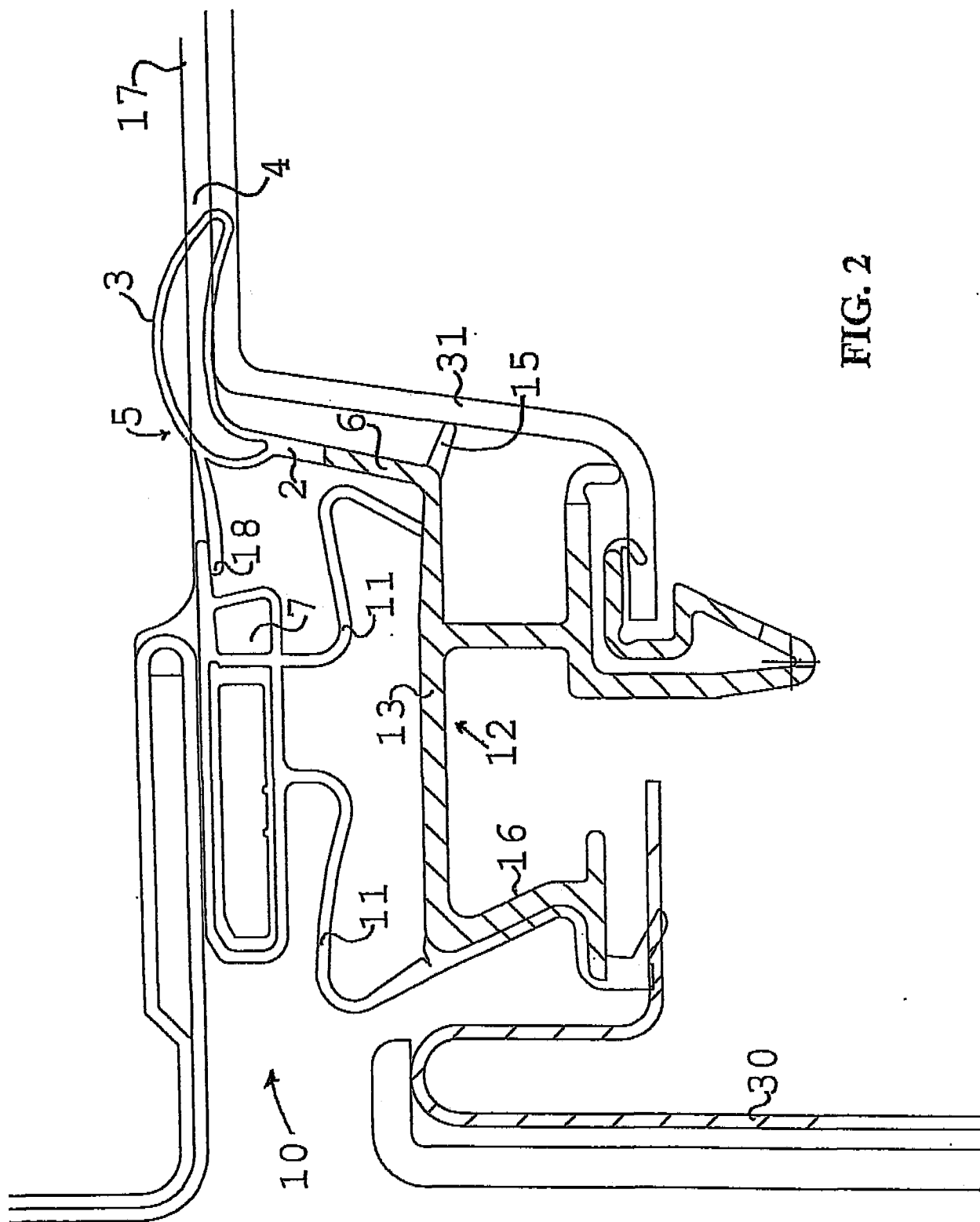


FIG. 2

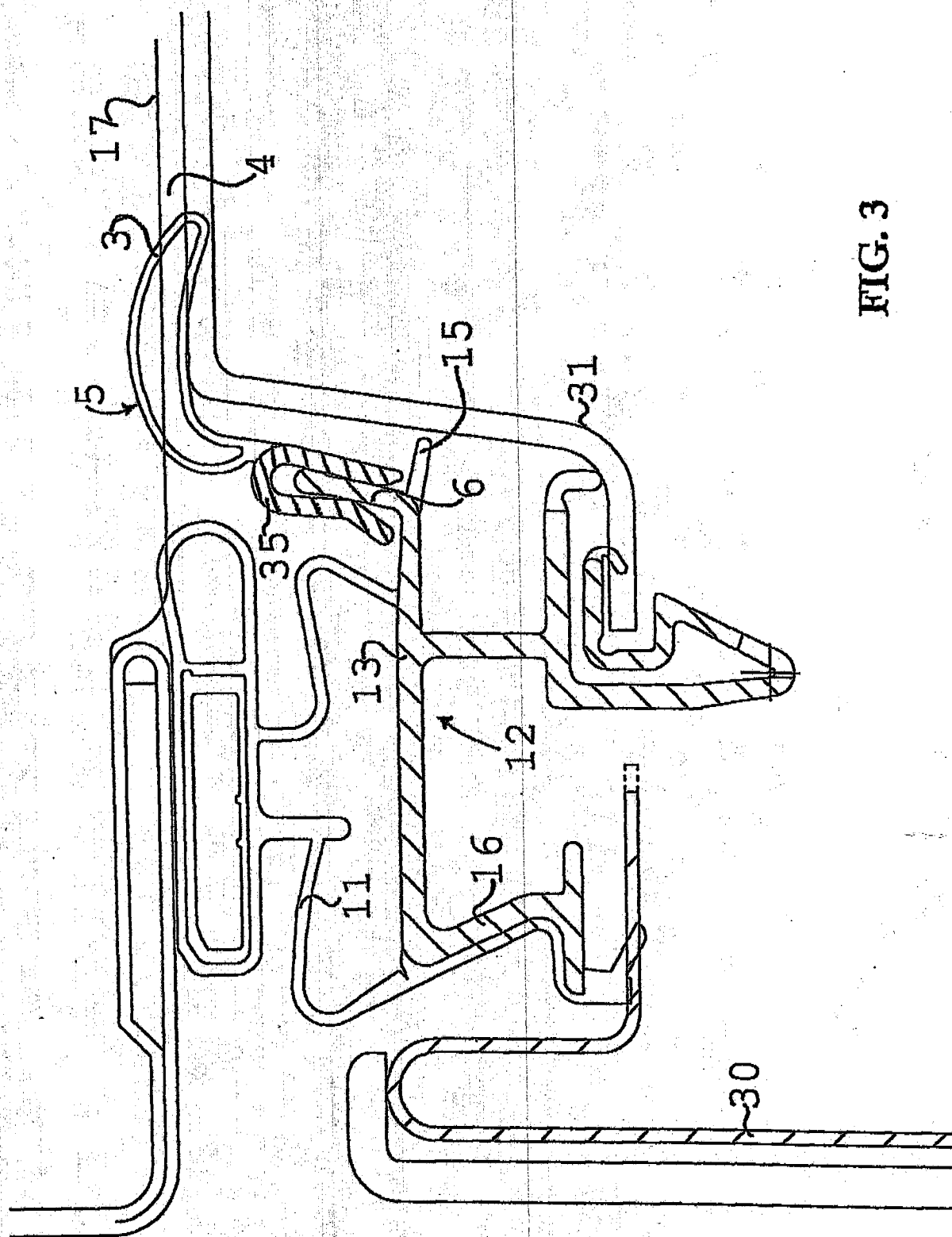


FIG. 3

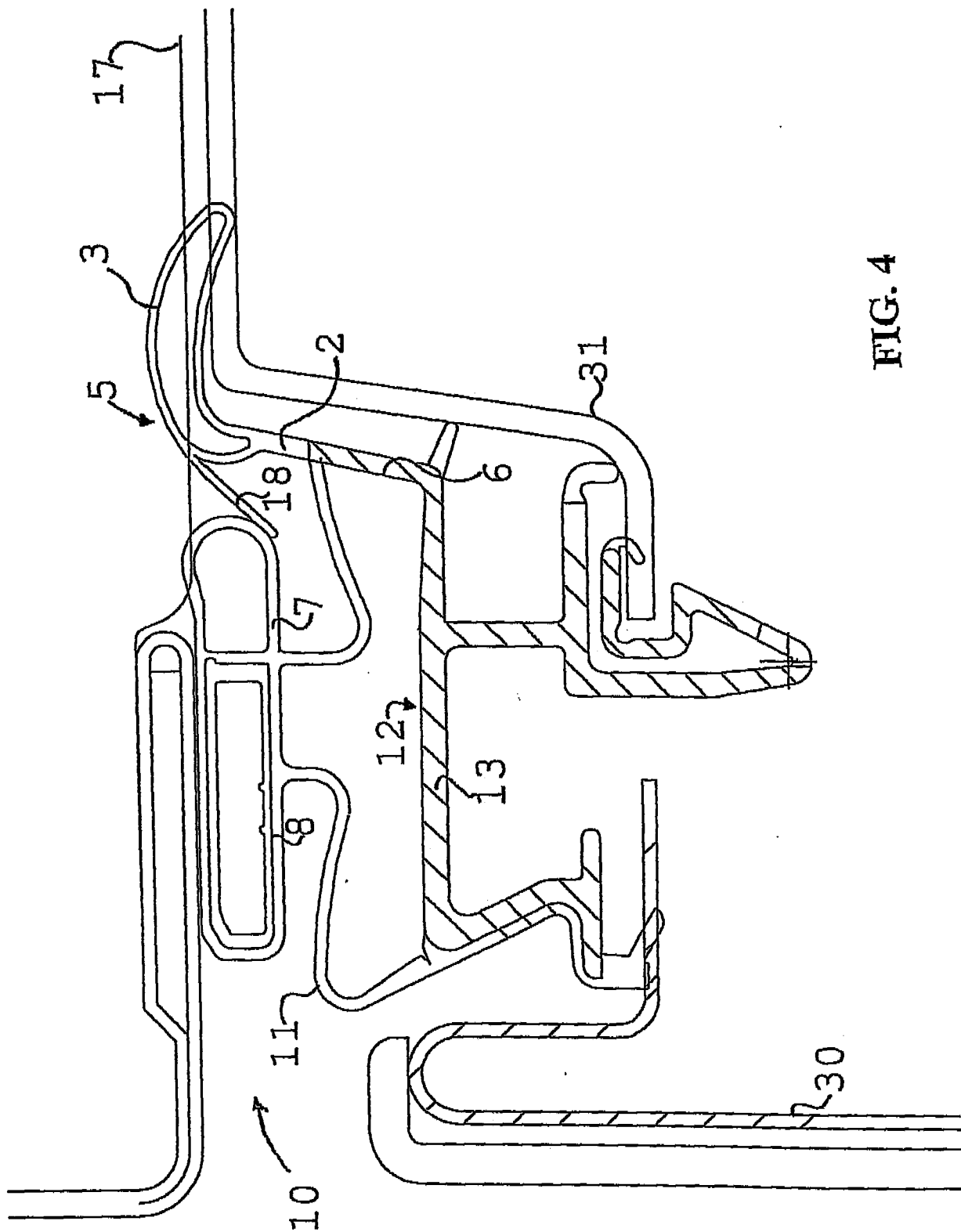


FIG. 4

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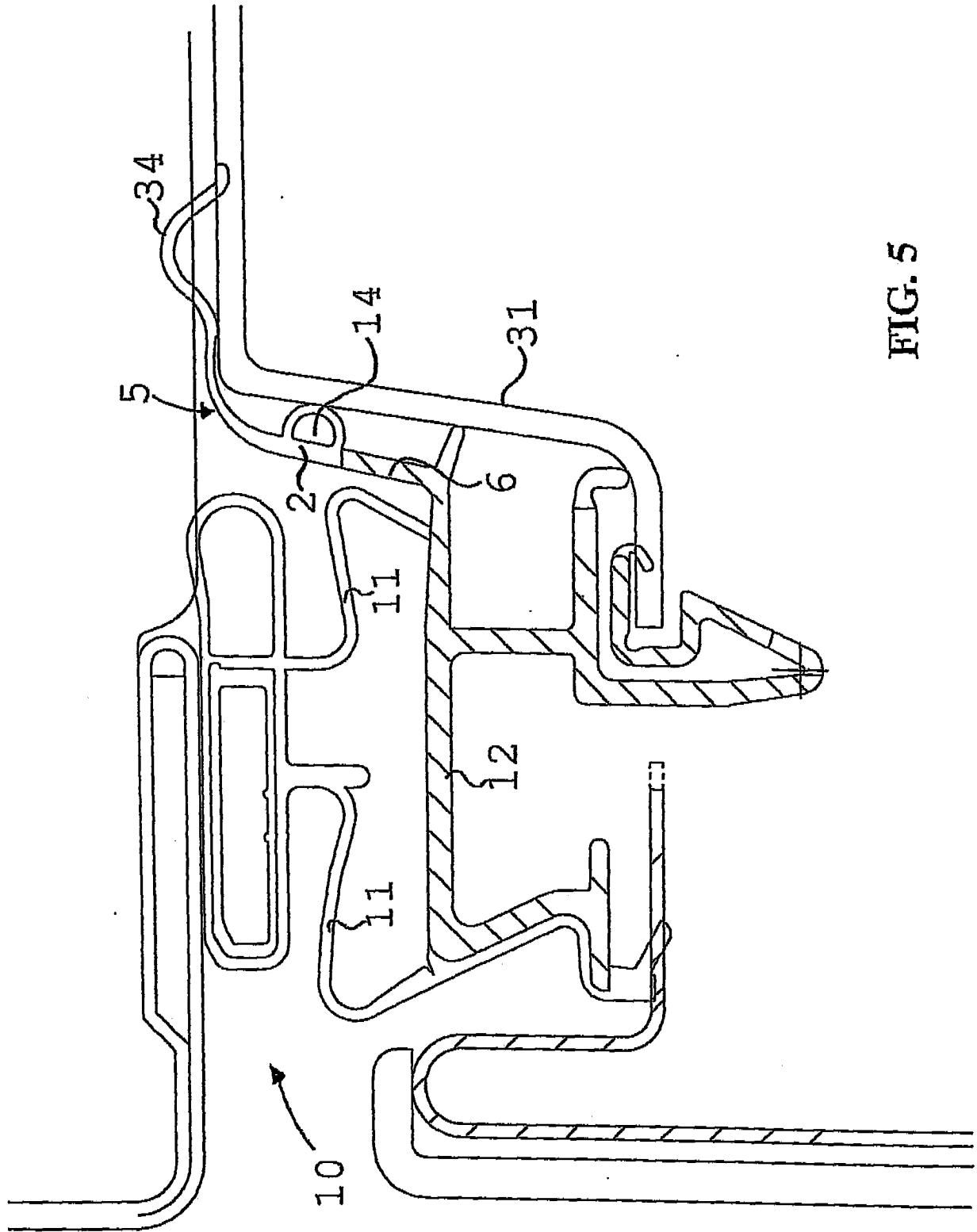


FIG. 5

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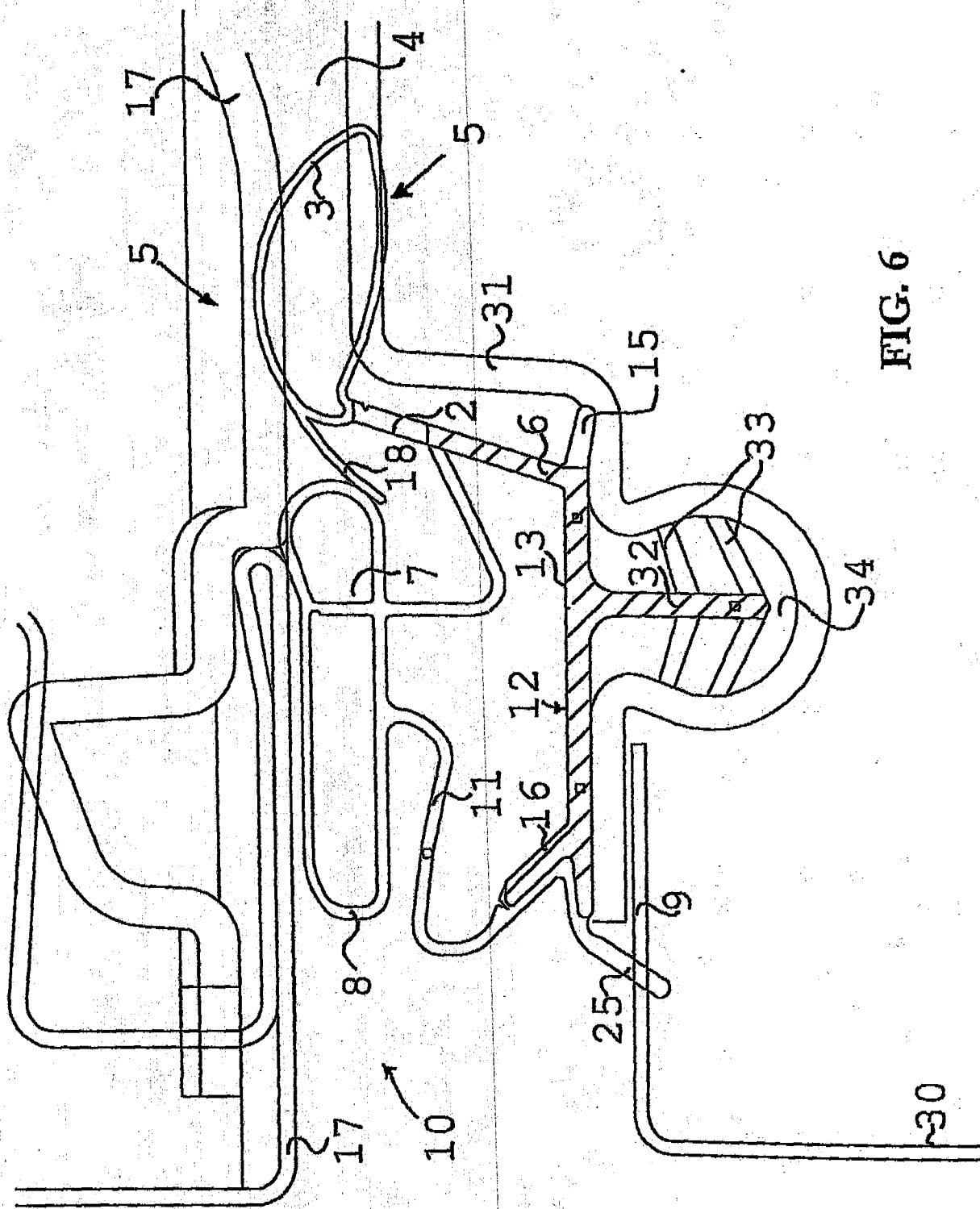


FIG. 6

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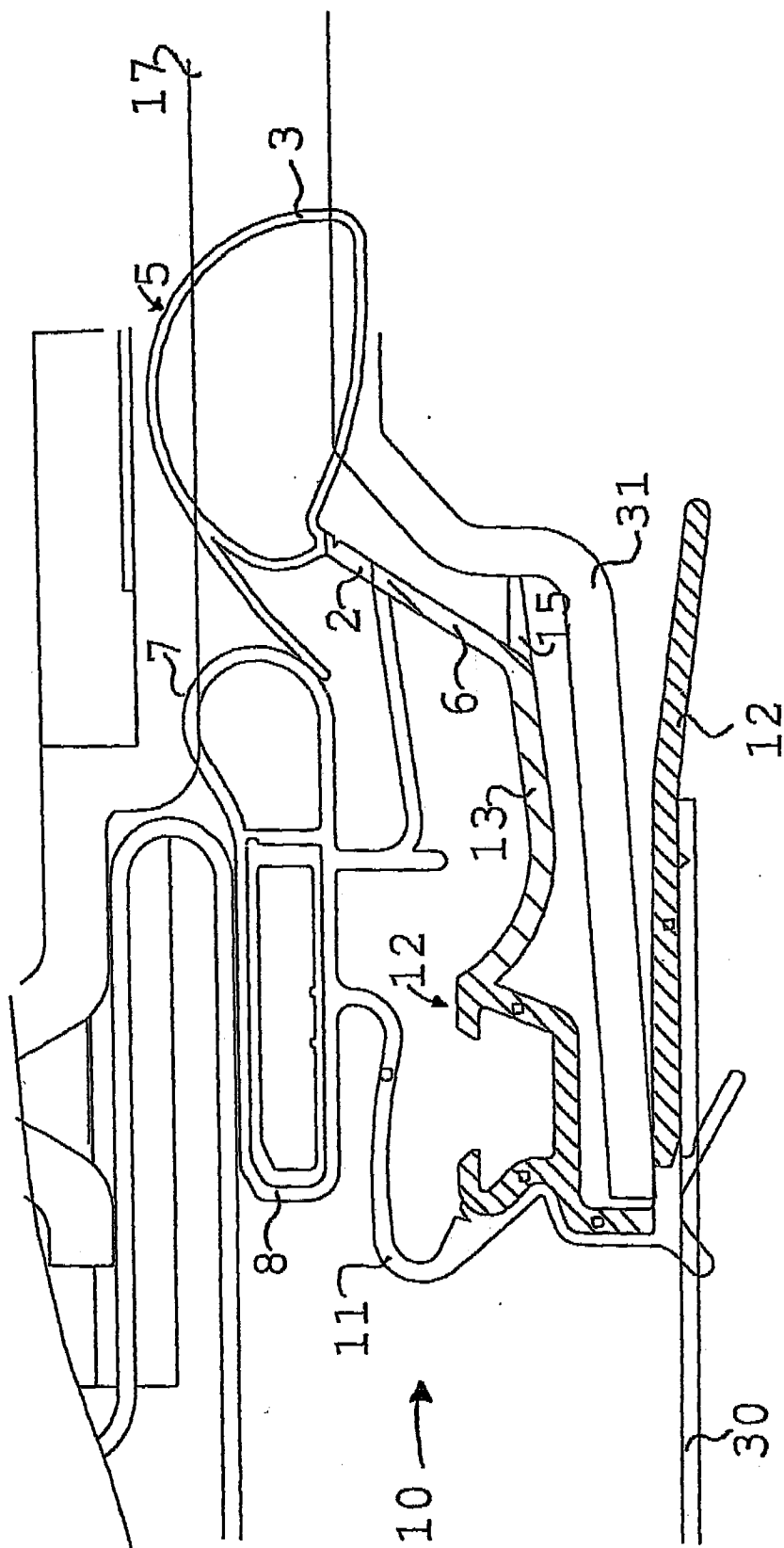


FIG. 7

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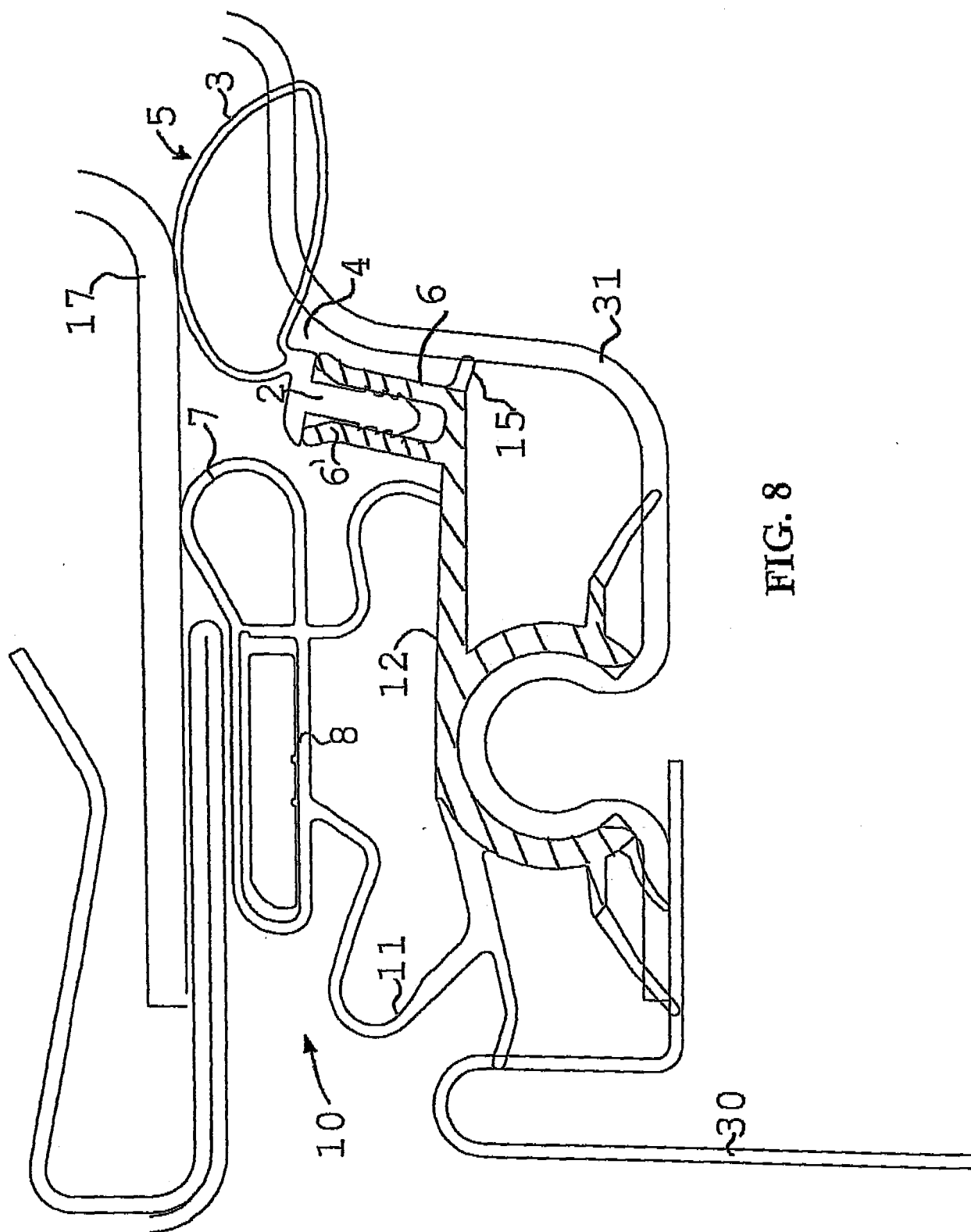


FIG. 8

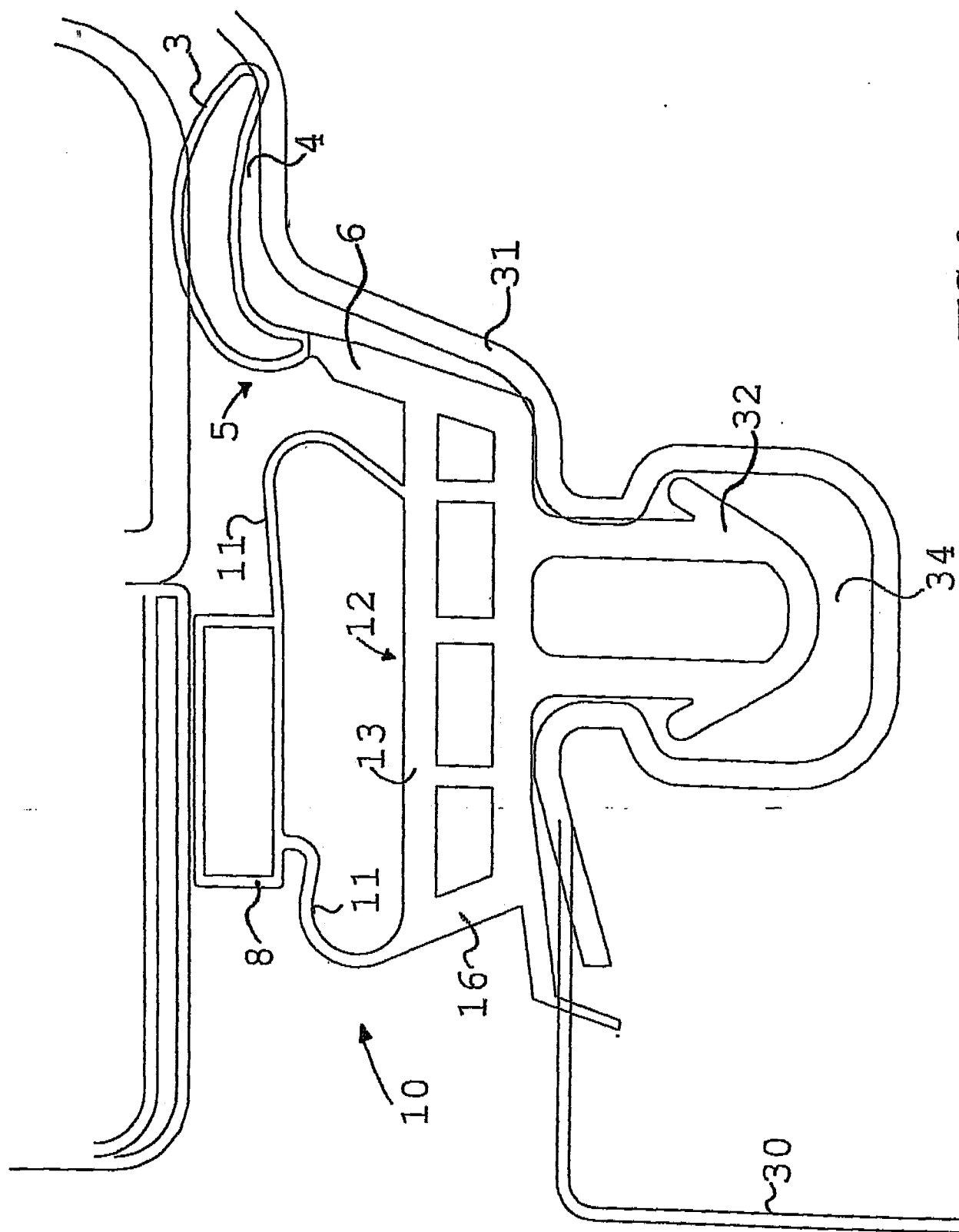


FIG. 9

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D23/08

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)
F25D E06B B60J

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 50 107556 A (UNKNOWN) 25 August 1975 (1975-08-25)	1,2,4,8
Y	figure 2	12,13
X	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) & JP 2004 132684 A (TOKAI KOGYO CO LTD; SANYO SHOWA PANEL SYSTEM CO LTD), 30 April 2004 (2004-04-30)	1,4,14
Y	abstract; figures 1,2,9,10	12,13
X	US 5 117 587 A (DOAN ET AL) 2 June 1992 (1992-06-02)	1,14
Y	column 6, line 6 - line 23	8,15
	-/-	

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

13 July 2006

Date of mailing of the international search report

20/07/2006

Name and mailing address of the ISA/

European Patent Office, P.B. 5618 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Weiland, T

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 65 396 E (COMPAGNIE FRANCAISE THOMSON-HOUSTON) 9 February 1956 (1956-02-09) figures	8
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 14, 31 December 1998 (1998-12-31) & JP 10 259983 A (HITACHI LTD), 29 September 1998 (1998-09-29)	1,4
Y	abstract; figures 3-5	15
A	US 5 533 311 A (TIRRELL ET AL) 9 July 1996 (1996-07-09) abstract; figures 14,15	1
A	US 2 963 754 A (HERMAN EUGENE T) 13 December 1960 (1960-12-13) column 1, line 61 - column 2, line 6	1

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 50107556	A	25-08-1975	NONE	
JP 2004132684	A	30-04-2004	NONE	
US 5117587	A	02-06-1992	NONE	
FR 65396	E	09-02-1956	NONE	
JP 10259983	A	29-09-1998	NONE	
US 5533311	A	09-07-1996	CA US	2155083 A1 5716581 A
				31-03-1996 10-02-1998
US 2963754	A	13-12-1960	NONE	

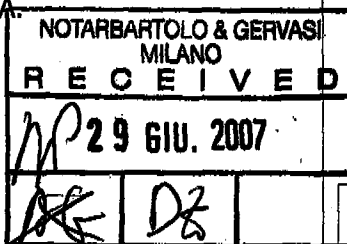
PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

Appoloni, Romano
Notarbartolo & Gervasi S.p.A.
Corso di Porta Vittoria, 9
I-20122 Milan
ITALIE



NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(PCT Rule 71.1)

Date of mailing
(day/month/year)

28.06.2007

Applicant's or agent's file reference
66668PTWO AG/su

IMPORTANT NOTIFICATION

International application No.
PCT/EP2006/060876

International filing date (day/month/year)
20.03.2006

Priority date (day/month/year)
21.03.2005

Applicant
INDUSTRIE ILPEA S.p.A.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:



European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

Ter Haar, Heidi

Tel. +31 70 340-3817



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 66668PTWO AG/su		FOR FURTHER ACTION		See Form PCT/IPEA416
International application No. PCT/EP2006/060876		International filing date (day/month/year) 20.03.2006		Priority date (day/month/year) 21.03.2005
International Patent Classification (IPC) or national classification and IPC INV. F25D23/08				
Applicant INDUSTRIE ILPEA S.p.A.				
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☐ sent to the applicant and to the International Bureau a total of sheets, as follows: ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).				
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☒ Box No. VIII Certain observations on the international application				
Date of submission of the demand 2007-01-17		Date of completion of this report 28.06.2007		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer Schouten, Adri Telephone No. +31 70 340-4088 		

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2006/060876

Box No. I Basis of the report

1. With regard to the language, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements* of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

Description, Pages

1-10 as originally filed

Claims, Numbers

1-15 as originally filed

Drawings, Sheets

1/10-10/10 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2006/060876

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>3.5-7.9-13.15</u>
	No: Claims	<u>1.2.4.8.14</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-15</u>
Industrial applicability (IA)	Yes: Claims	<u>1-15</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2006/060876

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

- 1 Reference is made to the following document:
D1: JP 50 107556 A; 25 August 1975 (1975-08-25)

2 INDEPENDENT CLAIM 1

- 2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

Document D1 discloses in figure 2 (the references in parentheses applying to this document):

Gasket (10) for refrigerator cabinets of the type including a soft bellows-type portion (3), extending from a base portion (B) whereby said base portion (B) is substantially rigid and that at the end of it a sealing means (7) made of substantially soft material extends, said sealing means (7) being independent and free from constraints with respect to said soft bellows-type portion (3).

3 DEPENDENT CLAIMS 2-15

Dependent claims 2-15 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step for the following reasons:

- claims 2,4,8,12-15: see documents D1-D5 and the corresponding passages cited in the search report.
- claims 3,5-7,9-11: the features of claims 3,5-7,9-11 are merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2006/060876

Re Item VIII

Certain observations on the international application

The application does not meet the requirements of Article 6 PCT, because claims 1-15 are not clear.

The relative terms "substantially rigid" and "substantially soft" used in claim 1 have no well-recognised meaning and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved (said sealing means (5) being independent and free from constraints with respect to said soft bellows-type portion (11)), which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

Furthermore it is noted that said sealing means (5) cannot be independent and free from constraints with respect to said soft bellows-type portion (11) because they (5,11) are connected to each other by the base portion (12) and section (6).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 6668PTWO/er	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, Item 5 below.	
International application No. PCT/EP2006/060876	International filing date (day/month/year) 20/03/2006	(Earliest) Priority Date (day/month/year) 21/03/2005
Applicant INDUSTRIE ILPEA S.P.A.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☐ the text is approved as submitted by the applicant
☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 2
☐ as suggested by the applicant
☒ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2006/060876

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D23/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
F25D E06B B60J

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 50 107556 A (UNKNOWN) 25 August 1975 (1975-08-25)	1,2,4,8
Y	figure 2	12,13
X	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) & JP 2004 132684 A (TOKAI KOGYO CO LTD; SANYO SHOWA PANEL SYSTEM CO LTD), 30 April 2004 (2004-04-30)	1,4,14
Y	abstract; figures 1,2,9,10	12,13
X	US 5 117 587 A (DOAN ET AL) 2 June 1992 (1992-06-02)	1,14
Y	column 6, line 6 - line 23	8,15
	--- -/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

13 July 2006

Date of mailing of the international search report

20/07/2006

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Authorized officer

Weiland, T

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2006/060876

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 65 396 E (COMPAGNIE FRANCAISE THOMSON-HOUSTON) 9 February 1956 (1956-02-09) figures	8
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 14, 31 December 1998 (1998-12-31) & JP 10 259983 A (HITACHI LTD), 29 September 1998 (1998-09-29) abstract; figures 3-5	1,4
Y		15
A	US 5 533 311 A (TIRRELL ET AL) 9 July 1996 (1996-07-09) abstract; figures 14,15	1
A	US 2 963 754 A (HERMAN EUGENE T) 13 December 1960 (1960-12-13) column 1, line 61 - column 2, line 6	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2006/060876

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 50107556	A	25-08-1975	NONE	
JP 2004132684	A	30-04-2004	NONE	
US 5117587	A	02-06-1992	NONE	
FR 65396	E	09-02-1956	NONE	
JP 10259983	A	29-09-1998	NONE	
US 5533311	A	09-07-1996	CA 2155083 A1 US 5716581 A	31-03-1996 10-02-1998
US 2963754	A	13-12-1960	NONE	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/EP2006/060876

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

Gasket (10) for refrigerator cabinets of the kind including a soft bellows-type portion (11) used for sealing the area between the cabinet (17) and the door (31), thus extending from a base portion (12) able to match the outer door and/or inner door of the refrigerator cabinet, wherein said base portion is substantially rigid and that at one end of it there is a means (5) made of substantially soft material extending toward said inner door, said material having good flexible and spring back features when exposed to refrigerator and freezer temperatures, able to further seal, preferably by compression, the space located between said cabinets and inner door in a more internal area of the refrigerator cabinet, wherein said sealing means (5) is independent and free from constraints with respect to said soft bellows-type portion (11).

PATENT COOPERATION TREATY

64
63

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/EP2006/060876

International filing date (day/month/year)
20.03.2006

Priority date (day/month/year)
21.03.2005

International Patent Classification (IPC) or both national classification and IPC
INV. F25D23/08

Applicant
INDUSTRIE ILPEA S.P.A.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
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Fax: +31 70 340 - 3016

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Weiand, T

Telephone No. +31 70 340-3204



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2006/060876

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material:

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material:

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing:

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2006/060876

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1,2,4,8,14
Inventive step (IS)	Yes: Claims	
	No: Claims	12,13,15
Industrial applicability (IA)	Yes: Claims	
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/EP2006/060876

Re Item V.

- 1 Reference is made to the following document:

D1 : JP 50 107556 A; 25 August 1975 (1975-08-25)

2 INDEPENDENT CLAIM 1

- 2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

Document D1 discloses (the references in parentheses applying to this document):

A gasket for refrigerator cabinets of the type including a soft bellows-type portion (3) extending from a base portion (B) whereby said base portion is substantially rigid and whereby at the end facing the inner door an additional independent seal (7) extends.

3 DEPENDENT CLAIMS 2, 4, 8, 12-15

As indicated in the search report, dependent claims 2, 4, 8, 12-15 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).



特 許 願 3

49 2 1 1

特許庁長官 殿

発 明 の 名 称 容器シール兼断熱装置

発 明 者

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株式会社日立製作所 家電研究所内
野口 泰 孝

特 許 出 願 人

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代 理 人

東京都千代田区丸の内一丁目5番1号
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電話東京 270-2111 (大代表)
(7237) 弁護士 藤 田 利

明 細 書

発明の名称 容器シール兼断熱装置

特許請求の範囲

容器をシールし、かつ断熱をする装置であつて、
容器のドアあるいは容器わくの全周又はその一部
に沿つて取り付けられた伸縮性と断熱性とを有す
るシール条片に永久磁石条片が設けられ、容器ド
アを閉鎖する形式のものにおいて、シール条片着
部に容器内側に向つてのびるつばをドアわくに沿
つて設け、容器わくとドアとの間の全周またはそ
の一部に断熱性を有し、かつ弾力性を有するシール
条片をはさみ込んで、容器内の気体が容器永久
磁石条片のシール部にふれることをなくし、容器
内からの熱の漏洩および外から容器内への熱の流
入を防止することを特徴とする容器シール兼断熱
装置。

発明の詳細な説明

本発明は容器、たとえば冷蔵庫をシールしかつ
断熱を行なう装置に関するものである。

以下第1図により、公知の冷蔵庫を外気からシ

① 日本国特許庁

公開特許公報

①特開昭 50-107556

③公開日 昭50.(1975) 8.25

②特願昭 49-12738

②出願日 昭49.(1974) 2.1

審査請求 未請求 (全3頁)

庁内整理番号

6772 32

7024 32

⑤日本分類

70 A221.4

70 B22

⑥Int.Cl²

F25D 23/02

ールする装置について説明する。冷蔵庫はその庫
内を外気からシールするため、そのドアは弾性的
なシール条片8によりシールされ、このシール条
片はドアあるいはドアわくの全周に沿つて取り
つけられる。冷蔵庫におけるシール装置はもう一
つの機能として断熱性を必要とされるが、公知の
シール装置は断熱性が悪く、角形ドアは四すみの
明瞭状態を保つことが構造上不完全となるため、
断熱性を多くしている。

本発明の目的はこれらの欠点を取り除き、良好
な断熱かつシール特性を有すると同時に製作上の
容易さをも考慮した断熱、シール装置を提供する
ことである。

そこで、この発明の特徴とするところを第2図
を参照して説明すると、まずドアわく4に取り付
けられたシール条片8はシールポケット内の永久磁石
条片2によつて、これと向き合う冷蔵庫わく1の
磁性部分9に付着している。このシールには肉
厚の厚い点より冷蔵庫内側に向かつてシール条
片5をドアわく4に沿つて付け、その先に断熱性

と伸縮性を有するシール^{条片}7がある。シール^{条片}7は横断面が袋状になつていて、その中に液体や気体あるいは断熱材8を入れ、ドアわく4の全周またはその一部に沿つて設けられる。ドアを閉めると袋状のシール条片7により冷蔵庫内と外気とは遮断され、冷蔵庫内の気体の漏れおよび外気への熱の漏れや外気からの熱の流入を防止するものである。

第1図のシールと第2図のシールにおいて、図中に示す記号Aにおける温度測定点で断熱の効果を実験によりテストした結果によると、外気温が22℃で冷蔵庫の室内温度が-2.5℃の時公知のシールを使用したものより、本発明のシールではA点で8℃温度が低くなり、これを熱計算により熱流入量に換算すると公知のシールの熱流入量よりも約50%熱流入量が少なくなることが判明し、効果大である。

本発明から効果を同じくした別の構造のシール構造が第3図の別の実施例のごとく容易に発明される。

この実施例の第2図との相違点は、シール^{条片}8に

シール条片7を補強する為にシール条片12を付けたものであり、本発明と同じ効果がある。

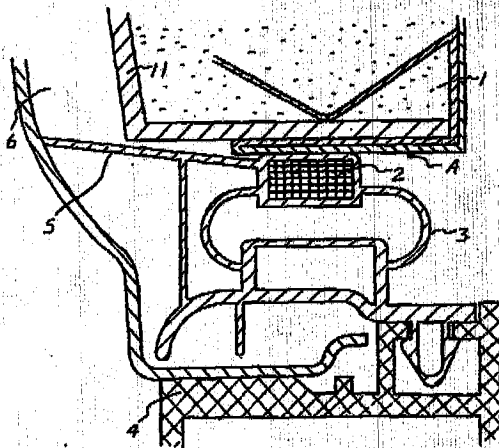
図面の簡単な説明

第1図は従来の容器シール装置を示す断面図、第2図は本発明の実施例による容器シール装置を示す断面図、第3図は本発明の他の実施例による容器シール装置を示す断面図である。

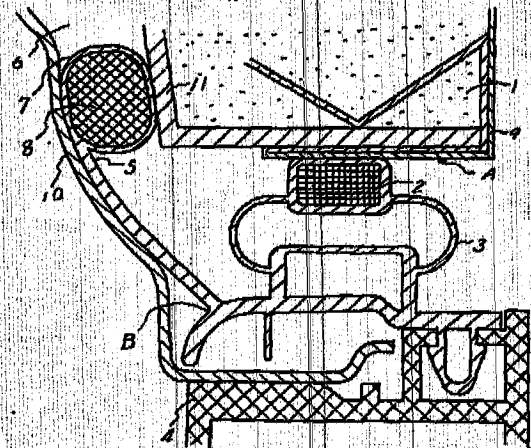
1, 11...冷蔵庫わく、2...永久磁石条片、3, 5, 7, 12...シール条片、4...ドアわく、6...切線部、8...断熱材、9...伸縮性部分、10...ドアわく。

代理人弁護士 澤田利

第1図

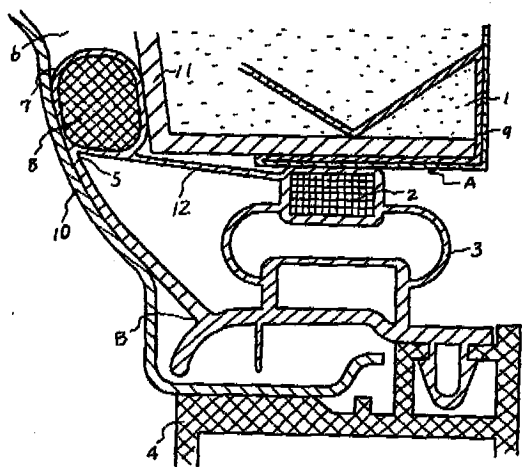


第2図



特開昭50-107556(3)

第 3 図



添附書類の目録

- (1) 明 細 書 1通 -
- (2) 図 面 1通
- (3) 要 任 状 1通
- (4) 特 許 願 出 本 1通

前記以外の発明者、特許出願人または代理人



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株式会社日立製作所 中央研究所内

氏 名 カノ ベラ ヤス シヅ
柏 原 廣 成

Patent Abstracts of Japan

PUBLICATION NUMBER : 2004132684
PUBLICATION DATE : 30-04-04

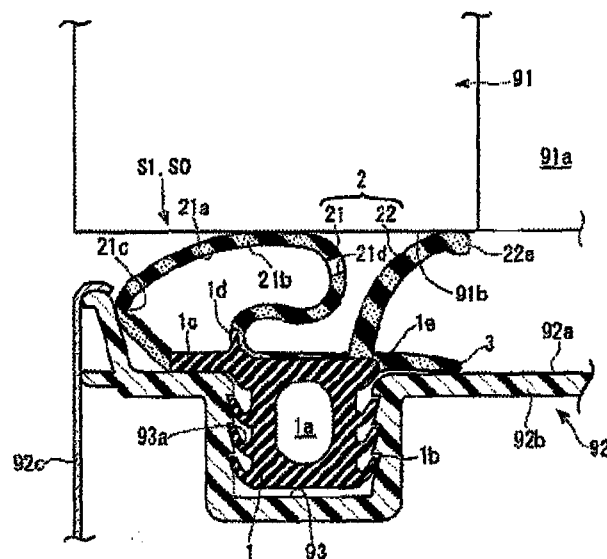
APPLICATION DATE : 27-05-03
APPLICATION NUMBER : 2003149343

APPLICANT : SANYO SHOWA PANEL SYSTEM CO
LTD;

INVENTOR : KURODA YOSHINORI;

INT.CL. : F25D 23/02

TITLE : HEAT INSULATING SEALING
MATERIAL, HEAT INSULATING
SEALING ASSEMBLY, AND HEAT
INSULATING DEVICE



ABSTRACT : PROBLEM TO BE SOLVED: To provide a heat insulating sealing material realizing a reduction of the manufacturing cost, exhibiting superior heat insulation property, and not needing a large power when closing a lid body, and a heat insulating sealing assembly and a heat insulating device using the heat insulating sealing material.

SOLUTION: The long heat insulating sealing material SO is used in the heat insulating device provided with a substantially box shaped heat insulating device body 91 having a housing chamber 91a in an interior and an opening rim 91b opening the housing chamber 91a to the outside, and the rotary opening and closing type lid body 92 sealing the opening rim 91b of the heat insulating device body 91 by a circumferential rim 92a. The heat insulating sealing material SO has an attachment base part 1 comprising an elastic material attached by engagement with an engagement groove 93 provided along the opening rim 91b or the circumferential rim 92a, and a sealing part 2 comprising an elastic material having more flexibility than the attachment base part 1 and integrally protruding from the attachment base part 1 toward an opening and closing direction of the lid body 92. The sealing part 2 comprises a hollow first sealing part 21 positioned in an outer side in an inside/outside direction based upon a plane center of the lid body 92 and a lip-like second sealing part 22 positioned inside, maintaining an interval with respect to the first sealing part 21, extending in parallel with the first sealing part 21.

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US005117587A

United States Patent [19][11] **Patent Number:** 5,117,587**Doan**[45] **Date of Patent:** Jun. 2, 1992[54] **SEALING STRUCTURE**[75] **Inventor:** Daniel C. Doan, Marietta, Ohio[73] **Assignee:** RJF International Corporation,
Fairlawn, Ohio

3,952,455 4/1976 McAlarney 49/498 X
4,006,562 2/1977 Belanger et al. 49/495 X
4,807,397 2/1989 Doan 49/383 X
4,974,366 12/1990 Tizzoni 49/478 X

FOREIGN PATENT DOCUMENTS

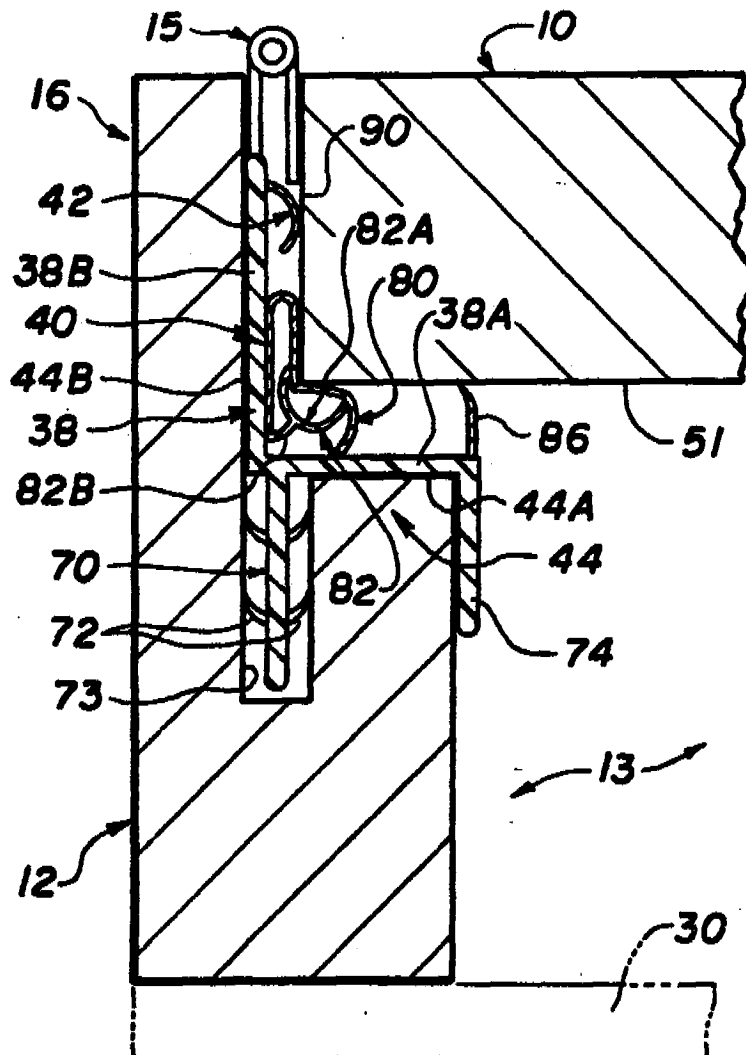
1375473 9/1964 France 49/495

Primary Examiner—Philip C. Kannan*Attorney, Agent, or Firm*—Calfee Halter & Griswold[21] **Appl. No.:** 694,835[22] **Filed:** May 2, 1991[51] **Int. Cl.:** E06B 7/16[52] **U.S. Cl.:** 49/495; 49/383;
49/475; 49/498[58] **Field of Search** 49/495, 498, 478, 484,
49/383, 475[56] **References Cited****U.S. PATENT DOCUMENTS**

2,263,806 11/1941 Hammerl 49/498
3,238,573 3/1966 Pease, Jr. 49/478 X
3,761,347 9/1973 Yackiw 49/495 X
3,851,420 12/1974 Tibbetts 49/495 X

[57] **ABSTRACT**

Sealing structure for providing a seal between the perimeter of a door and a surrounding structure such as a door frame. The sealing structure is preferably formed as a tri-part extrudate and is particularly useful in providing a seal for a structure (e.g., a refrigerator, freezer, walk-in freezer, etc.) where it is desirable to obtain a hermetic and/or thermal seal.

9 Claims, 4 Drawing Sheets

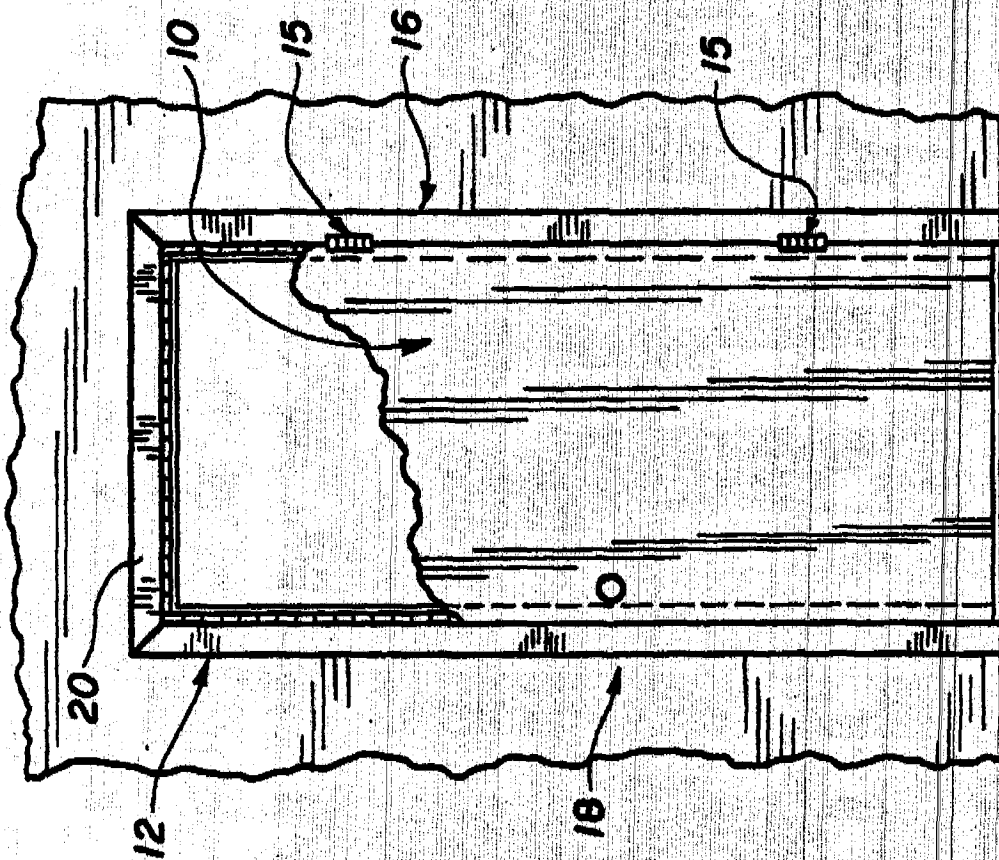


FIG. 1

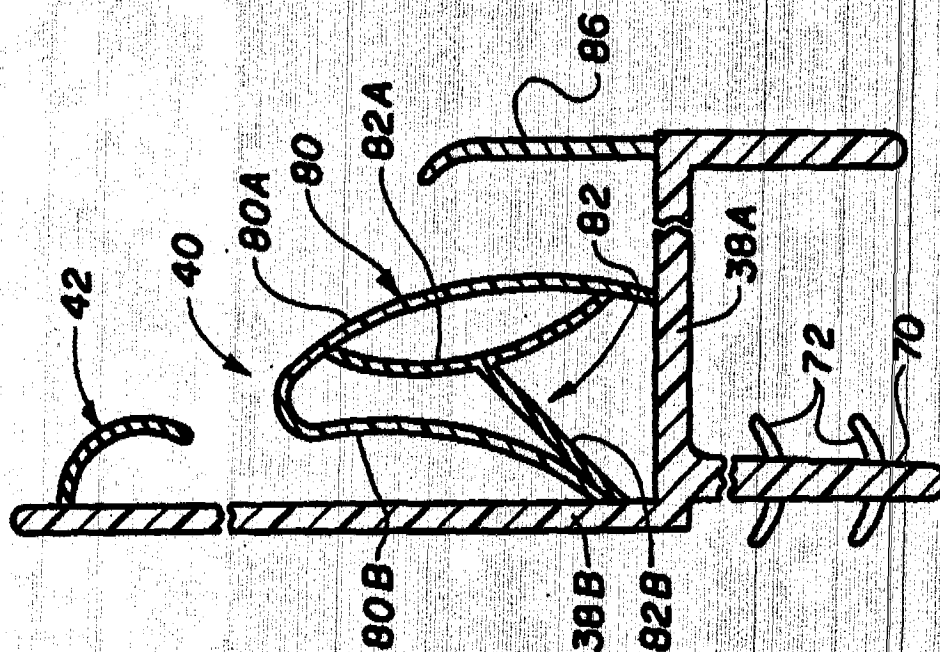


FIG. 5

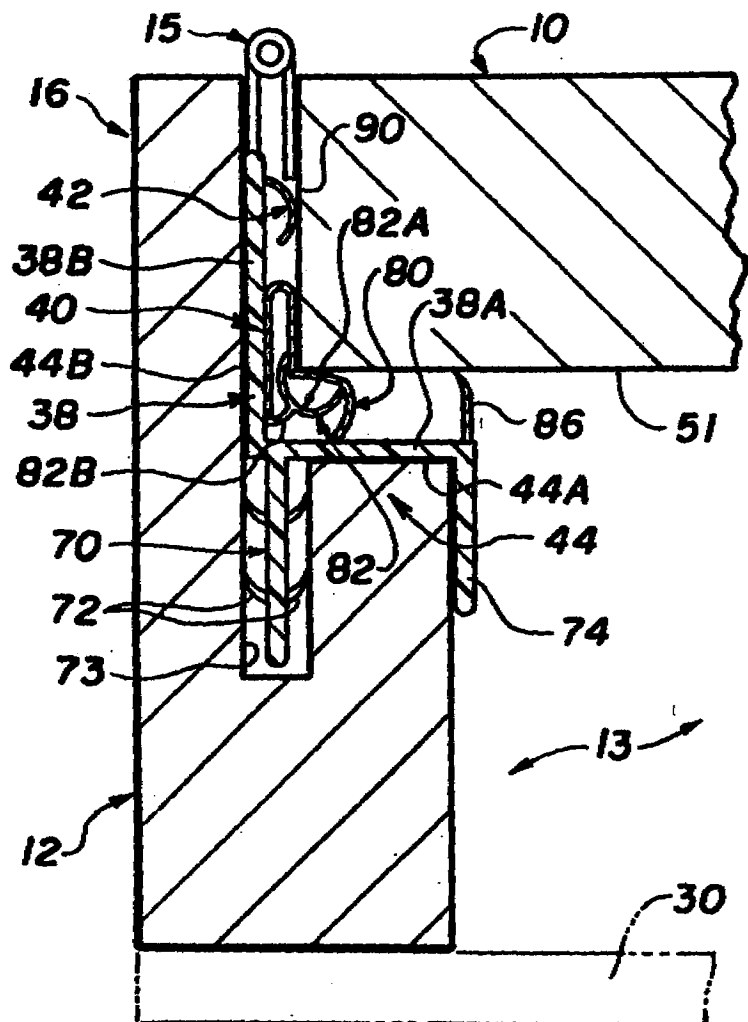


FIG. 2a

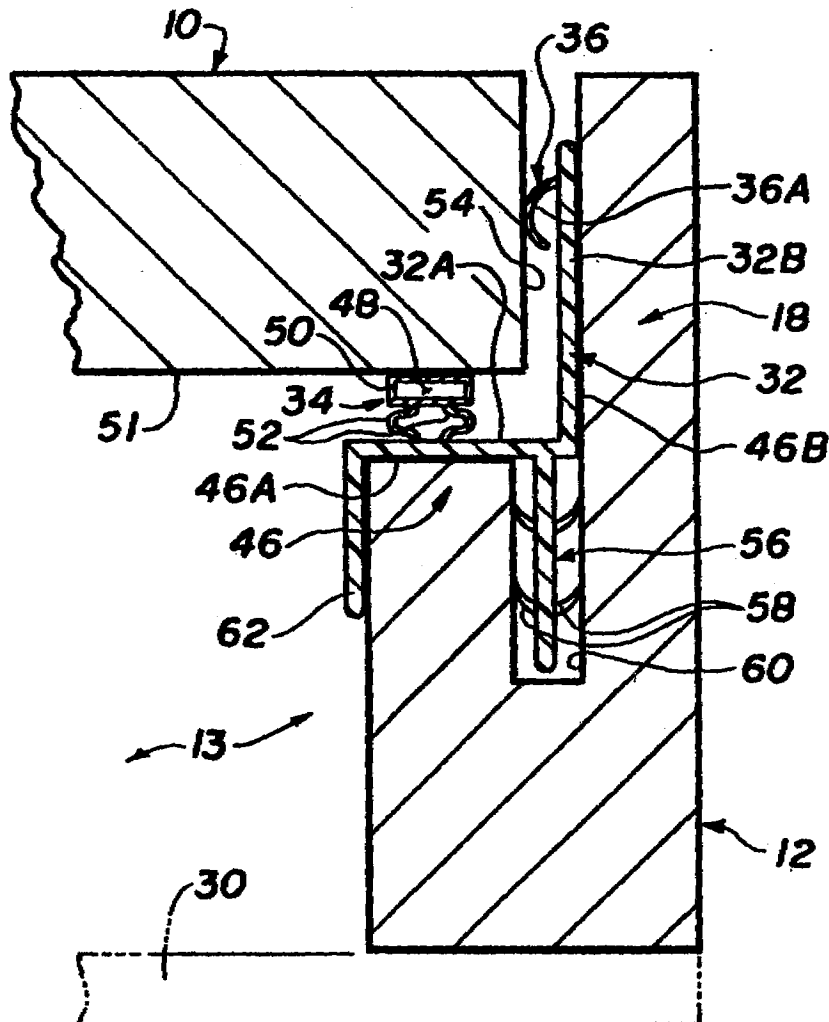


FIG. 2b

2/3

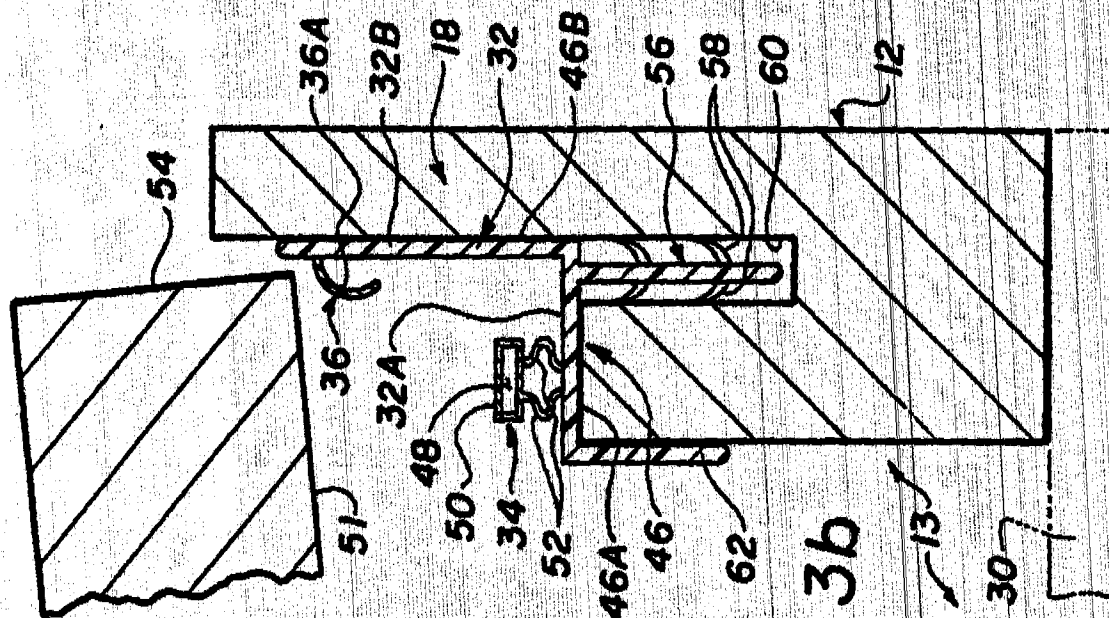


FIG. 3b

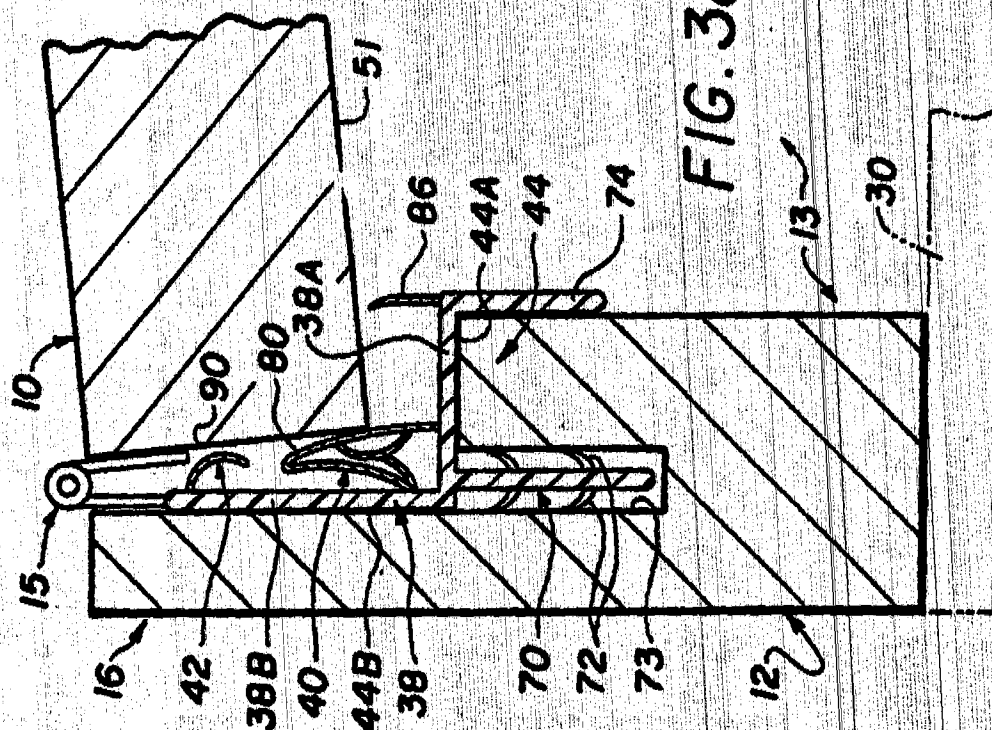
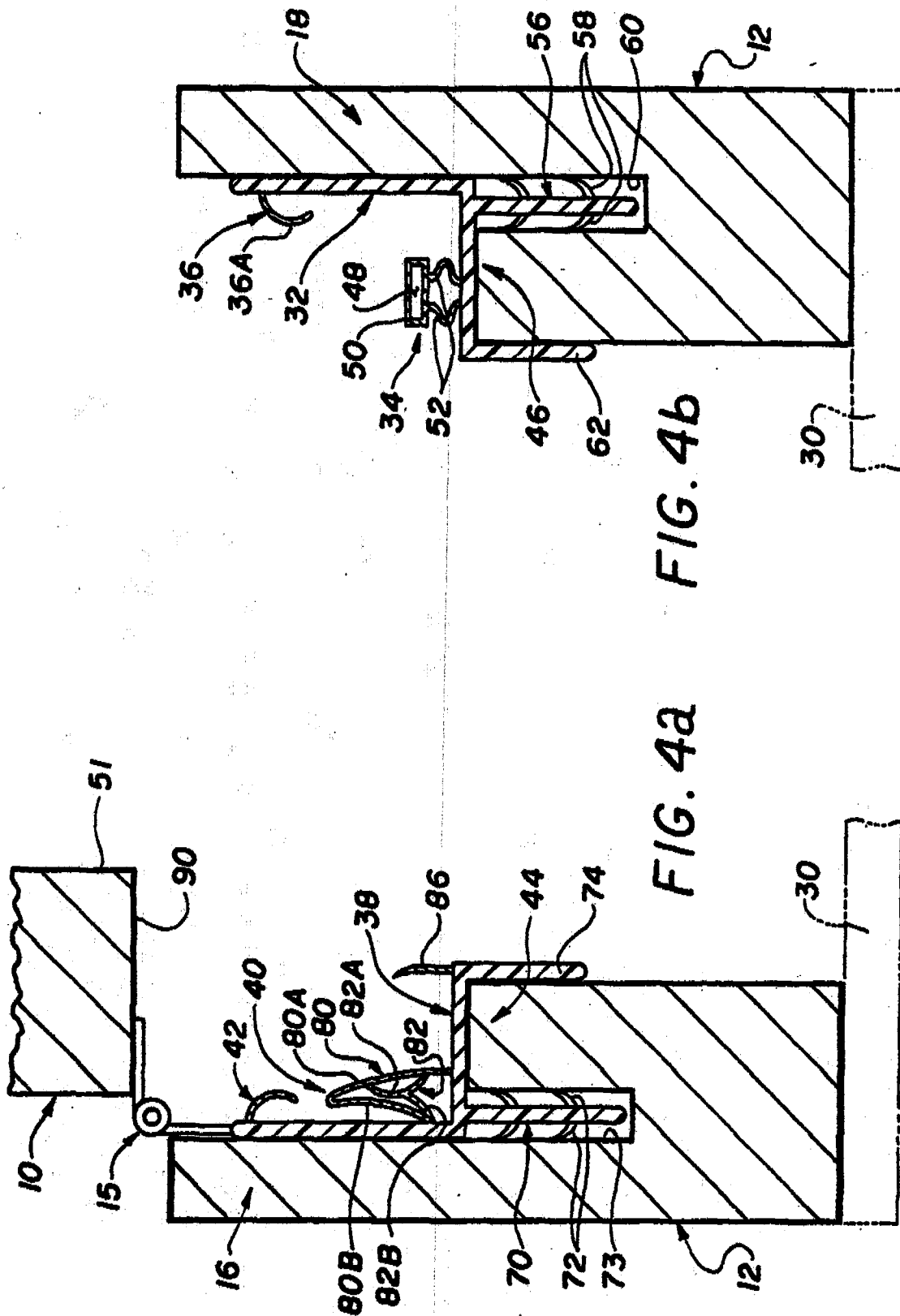


FIG. 3a

7374



SEALING STRUCTURE

FIELD OF THE INVENTION

The present invention relates to sealing structure for providing a seal between the perimeter of a door and a surrounding structure such as a door frame. The sealing structure is preferably formed as a tri-part extrudate and is particularly useful in providing a seal for a structure (e.g., a refrigerator, freezer, walk-in freezer, etc.) where it is desirable to obtain a hermetic and/or thermal seal.

BACKGROUND

In the past, different types of structures for providing a thermal and/or hermetic seal between a door and a surrounding structure have been suggested. One type of sealing structure, disclosed in U.S. Pat. No. 4,807,397, provides a honeycomb sealing structure along each of the hinge and closure sides of the door. The honeycomb structure comprises a base which is connected to the jamb of a door frame and a honeycomb which is integrally connected with the base. The honeycomb structure is formed as a co-extrusion of two different types of thermoplastic elastomer. A semi-rigid thermoplastic elastomer material forms a base which is connected to the jamb of a door frame. A flexible thermoplastic elastomer material forms a honeycomb which is integrally connected with the base. The honeycomb sealing structure extends about the perimeter of the door frame. The honeycomb sealing structure forms a compression seal against the peripheral edges of the door as the door is pivoted to a closed position relative to the door frame.

Another known structure for providing a thermal and/or hermetic seal between a door and a door frame is a magnetic sealing gasket. A base formed of a semi-rigid thermoplastic elastomer material is secured to the jamb of a door frame. A magnetic material is encased in a jacket formed of a flexible thermoplastic elastomer material, and a flexible bellows-like structure, also formed of the flexible thermoplastic elastomer material, connects the jacket to the base. The bellows-like structure biases the magnetic sealing gasket to a predetermined orientation when the door is in an open condition. As the door closes, the magnetic sealing gasket engages a selected part of the door and the flexible bellows-like structure allows a predetermined amount of reachout of the magnetic sealing gasket, to provide an effective thermal and/or hermetic seal between the door and the door frame.

With either a magnetic or a honeycomb type seal, it is important that the sealing structure be biased to an orientation relative to the door frame such that as the door is closed the sealing structure engages the door in a predetermined manner, to provide an effective thermal and/or hermetic seal. Otherwise, the sealing structure may provide an inadequate seal with the door, or might interfere with proper closure of the door.

Also, warpage of the door can make it difficult for a seal structure to achieve an adequate hermetic and/or thermal seal. Specifically, warpage of the door can cause peripheral edge portions of the door (which would normally engage the magnetic and/or honeycomb seal) to bow in such a manner as to make it difficult to achieve an effective thermal and/or hermetic seal about the entire perimeter of the door. In the past, one way the warpage problem has been addressed has been to provide an extrudate which forms a primary seal, and an additional sealing member which is stapled

to the extrudate to form a secondary seal. The secondary seal is located to seal selected parts of the door and the door frame, to account for the warpage problem.

SUMMARY OF THE PRESENT INVENTION

The present invention provides new and useful sealing structure, designed especially for providing a hermetic and/or thermal seal between a door and a door frame.

According to a preferred form of the invention, different forms of sealing structure are provided along the hinge side and the closure side of a door and a surrounding door frame. The sealing structure disposed along the closure side comprises a magnetic sealing gasket and a secondary sealing member, formed together as a single, tri-part extrudate. The sealing structure along the hinge side of the door and frame comprises a honeycomb sealing structure and one or more secondary sealing members, also formed together as a single, tri-part extrudate.

Along the closure side of the door, a magnetic sealing gasket seals along an interior face of the door and the secondary sealing member seals along the adjacent side surface of the door. Normally, in the absence of door warpage, the magnetic sealing gasket would provide an adequate thermal and/or hermetic seal between the closure side of the door and the door frame, without the need for additional sealing structure. However, if door warpage is severe enough to preclude the magnetic sealing gasket alone from providing an effective seal, the secondary sealing member can still seal the side surface of the door in a manner which, when combined with the magnetic seal, should provide an effective seal between the door and the door frame.

Along the hinge side of the door, the honeycomb compression seal is adapted to seal about an edge of the door. The secondary sealing member is disposed between the honeycomb seal and the hinge of the door, and is disposed to seal against the side surface of the door. Again, the secondary sealing member is designed so that if door warpage causes the honeycomb seal alone to be ineffective to completely seal the hinge side of the door, the secondary seal can still seal against the side surface of the door in a manner which, when combined with the honeycomb seal, should effectively seal the hinge side of the door.

According to a particularly useful feature of the invention, the honeycomb seal comprises a tri-part extrudate with a new honeycomb configuration. Specifically, the honeycomb seal comprises a relatively rigid base with a flexible outer web and an inner web secured thereto. The base has a generally "L" shaped configuration. The flexible outer web extends from one leg of the base to the other leg, and together with the base forms a fluid chamber. Moreover, the flexible outer web forms a front leg which contacts the door and a rear leg which is compressed against one of the base legs as the door is closed. The inner web has a stem which connects to the base and a curved segment which is connected to the front leg of the outer web. Such a configuration promotes effective compression of the honeycomb seal as the door is being closed and provides good recovery of the shape of the honeycomb configuration when the door is opened.

Also according to the preferred embodiment, the honeycomb is formed of three different types of thermoplastic elastomeric materials. The outer web of the

honeycomb is formed of a relatively soft, flexible type of thermoplastic elastomer material, and preferably a material sold by Shell Chemical Company under the trademark Kraton 1650/1651 (referred to herein as TPE). The base is formed of a semi-rigid form of thermoplastic elastomer material, preferably a Kraton 1650/1651 type with less plasticizer or more filler than the outer web (referred to herein as SR/TPE) which is tough and flexible, and provides good recovery of its original shape after compression. The inner web of the honeycomb is formed of a tough, flexible vulcanized rubber that processes as a thermoplastic, preferably a Santoprene® 101-73 type sold by Advanced Elastomer Systems, Akron, Ohio (referred to herein as VTR/TPE).

Further, according to the preferred embodiment, the magnetic sealing structure on the lock side of the door comprises a base formed of the semi-rigid type of TPE material, a flexible jacket and bellows-like structure are formed of the relatively soft, flexible type of TPE material, and the secondary seal is formed of the tough and flexible type VTR/TPE material.

Additionally, according to the preferred embodiment, at the header side of the door, a seal similar to the seal on the lock side of the door would be provided. Such a seal would include both a magnetic sealing gasket and a secondary seal.

Further objects and advantages of the present invention will become further apparent from the following detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary front view of a conventional door illustrating sealing structure according to the invention around the periphery of the door;

FIGS. 2a and 2b are fragmentary cross-sectional views of the hinge and lock sides of the door, respectively, in directions perpendicular to the lengths of the sealing structures, with the door in a closed position;

FIGS. 3a and 3b are fragmentary cross-sectional views of the hinge and lock sides of the door, respectively, in directions perpendicular to the lengths of the sealing structures, with the door in a partially closed position;

FIGS. 4a and 4b are fragmentary cross-sectional views of the hinge and lock sides of the door, respectively, in directions perpendicular to the lengths of the sealing structures, with the door in an open position; and

FIG. 5 is an enlarged fragmentary cross-sectional illustration of the honeycomb seal structure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As discussed above, the present invention relates to sealing structure for sealing about a door and a surrounding door frame to provide a thermal and/or hermetic seal about the door and the door frame. The figures illustrate a door 10 and a surrounding frame 12. The frame 12 surrounds an opening 13 (FIGS. 2a, 2b, 3a, 3b, 4a, 4b) which is opened or closed, depending upon whether the door 10 is in an open or a closed position. In FIGS. 1, 2a and 2b, the door 10 is in a closed position. In FIGS. 4a, 4b, the door 10 is in an open position.

The door 10 is connected to one side 16 of the frame 12 (referred to as the "hinge side") by means of a pair of hinges 15. The other side 18 of the frame 12 (referred to

herein as the "lock side") has conventional coupling means (not shown) for engaging a part of the door and for holding door in a closed position. A header 20 extends across the top side of the opening which is surrounded by the frame 12.

Sealing structures, each constructed according to the present invention, extend along the lock side 18 and the hinge side 16 of the frame, as well as along the header 20. Conventional sealing structure, not part of this invention, would be provided, if necessary, along the bottom of the door.

The door 10 has an open position and a closed position. When in an open position (FIGS. 4a and 4b), the door 10 uncovers the opening 13 in the frame 12. When in a closed position, the door 10 closes the opening 13 in the frame 10, thereby closing an interior chamber (shown schematically at 30) formed on the inside of the frame 12. When the interior chamber 30 forms part of a refrigerator or comparable structure, it is important to provide a thermal and hermetic seal between the door 10 and the frame 12. The thermal seal is effective against heat transmission into the chamber 30. The hermetic seal prevents air, water and/or other environmental materials from invading the chamber 30.

As described above, sealing structures according to the present invention are provided along the lock side 18 and the hinge side 16 of the door 10 and along the frame 12. On the lock side 18, there is a sealing structure comprising a base 32, a magnetic sealing gasket 34 and a secondary seal 36. Along the hinge side 16 there is a seal comprising a base 38, a compression honeycomb seal 40 structure and a secondary seal 42.

The frame 12 includes door jambs 44, 46 along the hinge and lock sides respectively. The door jamb 44 has surfaces 44A, 44B extending at right angles to each other. The door jamb 46 has surfaces 46A, 46B extending at right angles to each other. Although not specifically disclosed, still another jamb would be provided along the header 20, as is readily known to those of ordinary skill in the art.

Along the lock side 18 of the door jamb 46, the base 32 of the seal comprises a pair of legs 32A, 32B which extend at right angles to each other and match the configuration of the surfaces 46A, 46B of the door jamb 46. The magnetic sealing gasket 34 comprises a magnetic strip 48 disposed within a jacket 50, and a flexible bellows-shaped chamber formed by a pair of flexible legs 52 extending between the jacket 50 and the base leg 32A. The magnetic sealing gasket and the bellows-shaped chamber extend along the entire lock side of the door jamb as will be readily recognized by those of ordinary skill in this art.

The magnetic strip 48 may be made of a finely divided magnetizable material dispersed in a binder such as a thermoplastic or elastomeric polymer. Preferably, the magnetizable material is ferrite, such as barium ferrite and the polymer is a blend such as chlorosulfonated polyethylene/polyisobutylene, or the like as is conventionally known. Any moldable or extrudable magnetizable material, however, may be employed in the magnetic gasket of the present invention.

The magnetic strip 48 and the surrounding jacket 50 are designed to provide a significant contact surface between the door 10 and the flexible magnetic sealing gasket when the door is fully closed. The flexible legs 52 extending between the jacket 50 and the base leg 32A provide a flexible, spring-like chamber which exerts a certain bias urging the magnetic strip 48 and the sur-

rounding jacket 50 away from the base leg 32 when there is no compressive forces on the magnetic gasket 34. Further, the flexible leg portions 52 allow the magnetic gasket 34 to be compressed between the inside face 51 of the door and the base leg 32A as the door 10 is fully closed.

The secondary seal 36 on the lock side 18 comprises a flexible sealing member 36A connected with the base leg 32B. The sealing member 36A is biased a predetermined distance toward the path of movement of the side surface 54 of the door 10 as the door is moving to its closed position. The sealing member 36A is curved inward in relation to the path of movement of the door 10. Moreover, the sealing member 36 is biased far enough away from the base leg 32B that it is compressed between the base leg 32B and the side surface 54 of the door 10 as the door is closed.

A locking stem 56 is integrally formed in one piece with the base leg 32A, and extends away from the base leg 32A. The locking stem 56 has deflectable fingers 58 which are resiliently deflected when the locking stem 56 is forced into a kerf 60 formed in the jamb 46, to connect the base 32 to the jamb 46. A protective flange 62 is also integrally formed with an end of the base leg 32A, and is adapted to overlay and protect a portion 64 of the jamb 46 when the base 32 is connected to the jamb.

Preferably, the magnetic gasket 34 is formed as a single tri-part extrudate. The base 32 (including the stem 56 and the flange 62) is formed of the relatively stiff type SR/TPE polymer (i.e., the Kraton 1650/1651 type elastomer with less plasticizer or more filler). The magnet jacket 50 and the legs 52 are formed of the soft, flexible TPE elastomer (i.e., the Kraton 1650/1651 type elastomer) which has good resistance to paint migration, which is relatively soft and flexible, and which allows the spring-type action of the magnetic gasket described above. The secondary seal member 36 is formed of the VTR/TPE type elastomer (i.e., the Santoprene® type) which has good shape retention even after compression and even over significant temperature ranges.

The sealing structure on the hinge side 16 of the door comprises the base 38, the compression honeycomb seal 40 and the secondary seal 42. The base 38 comprises legs 38A, 38B which extend at a right angle to each other and match the profile of the surfaces 44A, 44B of the jamb 44. Moreover, a locking stem 70 (with deflectable fingers 72) is formed in one piece with the base leg 38A. Still further, a protective flange 74 is formed in one piece with an end of the base leg 38A. The locking stem 70 and deflectable fingers 72 secure the sealing structure to a kerf 73 formed in the jamb. The protective flange 74 covers an inside surface of the jamb when the sealing structure is coupled to the jamb.

The honeycomb seal 40 comprises an outer web 80 and an inner web 82. The outer web 80 extends between the base legs 38A, 38B. The outer web 80 forms an outwardly curved front portion 80A and an inwardly curved rear portion 80B. The outer web 80 combines with the base 38 to form a fluid chamber. The inner web 82 divides the fluid chamber into three smaller fluid chambers. The inner web 82 has a curved portion 82A and a relatively straight stem portion 82B. The curved portion 82A connects two portions of the outwardly curved front portion 80A of the outer web 80, and is curved away from the outwardly curved portion 80A. The relatively straight stem portion 82 extends from

about midpoint of the curved portion 82 to a point along base leg 38B which is near the junction of base legs 38A, 38B. The honeycomb seal structure extends the length of the hinge side of the door frame, as will be readily recognized by those of ordinary skill in this art.

The secondary seal 42 is integrally formed with, and extends away from the base leg 38B. The secondary seal 42 is located between the honeycomb compression seal 40 and the door hinge 15. Moreover, an additional secondary seal 86 is integrally formed with, and extends away from, the base leg 38A.

The foregoing sealing structure is preferably formed as a tri-part extrudate. The base 38, locking stem 70 and protective flange 74 are formed of the relatively stiff type SR/TPE type material. The outer web 80 of the honeycomb seal, and the secondary seal 86 along the base leg 38A, are formed with the relatively soft, flexible type of TPE material. The secondary seal 42, and the inner web 82 of the honeycomb seal, are each formed of the VTR/TPE type material which has good form retention and recovery characteristics over a wide temperature range.

The foregoing combination of materials, and the configuration of the seal structure, combine to form an effective compression seal along the hinge side 16 of the door. On account of the form retention characteristics and configuration of the inner web 82, the outer web 80 of the honeycomb is biased in such a manner that the front portion 80A of the outer web engages the corner of door 10, as the door is being closed (see FIGS. 3A, 3B). As the door continues to close, the honeycomb seal is compressed in the manner illustrated in FIG. 2A, to effectively seal about the corner of the door. The secondary seal 42 is adapted to be compressed between the side surface 90 of the door and the base leg 38B as the door is being closed. The secondary seal 86 is compressed between the base leg 38A and the interior surface 51 of the door 10 as the door is closed.

Because the secondary seal 42 at the hinge side is located close to the hinge 15, the secondary seal 42 should be effective even if the door has significant warpage at the interior surface 51. Also, because the secondary seal 36 at the lock side is located along the base leg 32B, the secondary seal 36 should also be effective if the door has significant warpage at the interior surface 51. Together, the secondary seals are designed to provide additional sealing even if the primary magnetic seal (lock side) and/or the primary honeycomb seal (hinge side) become ineffective due to excessive warpage of the door.

Finally, it is contemplated that magnetic sealing structure similar to that along the lock side of the door and frame would also be provided along the header 20.

Thus, according to the invention, new and useful sealing structure for providing a hermetic and/or thermal seal between a door and a surrounding structure has been disclosed. With the foregoing disclosure in mind, it is believed that various obvious modifications of the sealing structure will become apparent to those of ordinary skill in the art.

What is claimed is:

1. An extrudate for use in forming a seal for an edge of a door jamb having an angular profile, said extrudate comprising:

(a) a base comprising a pair of legs forming an angular profile matching the angular profile of the jamb,

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(b) a connecting member extending away from the base and adapted to connect the base to the door jamb,

(c) a honeycomb seal structure connected to the base and extending inward from the base, said honeycomb seal structure adapted to form a compression seal with a door when the door is in a closed position, and

(d) a secondary seal extending away from one leg of the base and adapted to form an additional compression seal between a selected edge portion of a door and the one leg of the base when the door is in a closed position;

wherein said extrudate comprises three different materials, said base comprising a relatively rigid material forming said pair of legs, said honeycomb seal structure comprising an outer web formed of a relatively flexible material, said outer web extending between said pair of legs and cooperating therewith to define a main fluid chamber, said honeycomb seal structure having an inner web disposed within said main chamber and dividing said main chamber into a plurality of sections, said inner web formed of a third material with better recovery to compression than said second material, and said secondary seal being formed of said third material.

2. An extrudate as defined in claim 1, wherein said outer web of said honeycomb seal structure comprises a convex front portion extending away from one leg of said base and a concave back portion extending away from the other leg of said base, said inner web comprising an inner portion extending across and disposed opposite part of said convex front portion of said outer web and a stem portion extending from said inner portion to a position substantially adjacent the corner of said base.

3. An extrudate as defined in claim 2, wherein each of said first and second materials comprises a thermoplastic elastomer material and said third material comprises a vulcanized rubber which processes like a thermoplastic elastomer.

4. An extrudate as defined in claim 3, wherein said first and second materials each comprises a Kraton 1650/1651 type of material, said first material having less plasticizer or more filler than said second material to provide said first material with its semi-rigid characteristics, and said third material comprising a Santoprene® 101/73 type of material.

5. An extrudate as set forth in any of claims 1-4, including an additional seal extending away from the

other leg of said base, said additional seal being formed of said second material.

6. An extrudate as defined claim 5, further including a flange extending away from the distal end of said other leg of said base, said flange providing a protective cover for a part of a door jamb, and said flange being formed of said first material.

7. An extrudate for use in forming a seal for an edge of a door jamb having an angular profile, said extrudate comprising

(a) a base comprising a pair of legs forming an angular profile matching the angular profile of the jamb,

(b) a connecting member extending away from the base and adapted to connect the base to the door jamb, and

(c) a honeycomb seal structure connected to the base and extending inward from the base, said honeycomb seal structure adapted to form a compression seal with a door when the door is in a closed position,

(d) said base comprising a relatively rigid material forming said pair of legs, said honeycomb seal structure comprising an outer web formed of a relatively flexible material, said outer web extending between said pair of legs and cooperating therewith to define a main fluid chamber, said outer web comprising a convex front portion extending away from one leg of said base and a concave back portion extending away from the other leg of said base, said honeycomb seal structure further having an inner web disposed within said main chamber and dividing said main chamber into a plurality of sections, said inner web formed of a third material with better recovery to compression than said second material, said inner web comprising an inner portion extending across and disposed opposite part of said convex front portion of said outer web and a stem portion extending from said inner portion to a position substantially adjacent the corner of said base.

8. An extrudate as defined in claim 7, wherein each of said first and second materials comprises a thermoplastic elastomer material and said third material comprises a vulcanized rubber which processes like a thermoplastic elastomer.

9. An extrudate as defined in claim 8, wherein said first and second materials each comprises a Kraton 1650/1651 type of material, said first material having less plasticizer or more filler than said second material to provide said first material with its semi-rigid characteristics, and said third material comprising a Santoprene® 101/73 type of material.

* * * * *



Dispositif perfectionné de fermeture magnétique étanche.

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(Brevet principal pris le 27 septembre 1950.)

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au nom de M. Harold Philip HARLE.)

1^{re} addition n° 62.243.

2^e addition n° 65.019.

La présente addition a pour objet des perfectionnements aux fermetures magnétiques étanches décrites dans le brevet principal et ses additions précédentes, en vue d'améliorer encore le joint.

Conformément à l'invention, la garniture comporte une partie centrale sur laquelle une partie tubulaire est élastiquement fixée, à la manière d'une charnière. La partie tubulaire, qui contient les aimants, comporte une nervure continue destinée à former joint avec le réfrigérateur, et une extension continue, dirigée vers l'extérieur, en vue de faire assurer un joint satisfaisant à ladite nervure, avec le réfrigérateur.

L'invention sera d'ailleurs bien comprise en se reportant à la description qui suit et au dessin qui l'accompagne à titre d'exemple non limitatif et dans lequel :

La figure 1 est une vue fragmentaire d'un réfrigérateur comportant une garniture conforme à l'invention.

La figure 2 est une coupe, à plus grande échelle, montrant les détails de la garniture, la porte étant ouverte.

La figure 3 est une vue analogue pendant la fermeture de la porte.

La figure 4 est une vue analogue, porte fermée.

La figure 5 est une vue fragmentaire, à échelle agrandie, d'un coin de la garniture.

La figure 1 représente un réfrigérateur 1 et son corps 2. Celui-ci comporte un châssis métallique extérieur 3, conformé de façon à présenter un encadrement 4, pour l'accès à un compartiment 5, pour les aliments. Une porte 6 est montée à charnières, telles que 7; elle comprend une paroi extérieure 8, avec une surface terminale 9, et une paroi interne 10.

Une garniture rectangulaire 11, en matière élastique, comme le caoutchouc ou une matière équivalente, est disposée contre la surface 9 de la paroi extérieure 8 de la porte, afin de constituer joint étanche.

Comme on le voit figures 2, 3 et 4, cette garniture 11 comporte une partie médiane 12. A partir de celle-ci on prévoit un prolongement, muni d'une nervure 13 de fixation à la porte. A cet effet, on utilise une ferrure 14, fixée à la paroi 8 de toute manière appropriée, par exemple au moyen de vis 15. Un talon 16 est formé sur une arête interne de 12, et s'appuie normalement contre la paroi 10.

Une partie creuse, tubulaire, 18, est reliée élastiquement à la partie 12, et comporte une nervure extérieure 19, dirigée vers la surface de l'encadrement 4 du châssis extérieur 3. On dispose à l'intérieur du tube 18, des aimants allongés 20, espacés les uns des autres. Le châssis 3 et l'encadrement 4 sont en matière magnétique, par exemple, en acier. Les aimants 20 sont attirés par la surface 4 et appuient la nervure de joint 19, de la partie tubulaire 18, contre ladite surface, comme expliqué au brevet principal.

La partie tubulaire 18 comporte également une extension continue, 21, dirigée vers l'extérieur et légèrement inclinée par rapport au réfrigérateur. La distance comprise entre la base de la nervure 13 de fixation et la partie supérieure de 21 est sensiblement égale à la distance comprise entre cette même base et la partie supérieure de la nervure 19 de ce joint. Autrement dit, les parties supérieures de 19 et de 21 sont dans un plan sensiblement parallèle à celui de la surface 9.

Quand la porte est suffisamment ouverte pour que la distance entre les aimants 20 et la surface 4

soit supérieure à celle qui existe entre lesdits aimants et la surface 9, ces aimants sont attirés par la surface 9, et la partie tubulaire 18 tourne autour de son attache élastique 17, agissant comme une sorte de charnière, de manière à se rapprocher de la porte 8 (fig. 2).

Pendant la fermeture de la porte, (fig. 3), la distance comprise entre les aimants 20 et la surface 4 diminue et, à un certain moment, les aimants sont attirés par cette surface, ce qui fait tourner la partie tubulaire 18 vers la surface 4, c'est-à-dire vers l'intérieur, autour de la charnière 17. On voit, figure 3, que l'extension 21 s'appuie sur la surface 4, avant la nervure 19 de joint.

Ensuite, l'attraction des aimants 20, vers la surface 4, fait tourner la partie 18 vers l'extérieur, autour du point de contact de 21 et de 4, vers cette surface 4. Cette rotation continue jusqu'à ce que la nervure 19 entre en contact avec cette même surface; à ce moment, l'entrefer minimum existe entre les aimants 20 et la surface 4, à travers la paroi du tube 18 au voisinage de la nervure 19, et entre l'extension 21 et cette même nervure. Il en résulte que les aimants 20 ont tendance à continuer à faire tourner la partie tubulaire 18, vers l'extérieur, autour du point de contact de 21 et de 4, ce qui maintient la nervure 19 contre la surface 4, de manière à constituer un joint satisfaisant.

Cette tendance de la partie 18 de continuer à tourner vers l'extérieur, crée des forces à travers la charnière 17 et la partie centrale 12, qui favorisent l'appui du talon 16 contre la paroi interne 10. On diminue ainsi la distance entre la partie 12 et la paroi 10, ce qui améliore le joint autour de l'ouverture d'accès au compartiment pour les aliments.

Un joint satisfaisant est en général difficile à réaliser dans les coins. Selon l'invention, grâce à la tendance de la partie 18 de tourner vers l'intérieur, autour de la charnière 17, lorsqu'on ferme la porte, les coins de la garniture sont soumis à une compression, dans le sens des flèches 22 de la figure 5. Comme on l'a dit ci-dessus, la garniture 11 est en matière élastique, et, à cause de sa conformation, elle peut facilement s'incurver dans la

partie 17 formant charnière. Par conséquent, à cause des forces de compression, les parties de la nervure 19, situées aux coins formés par la partie tubulaire 18, se déforment facilement pour se conformer aux surfaces des coins de la surface 4, et constituent des joints satisfaisants dans lesdits coins.

Bien qu'on n'ait représenté et décrit qu'un mode préféré de réalisation de l'invention, il est bien entendu que l'on ne désire pas se limiter à ces formes particulières données simplement à titre d'exemple, et sans aucun caractère restrictif et que, par conséquent, toutes les variantes utilisant les mêmes moyens techniques et ayant même objet que les dispositions indiquées ci-dessus rentrent comme elles dans le cadre de l'invention.

RÉSUMÉ

La présente addition a pour objet des perfectionnements aux fermetures magnétiques étanches décrites dans le brevet principal et ses additions précédentes, en vue d'améliorer encore le joint.

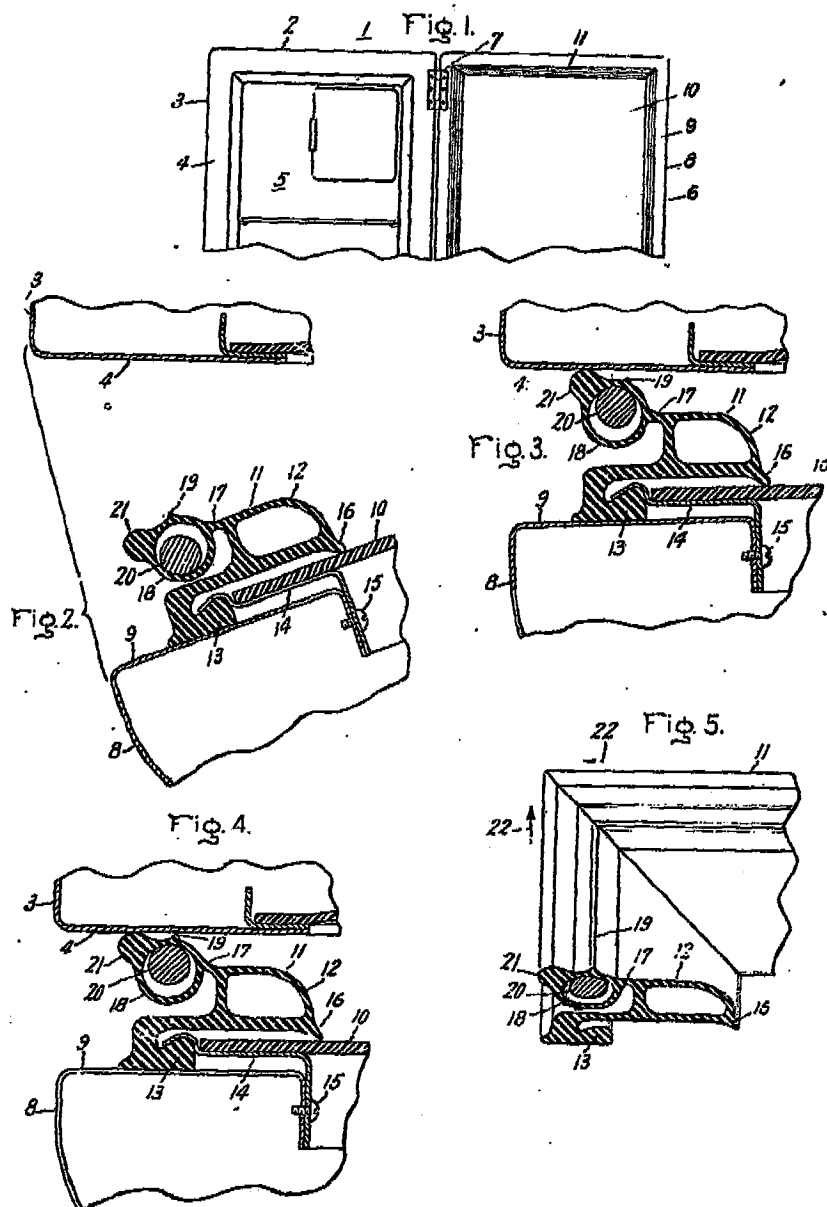
Elle est caractérisée notamment par les points suivants pris séparément, ou en combinaison partielle ou totale.

a. La garniture comporte une partie centrale à laquelle se raccordent élastiquement, d'une part, un prolongement muni d'une nervure de fixation à la porte et un talon faisant joint avec la paroi interne de cette porte et, d'autre part, une partie tubulaire, contenant les aimants, et raccordée à la partie centrale par une bande élastique formant charnière.

b. Cette partie tubulaire comporte une nervure continue destinée à former joint avec le réfrigérateur, et une extension continue, dirigée vers l'extérieur, destinée à faire assurer un joint satisfaisant à ladite nervure, avec le réfrigérateur.

A titre de produits industriels nouveaux, les réfrigérateurs munis d'une garniture de joint conforme à l'invention.

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Patent Abstracts of Japan

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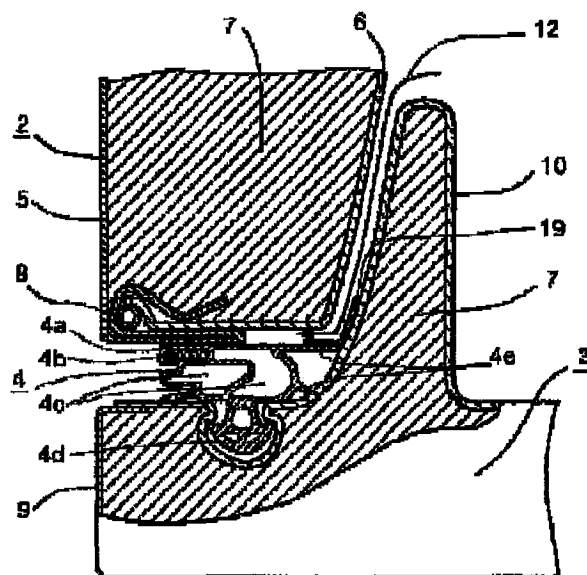
APPLICATION DATE : 19-03-97
APPLICATION NUMBER : 09066072

APPLICANT : HITACHI LTD;

INVENTOR : ISHIOKA TERUKAZU;

INT.CL. : F25D 23/02 E04B 1/684

TITLE : REFRIGERATOR



ABSTRACT : PROBLEM TO BE SOLVED: To attain a heat insulating property, durability and a property of design together at a high level by a method wherein the tips of fins positioned on the innermost side of a packing in respect to a refrigerator is brought into close contact with an inside-door plate of a door by bonding or fixing.

SOLUTION: A packing 4 made mainly of soft vinyl chloride is fixed in a packing fixing groove 11 provided in the periphery of the rear of a box body 2 being opposite to the front thereof, in such a manner that a fixing part 4d of the base thereof is fitted in the groove. The packing 4 has a structure wherein a closing part 4a forming the surface near to the outside of a refrigerator comes into close contact with the front of the box body 2 to which it is opposed, by utilizing a magnetic force acting in a magnet 4b provided just inside the closing part 4a and in an outer box 5 of the box body 2 and also the elastic deformation in the height direction of the packing given by an air chamber formed inside, so that it may function for sealing when a door 3 is closed. Fins 4e formed on the in-refrigerator side of the packing 4 comes into contact with the surface of an inner plate 10 of the refrigerator and functions for enhancing a heat insulating property in the width direction of the packing 4, together with the air chamber 4c formed inside the packing, due to air layers partitioned by these parts.

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US00553311A

United States Patent [19]

Tirrell et al.

[11] Patent Number: 5,533,311

[45] Date of Patent: Jul. 9, 1996

[54] THERMOFORMED PLASTIC
REFRIGERATOR DOOR

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52/784.16; 52/792.1; 49/501; 312/405

[58] Field of Search 52/784.1, 784.13-784.16,
52/783.1, 792.1, 793.1, 309.9, 309.1; 49/501;
312/405, 405.1, 406.2, 321.5

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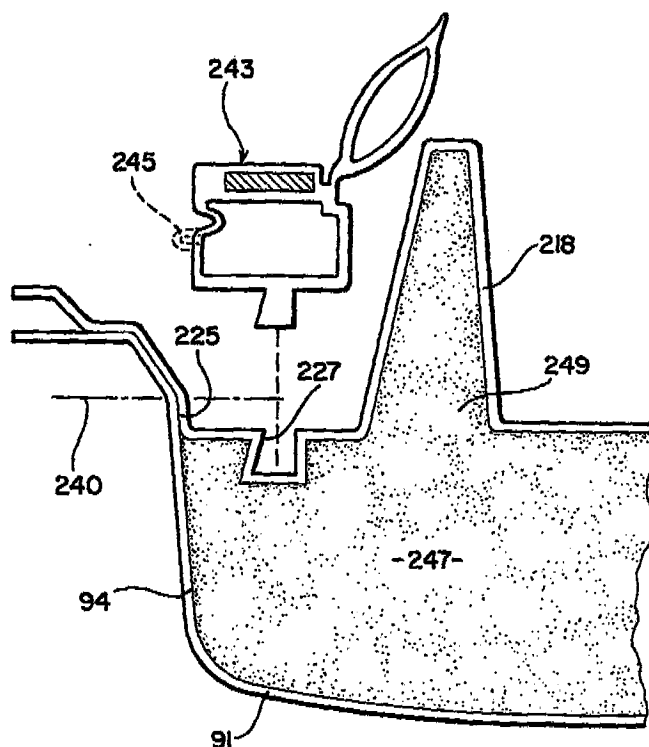
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Primary Examiner—Robert J. Canfield
Attorney, Agent, or Firm—Bacon & Thomas

[57] ABSTRACT

A unitary plastic refrigerator door is produced by simultaneously thermoforming an outer refrigerator door panel with an inner refrigerator door liner. During production, an annular flange portion of the inner refrigerator door liner is joined with an annular sidewall portion of the outer refrigerator door panel at an attachment location positioned inwardly of the annular side wall portion. The inner refrigerator door liner is also formed with either an annular recess or a plurality of spaced recesses in its annular flange portion adjacent the attachment location of the inner refrigerator door liner and the outer refrigerator door panel that is adapted to press-fittingly receive a door gasket. Preferably, the outer refrigerator door panel includes a thickened portion that is formed with a handle defining recess. A method of thermoforming the refrigerator door is also provided and advantageously enables the inner refrigerator door liner to be produced on a male mold member.

8 Claims, 13 Drawing Sheets



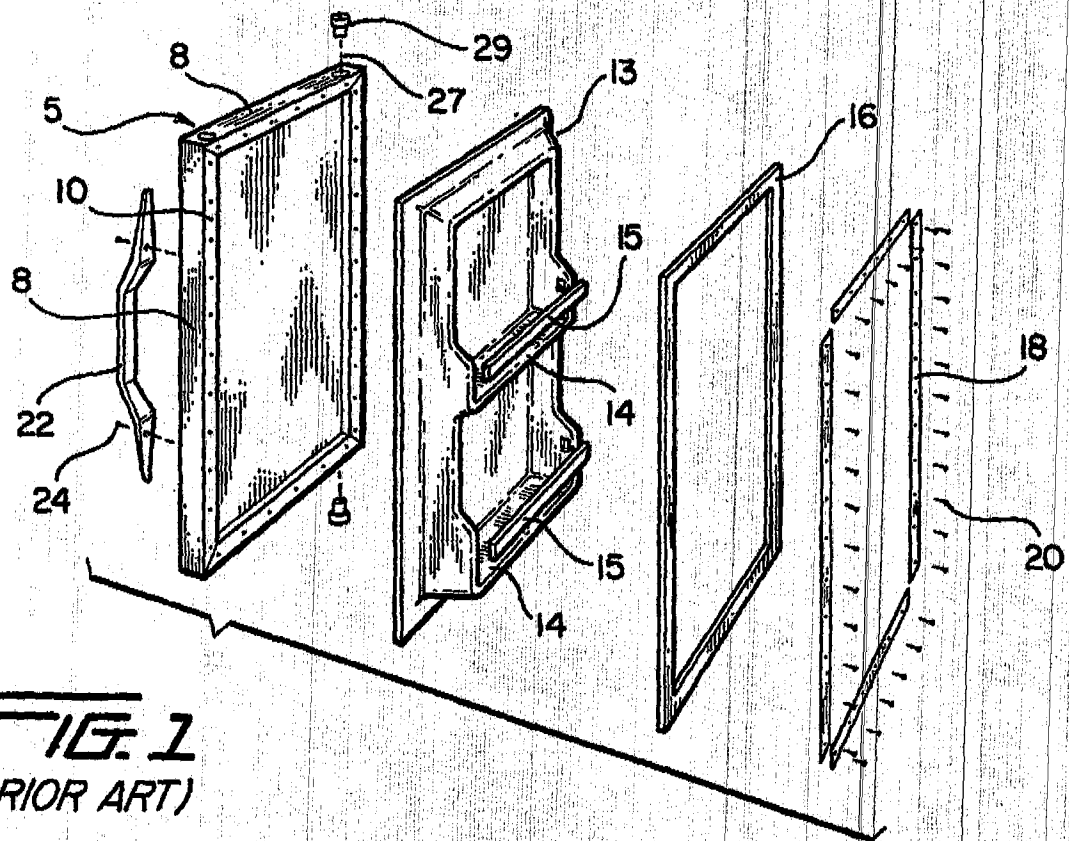


FIG. 1
(PRIOR ART)

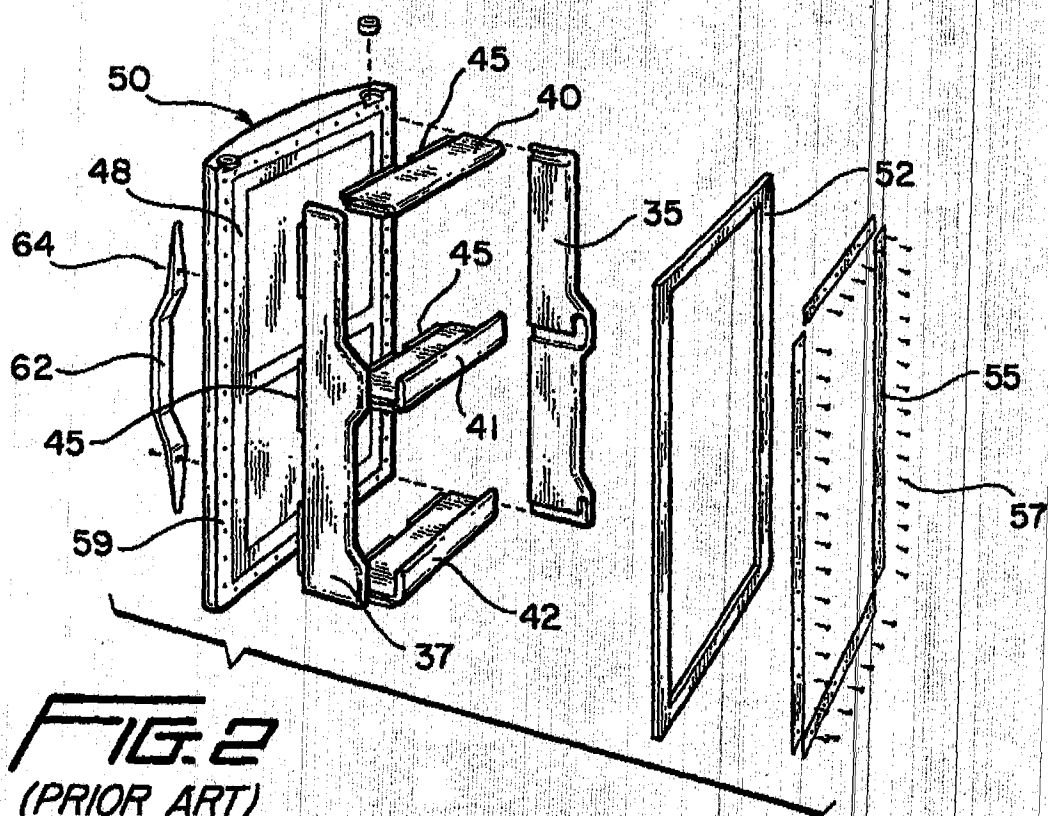


FIG. 2
(PRIOR ART)

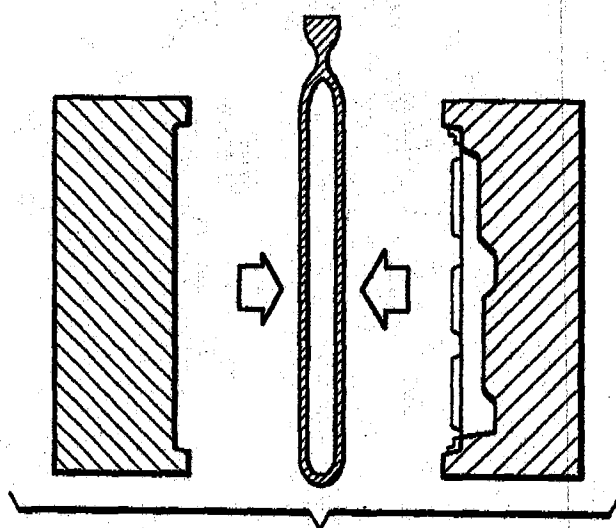


FIG. 3a
(PRIOR ART)

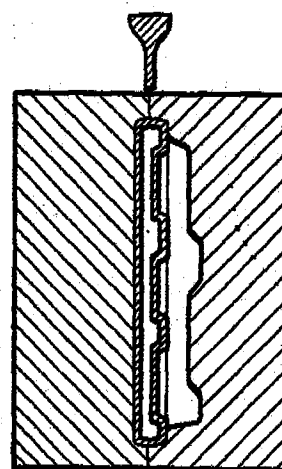


FIG. 3b
(PRIOR ART)

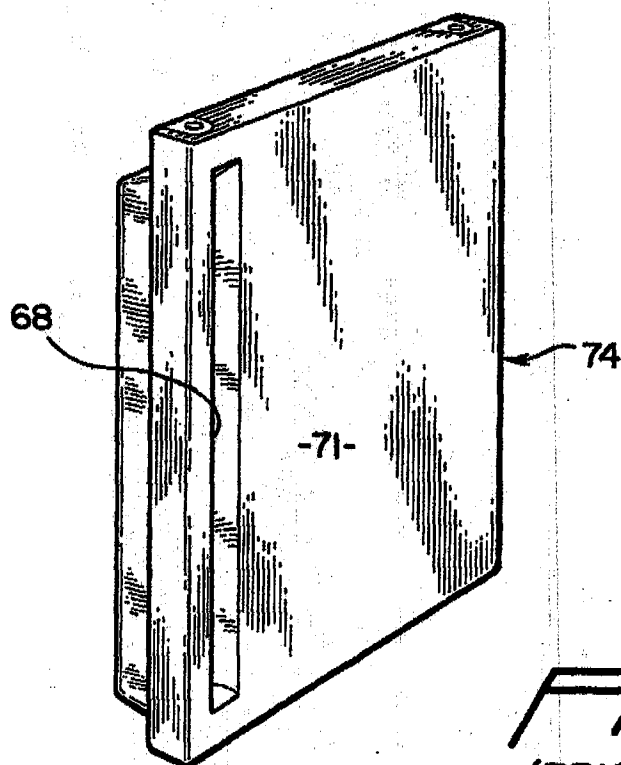


FIG. 4
(PRIOR ART)

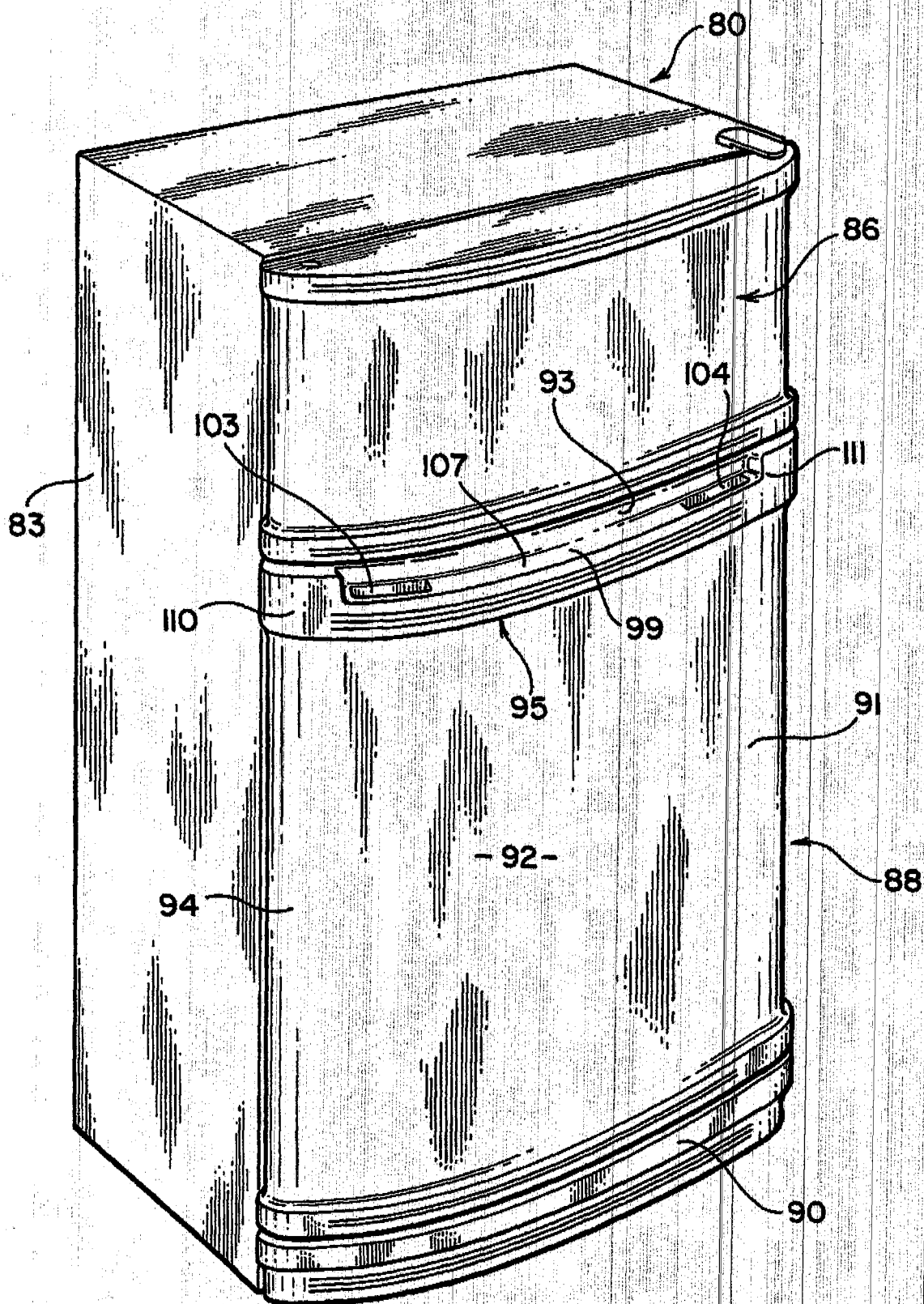
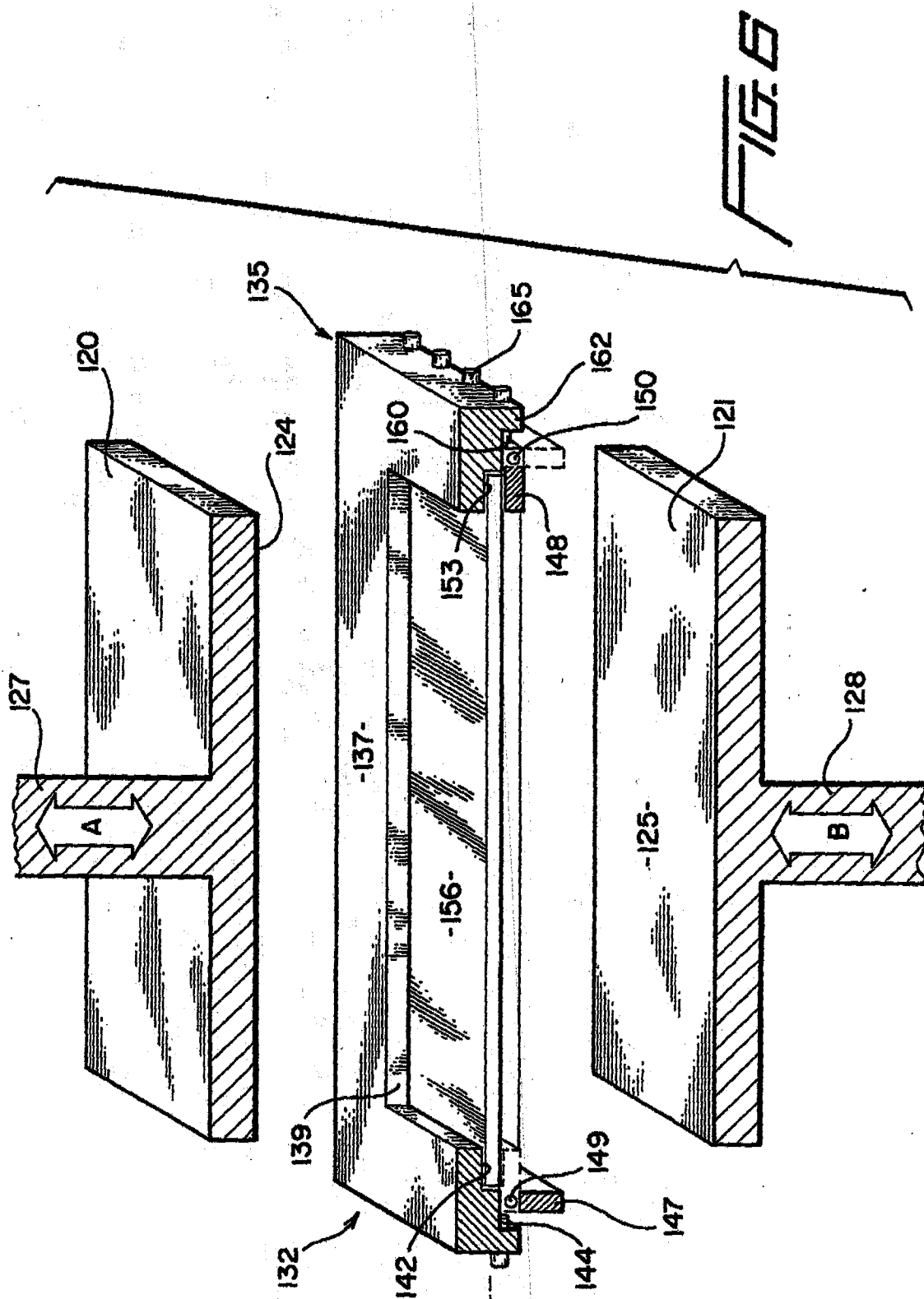
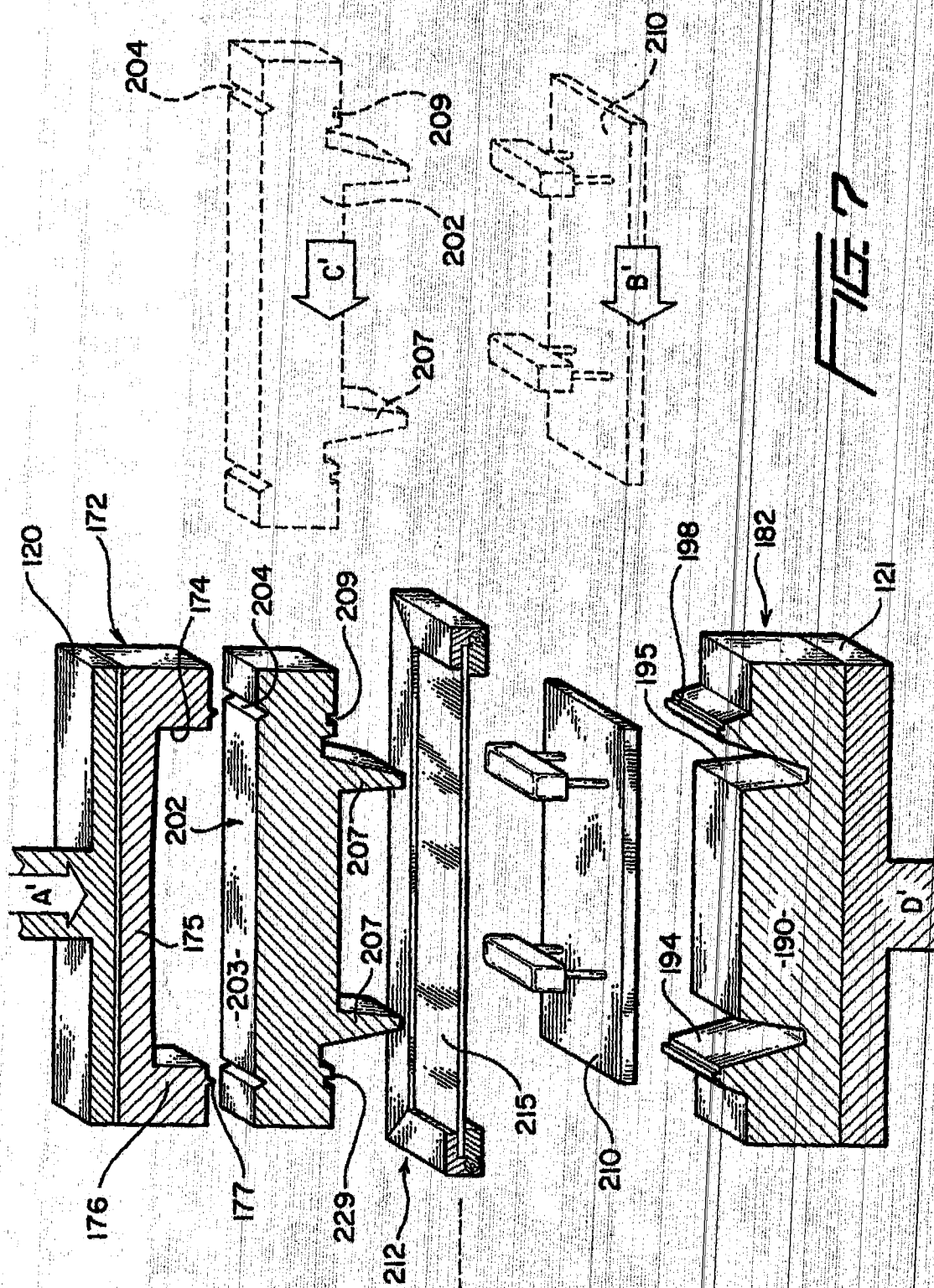


FIG. 5

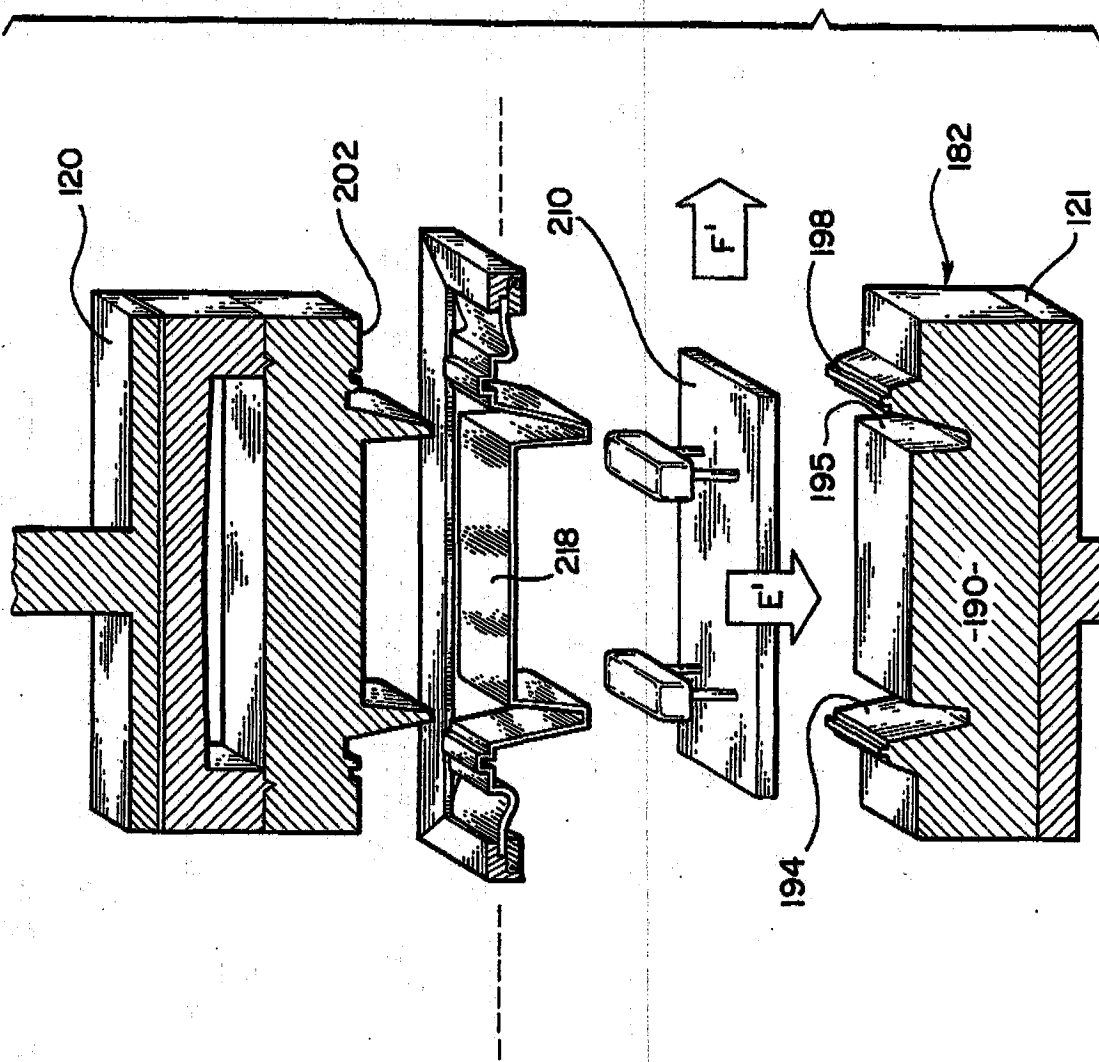
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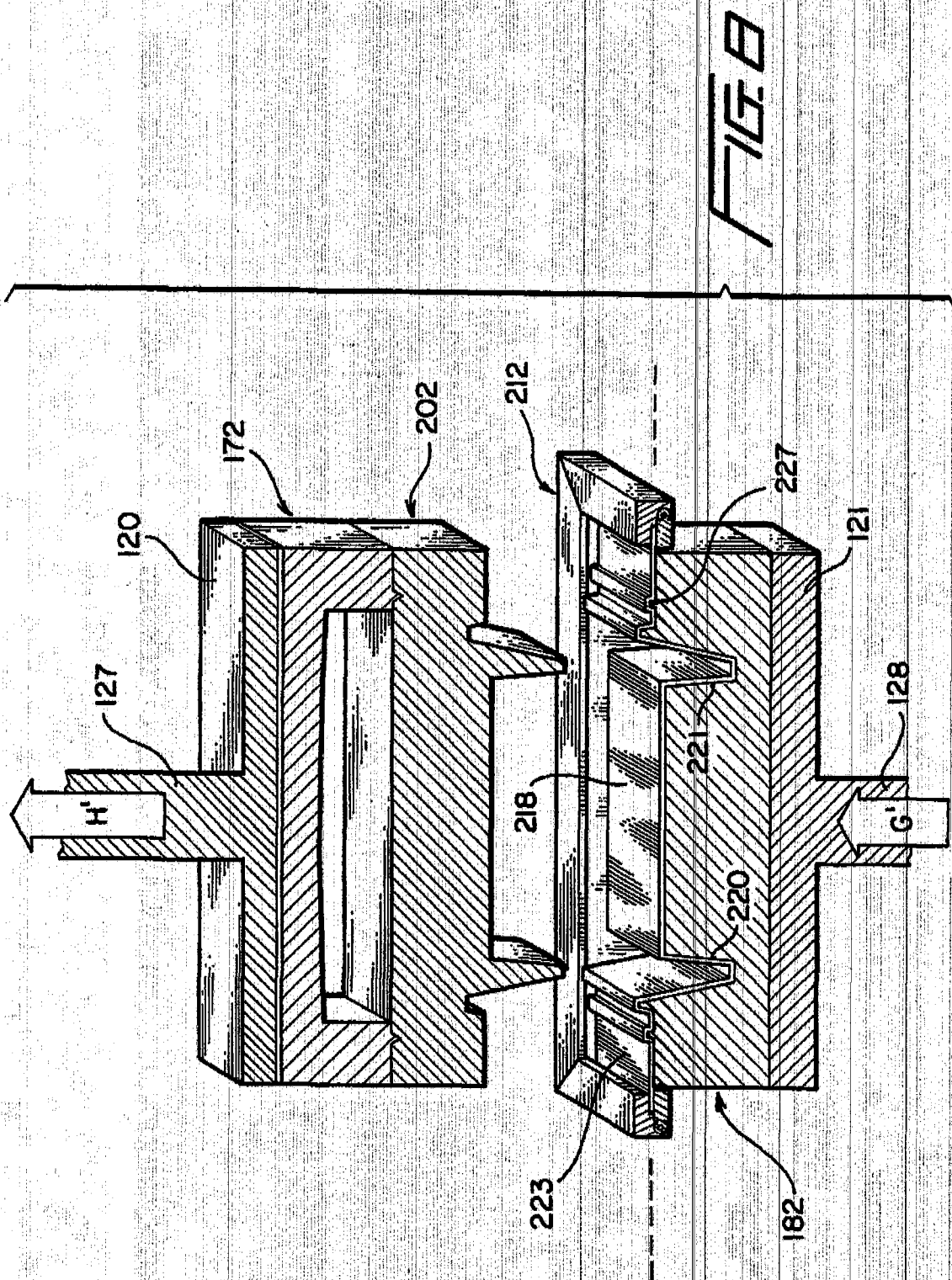




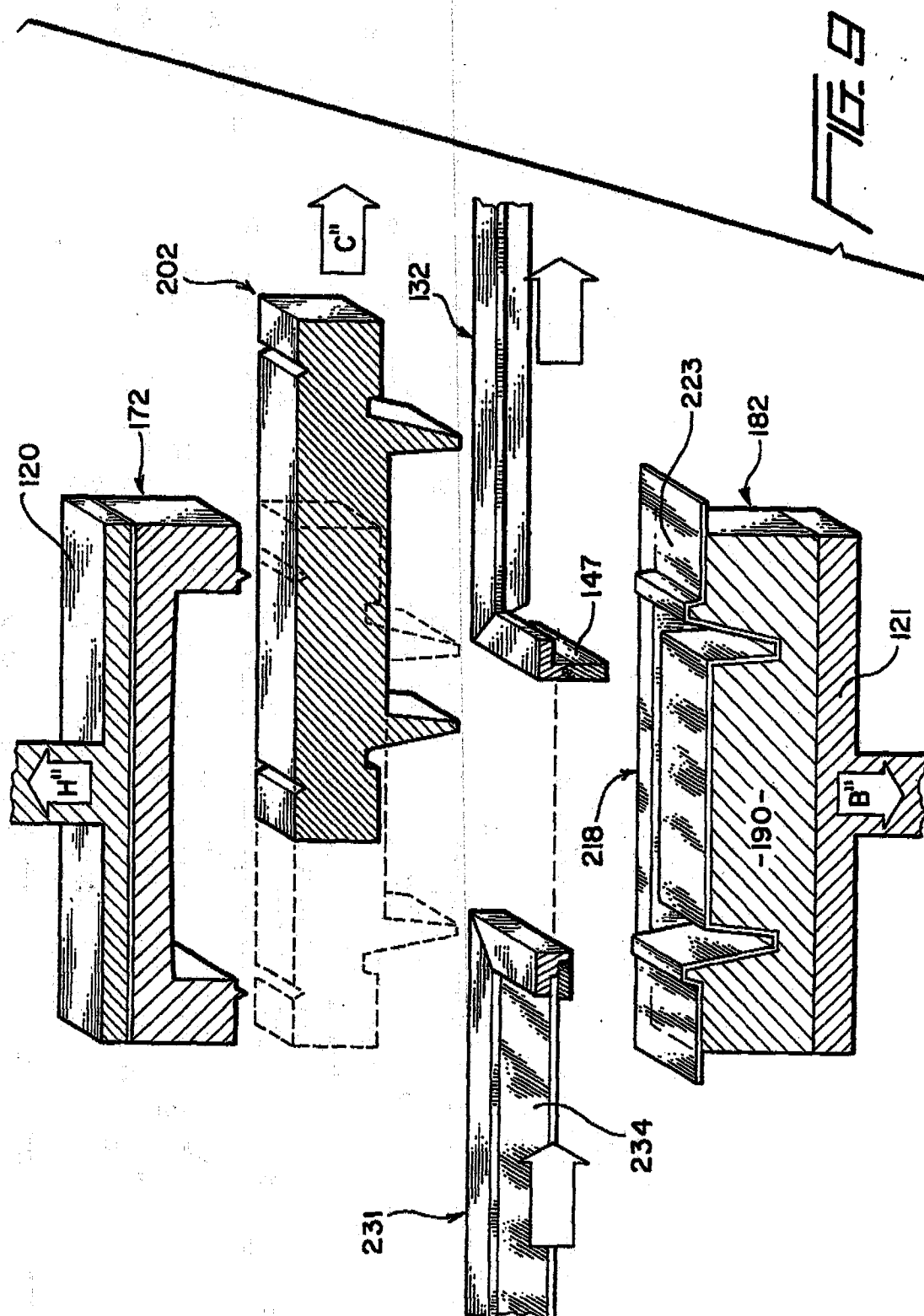
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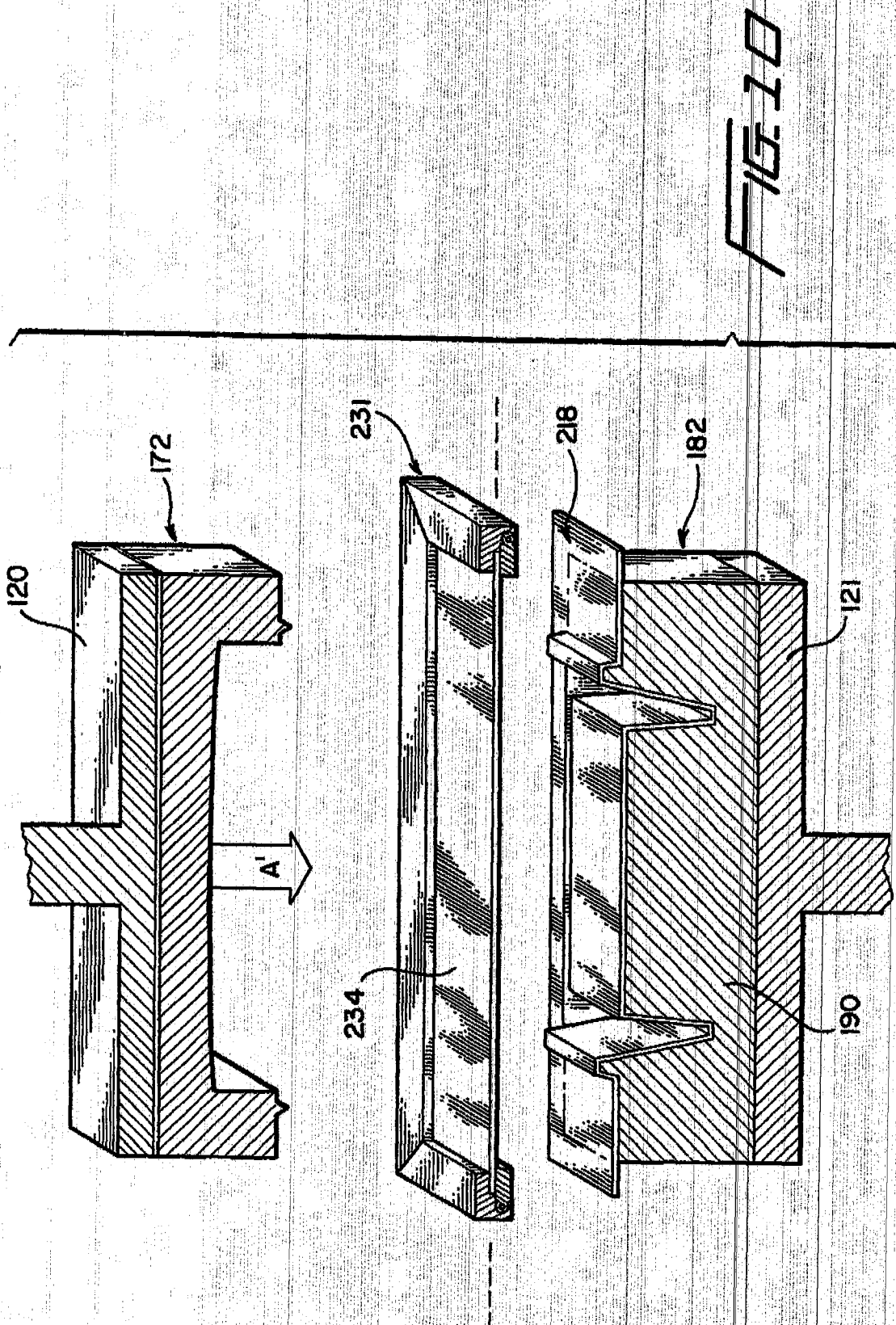
FIG 7A



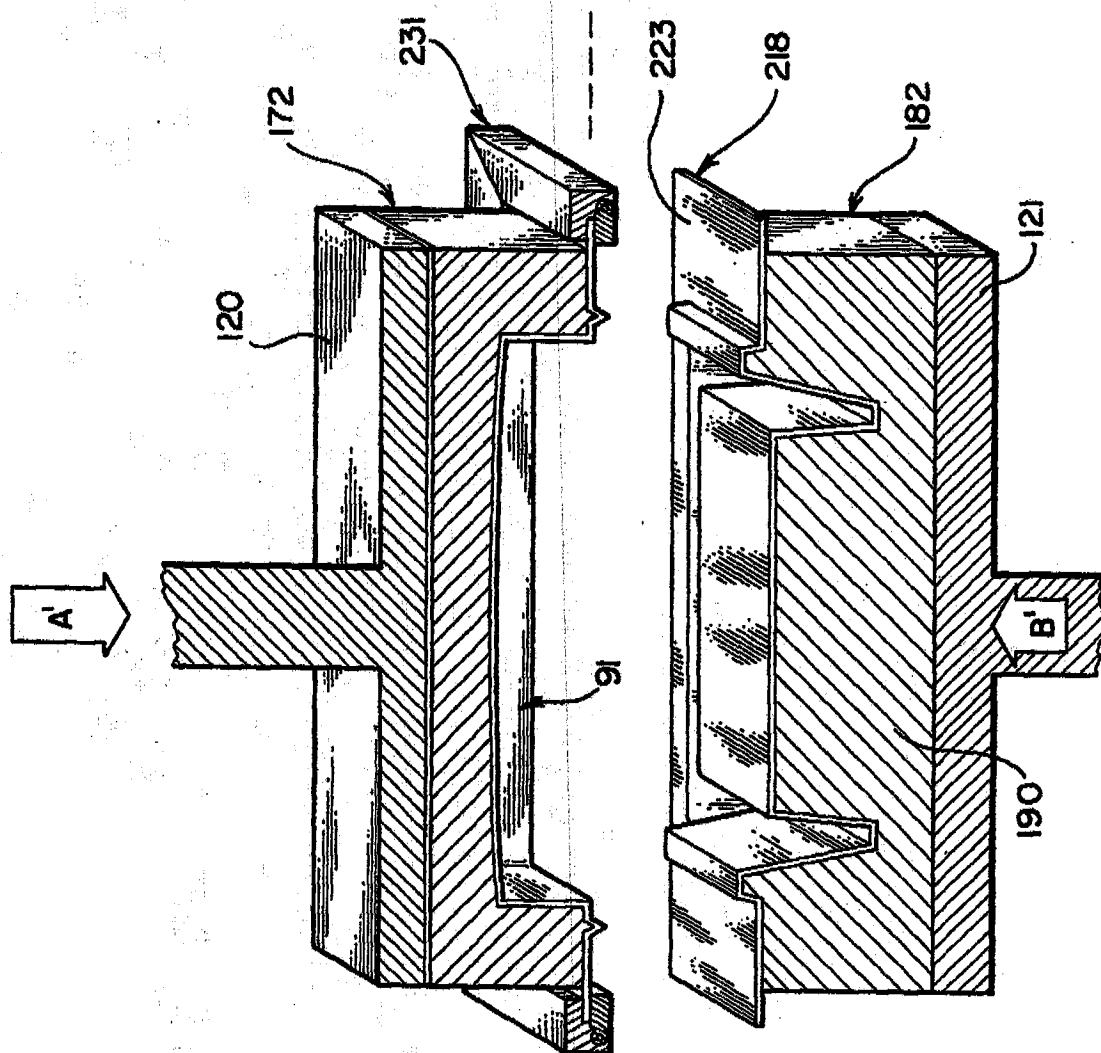


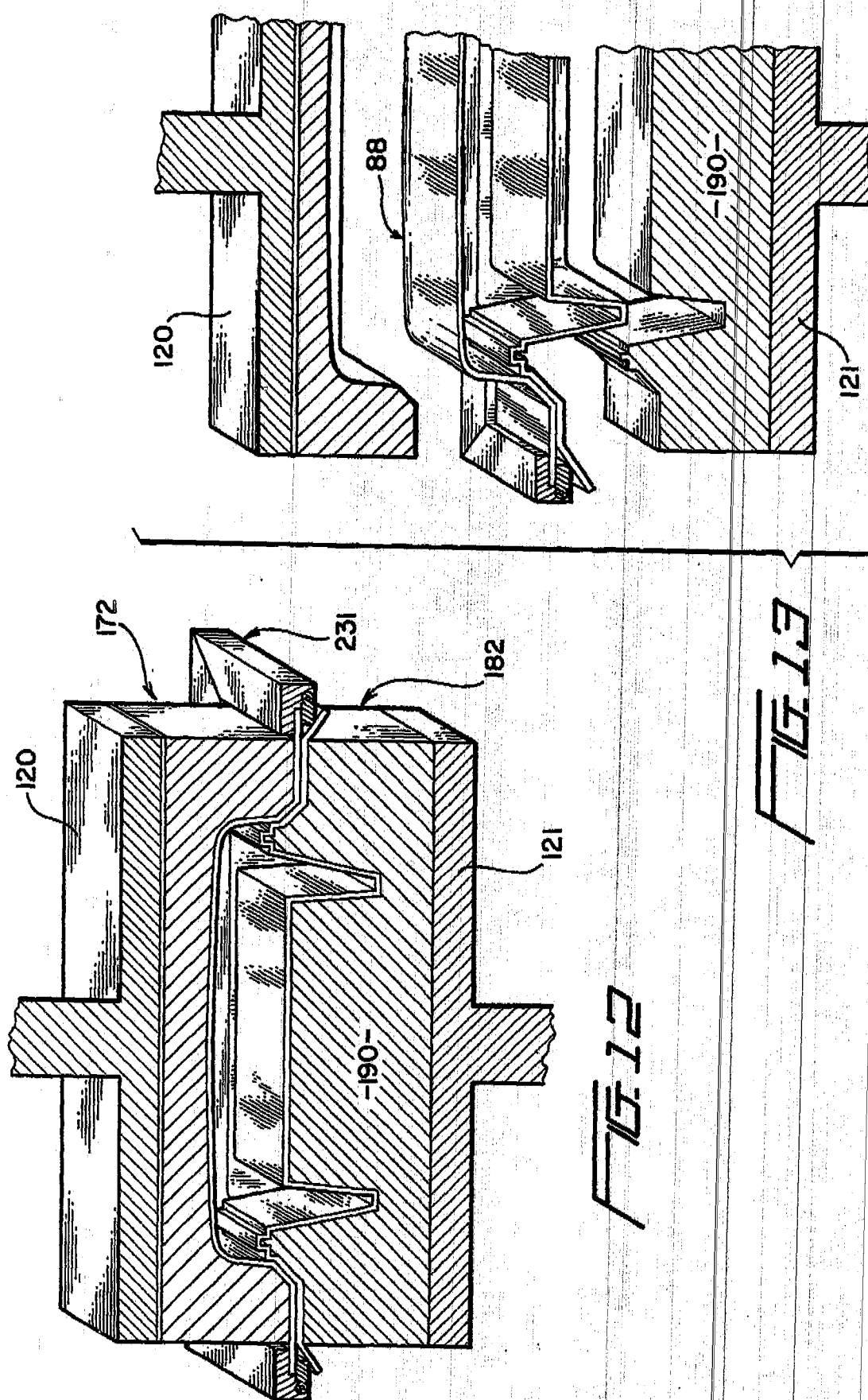
83 84





FLG 11





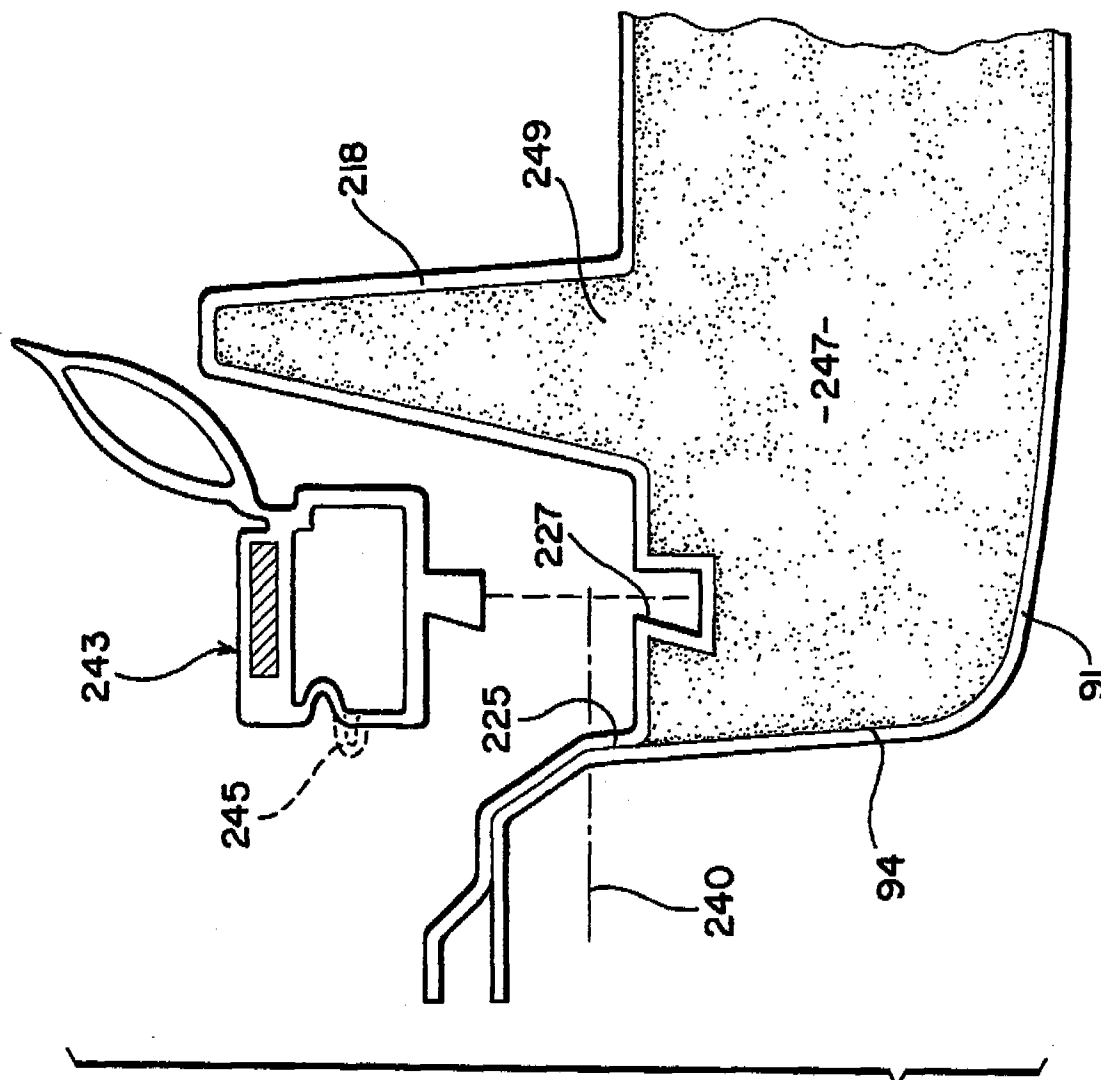
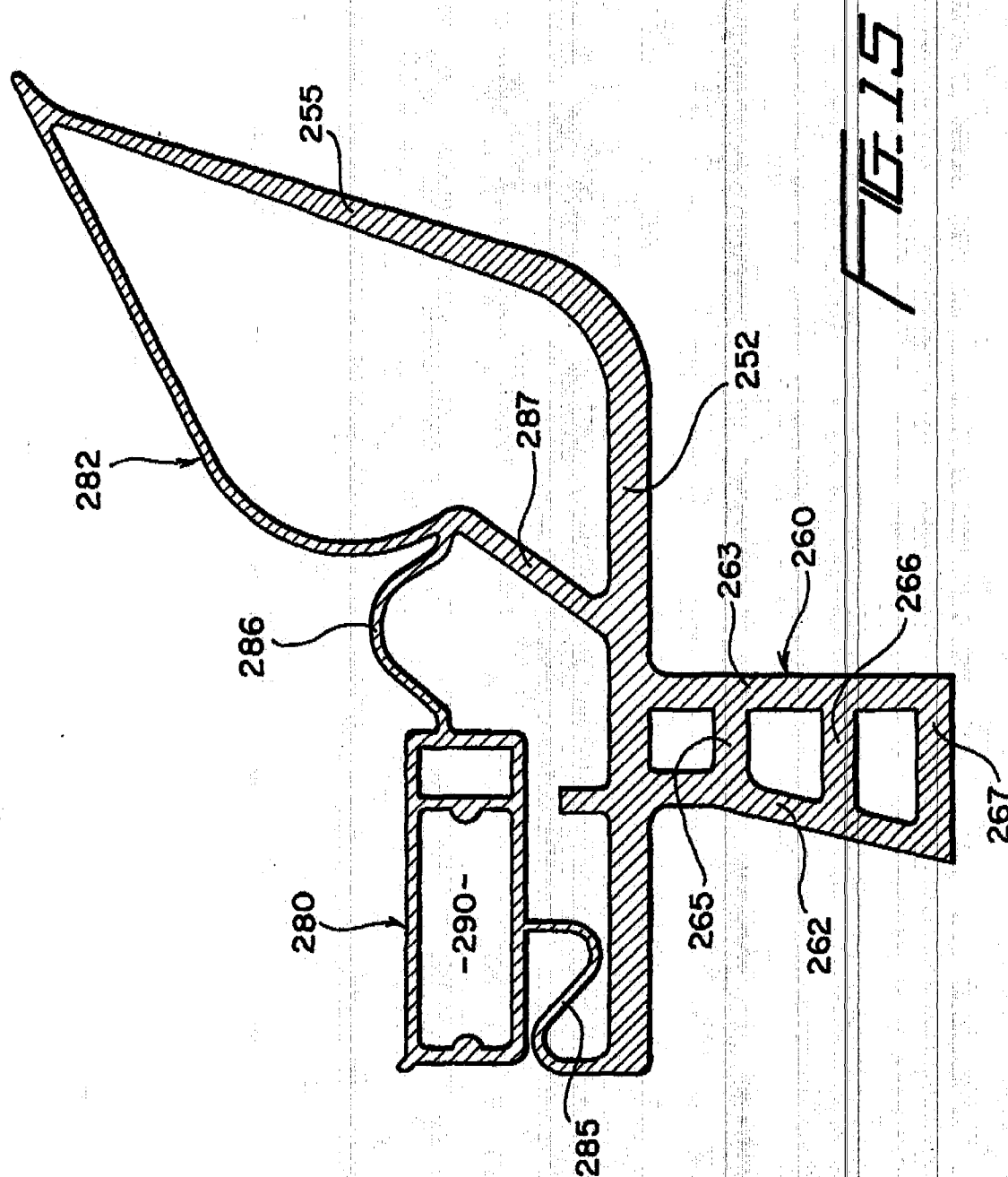


FIG 14



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THERMOFORMED PLASTIC REFRIGERATOR DOOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention pertains to the art of refrigerators and, more specifically, to a unitary plastic refrigerator door, as well as a method of thermoforming the plastic refrigerator door from two plastic sheets.

2. Discussion of the Prior Art

It is commonly known to produce a refrigerator door by independently manufacturing the various components that combine to make the door and then, in a separate manufacturing step, assembling the various components. For example, as represented in FIG. 1 of this application, it is common to form an outer refrigerator door panel 5 from a single stamped sheet of metal which is folded in order to form sides 8 and inwardly turned flanges 10. The inner liner 13 associated with such a refrigerator door is often thermoformed on a male mold member. In general, such an inner liner 13 is made on the male mold member because of the high draw ratios that would be involved with the use of a female mold member. Once the outer refrigerator door panel 5 and the inner refrigerator door liner 13 are formed, inner liner 13 is secured to door panel 5 along flanges 10, along with an annular gasket 16, by means of a plurality of connecting strips 18 and screws 20. A separate handle 22 is then secured to outer refrigerator door panel 5 by means of screws 24. Outer refrigerator door panel 5 is also generally formed with upper and lower aligned holes 27 which are adapted to receive pivot bushings 29 for mounting the assembled refrigerator door to a refrigerator cabinet. For insulation purposes, it is also known to inject foam between refrigerator door panel 5 and inner liner 13 after complete assembly of the refrigerator door.

The manufacturing procedure associated with constructing such a refrigerator door formed from various, individually produced components which are later assembled together, is inefficient. Such a process is extremely time consuming and requires various manufacturing stages wherein the individual components are made and assembled. In addition, since the outer refrigerator door panel 5 is made of metal, its outer surface must be painted for aesthetic purposes. The need for these multiple manufacturing stages obviously increases the overall costs associated with manufacturing such a refrigerator door.

It is also been proposed to manufacture a hollow refrigerator door formed entirely from plastic. Such an arrangement is generally shown in FIGS. 2, 3a and 3b and disclosed in U.S. Pat. No. 5,306,082. According to this method of making a refrigerator door, the first step in the manufacturing process involves independently making the individual components which combine to form the inner door members. As shown in FIG. 2, these inner components generally constitute opposing side members 35, 37 and a plurality of shelf defining members 40-42. In general, these interior components are separately blow molded by arranging two parallel sheets of plastic between first and second mold members (see FIGS. 3a and 3b), closing the mold members so as to pinch the sheets about outer perimeters thereof and injecting air between the sheets so as to cause the sheets to expand against the mold members. Side members 35, 37 and shelf members 40-42 are formed with tabs 45 which are adapted to extend within slots 48 formed in an outer door panel 50 that is constituted by a hollow plastic slab which is

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also blow molded. In a final stage of the blow molding of the outer door panel 50, the tabs 45 provided on side members 35, 37 and shelf members 40-42 are positioned within slots 48 such that slots 48 form about tabs 45 in order to secure side members 35, 37 and shelf members 40-42 to outer door panel 50. An annular gasket 52 is then secured by means of connecting strips 55 and screws 57 to an outer annular flange portion 59 of door panel 50. In addition, a separate handle 62 is secured to door panel 50 by means of screws 64.

The refrigerator door construction arrangement as represented by FIGS. 2, 3a and 3b has several advantages over the construction arrangement represented in FIG. 1 and discussed above. First, the entire refrigerator door of the FIG. 2 arrangement is formed from plastic and therefore its desired shape can be readily varied. In addition, such a manufacturing operation does not require a subsequent painting stage for outer door panel 50. Furthermore, making the outer door panel 50 from plastic can provide some additional heat efficiency benefits since the metal door panel of the FIG. 1 arrangement will be a better conductor of heat into the refrigerator than the plastic door. Finally, the use of plastic presents the ability to integrally form the outer door panel with a handle as also proposed in the prior art and represented in FIG. 4.

However, these previously proposed all-plastic refrigerator door arrangements suffer from various drawbacks. For example, the various components which make up each of the refrigerator doors are still separately manufactured and subsequently assembled. As indicated above, this is considered inefficient as it adds to the manufacturing time and cost associated with making such doors. Furthermore, the known all-plastic refrigerator door arrangements are generally not aesthetically appealing since the interconnection between the various components are often noticeably visible and there will be a pinch line where the mold halves close. Finally, although forming an outer door panel of plastic with an integrally formed handle reduces manufacturing costs associated with the outer door panel and is rather aesthetically appealing, the prior proposed system as represented in FIG. 4 forms the handle, generally indicated in 68, by creating a recess in the front surface 71 of the outer door panel 74 which inherently reduces the energy efficiency of the refrigerator door as a whole due to its reduced thickness. In addition, there is no practical way in the prior art to use different materials or colors for the inner and outer refrigerator door panels.

Therefore, there exists a need in the art for a plastic refrigerator door which can be produced in a minimum number of manufacturing stages so as to reduce the manufacturing costs associated with the refrigerator door. In addition, there exists a need in the art for a all-plastic refrigerator door and method of making the same wherein the energy efficiency associated with the refrigerator door is maintained or increased. Finally, there exists a need in the art for an aesthetically appealing plastic refrigerator door.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved all-plastic refrigerator door which minimizes the manufacturing stages and associated costs of producing such a door.

It is another object of the invention to produce a plastic refrigerator door including an integrally formed handle that does not reduce the overall energy efficiency characteristics of the refrigerator door.

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It is a further object of the present invention to produce an aesthetically pleasing all-plastic refrigerator door.

These and other objects of the present invention are achieved by simultaneously thermoforming an outer refrigerator door panel with an inner refrigerator door liner. By this arrangement, an annular flange portion of the inner refrigerator door liner is joined with an annular sidewall portion of the outer refrigerator door panel at an attachment location positioned inwardly of the annular sidewall portion wherein the attachment location is not visible from the front and sides of the refrigerator door. The inner refrigerator door liner is also formed with either an annular recess or a plurality of spaced recesses in its annular flange portion adjacent the attachment location of the inner refrigerator door liner and the outer refrigerator door panel in order to press-fittingly receive a door gasket. Preferably, the outer refrigerator door panel includes a thickened portion that is formed with a handle defining recess located outside of the door shelf and side dike perimeter of the inner refrigerator door liner. A method of thermoforming the refrigerator door is also provided and advantageously enables the inner refrigerator door liner to be produced on a male mold member.

Other objects, features and advantages of the invention should become apparent from the following detailed description of a preferred embodiment thereof, when taken in conjunction with the drawings wherein like reference numerals refer to corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of a refrigerator door constructed in accordance with the prior art.

FIG. 2 is an exploded view of another refrigerator door constructed in accordance with the prior art.

FIG. 3a is a cross-sectional view of a molding device used to make the refrigerator door FIG. 2 in its open state.

FIG. 3b is a cross-sectional view of a molding device of FIG. 3a in its closed state.

FIG. 4 is a perspective view of a still further plastic refrigerator door constructed in accordance with the prior art.

FIG. 5 is a perspective view of a refrigerator incorporating a unitary all-plastic refrigerator door constructed in accordance with the present invention.

FIG. 6 is a partial cross-sectional view of various components used in manufacturing of the refrigerator door of FIG. 5.

FIG. 7 illustrates an initial stage in the manufacturing method of the present invention to produce the refrigerator door of FIG. 5.

FIG. 7A is a view of the molding apparatus of FIG. 7 in another stage.

FIG. 8 is a partial schematic view of the molding apparatus of FIG. 7 in a subsequent manufacturing stage.

FIG. 9 is a partial schematic view of the molding apparatus of FIG. 7 in a still further manufacturing stage.

FIG. 10 is a partial schematic view of the molding apparatus utilized in accordance with the present invention in an initial refrigerator door panel manufacturing stage.

FIG. 11 is a partial schematic view of the molding apparatus utilized in accordance with the present invention in a subsequent refrigerator door panel manufacturing stage.

FIG. 12 is a partial schematic view of the molding apparatus in a final refrigerator door molding stage.

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FIG. 13 is a partial schematic view of the molding apparatus in an open state following completion of the molding operation.

FIG. 14 is an enlarged sectional view of a portion of the molded refrigerator door of the present invention.

FIG. 15 is a cross-sectional view of a preferred gasket construction incorporated in the refrigerator door of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 5 schematically depicts a refrigerator 80 constructed in accordance with the present invention. Refrigerator 80 generally includes a cabinet 83 having various compartments (not shown) formed therein that are selectively closed off by a freezer compartment door 86 and a refrigerator compartment door 88. Refrigerator 80 further includes a kick plate 90. It should be noted that the structure of cabinet 83 and kickplate 90 are not considered part of the present invention and therefore will not be further discussed herein. In addition, it should be noted that, although particular reference will be made to refrigerator compartment door 88 in describing the plastic refrigerator door and its method of manufacture in accordance with the present invention, it should be readily understood that the term "refrigerator door" refers to either a freezer compartment door or a refrigerator compartment door. Therefore, the present invention is equally applicable to combination refrigerator/freezers or dedicated refrigerator or freezer units.

Refrigerator compartment door 88 includes an outer refrigerator door panel 91 and an inner refrigerator door liner (not shown in FIG. 5) as will be more fully discussed below. Outer refrigerator door panel 91 includes an outer wall portion 92 having an associated surface 93 and an inwardly turned annular sidewall 94. Outer wall portion 92 includes a thickened portion 95 that projects slightly outwardly from surface 93. A plateau section 99 includes left and right recess defining handles 103, 104 that are defined between a central plateau section 107 and left and right upstanding, thickened end portions 110, 111 of thickened portion 95. As is commonly known in the art, refrigerator door panel 91 can be pivotally mounted about a vertical axis to either the left or right hand sides of cabinet 83. For this reason, the left and right halves of refrigerator door panel 91 are preferably symmetrically formed with the left and right recess defining handles 103, 104. However, it should be readily understood that refrigerator door panel 91 could be designed for use in connection with a refrigerator 80 having a predetermined door opening side wherein only one handle may be required. In addition, although thickened portion 95 is depicted in the preferred embodiment of FIG. 5 to be located at the upmost portion of refrigerator door panel 91, it should be readily understood that thickened portion 95 could be repositioned in order to locate handles 103 and 104 at a desired location and orientation. Since thickened portion 95 projects outwardly from surface 93, the formation of handles 103 and 104 do not detract from the overall energy efficiency of refrigerator door panel 91. In other words, the heat transfer characteristics associated with refrigerator door panel 91 are only increased by the presence of thickened portion 95 as opposed to the inherent decrease in the desired heat transfer characteristics that could be present if a handle was defined by a recess formed inward of surface 93.

In accordance with the preferred embodiment, refrigerator compartment door 88 is made by a thermoforming process which advantageously enables the particular shape of refrig-

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erator door panel 91 to be readily altered if desired. In addition, in accordance with the method of thermoforming a refrigerator door in accordance with the present invention, refrigerator compartment door 88 can be advantageously made from two plastic sheets utilizing a single molding apparatus and with a liner associated with refrigerator compartment door 88 being formed on a male mold member as now will be discussed with reference to FIGS. 6-13.

Initial reference will be made to FIG. 6 in describing a few of the basic components utilized in the process of thermoforming refrigerator compartment door 88. The thermoforming apparatus includes upper and lower platens 120, 121 each of which defines support surfaces 124 and 125 respectively. Upper and lower platens 120, 121 are integrally formed and are fixedly secured to control arms 127 and 128 respectively. Control arms 127 and 128 form part of or are attached to linear actuators (not shown), such as hydraulic, electric or pneumatic actuators, in order to reposition upper and lower platens 120, 121 vertically as depicted in FIG. 6 and represented by arrows A and B. The basic shifting arrangement for upper and lower platens 120, 121 has not been detailed in the drawings since such an arrangement is commonly known in the art of thermoforming articles and is therefore not considered an inventive aspect of the present invention.

FIG. 6 also illustrates a sheet supporting and shuttling member 132 utilized in the thermoforming method of the present invention. Sheet supporting and shuttling member 132 includes a clamping frame 135 having an upper annular frame member 137 provided with a central cut-out portion 139. Central cut-out portion 139 is sized in relation to the size of the molds that are attached to the upper and lower platens 120 and 121 so as to be slightly larger than the molds whereby the molds can be positioned entirely within central cut-out portion 139. Upper annular frame member 137 is provided with first and second undercut portions 142 and 144. As shown in FIG. 6, a pair of sheet retaining members 147, 148 are pivotally attached by means of rods 149, 150 to second undercut portion 144 of upper annular frame member 137. Through rods 149, 150, sheet retaining members 147, 148 can pivot between a sheet releasing position as indicated by the solid lines for sheet retaining member 147 on the left side of the upper annular frame member 137 in FIG. 6 and a sheet clamping position as illustrated by the position of sheet retaining member 148 in solid lines on the right side of FIG. 6. When sheet retaining members 147, 148 are in their respective clamping positions, an annular space 153 is defined between upper annular frame member 137 and sheet retaining members 147, 148 which is used to retain a plastic sheet 156. In this manner, plastic sheet 156 can be selectively supported by sheet supporting and shuttling member 132 within annular space 153 or can be released by pivoting members 147, 148. It should be noted that although only two sheet retaining members 147, 148 are depicted in FIG. 6 due to the view taken, additional sheet retaining members could be provided on the other opposing sides of sheet supporting and shuttling member 132. In particular, these additional sheet retaining members may be highly desired depending upon the required thickness of plastic sheet 156. In the preferred embodiment, for support purposes, all four sides of clamping frame 135 are provided with pivotable sheet retaining members.

Each sheet retaining member 147, 148 includes an outermost terminal end 160 that is spaced inward a predetermined distance from a downwardly extending portion 162 of upper annular frame member 137. This predetermined distance permits each sheet retaining member 147, 148 to freely

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pivot about its respective rod 147, 149. In order to prevent undesired pivoting of each sheet retaining member 147, 148, a locking arrangement is provided between upper annular frame member 137 and the sheet retaining members 147, 148. In one embodiment, the locking arrangement includes a plurality of locking pins 165 that extend through holes (not labeled) formed in downwardly extending portion 162 of upper annular frame member 137. Locking pins 165 can abut outermost terminal end 160 of a respective sheet retaining member 147, 148 or could actually extend into bores (not shown) formed in the outermost terminal end 160 of each sheet retaining member 147, 148. Locking pins 165 are slidably mounted within the through holes provided in downwardly extending portion 162 of upper annular frame member 137 and can be spring biased to a locking position.

Reference will now be made to FIG. 7 in describing an initial thermoforming stage in accordance with the present invention. For forming of refrigerator compartment door 88, upper platen 120 has secured thereto, by any means known in the art such as threaded fasteners (not shown) that extend into support surface 124, a first female mold unit indicated at 172. First female mold unit 172 includes an internal cavity 174 defined by a base 175 and an annular pillar 176. Annular pillar 176 is formed with an outwardly extending, tapered tongue element 177. A second female mold unit generally designated by numeral 182 is likewise fixedly secured upon support surface 125 of lower platen 121. An integral part of second female mold unit 182 is a cradle member 190. Cradle member 190 is formed with first and second dike receiving depressions 194 and 195. Cradle member 190 also includes an annular recess accommodating member 198.

During an initial stage of thermoforming refrigerator compartment door 88, a male mold member 202 is shuttled between the first and second female mold units 172 and 182. Male mold member 202 can be shuttled in the direction of arrow C' by a type of shuttling mechanism that can include, for example, a track and an actuator (not shown) attached to the upper platen 120. Of course, the manner in which male mold member 202 is repositioned during the thermoforming method of the present invention can be performed by various types of conveying assemblies known in the art. Male mold member 202 is formed, on an upper surface 203 thereof, with a tapering annular groove 204. When male mold member 202 is shuttled between the first and second female mold units 172, 182 and first female mold unit 172 is shifted toward second female mold unit 182 and the cradle member 190 in the direction of arrow A', male mold member 202 mates with first female mold unit 172 with tongue element 177 extending within tapering annular groove 204 in order to locate male mold member 202 relative to first female mold unit 172. It should be understood that other alternate locating methods than tongue element 177 and annular groove 204 could be used to locate male mold member 202 relative to the first female mold unit 172. Male mold unit 202 is also provided with a plurality of dike forming members 207, as well as an annular recess 209 spaced outwardly from dike forming members 207. At this point, it should be noted that annular recess 209 is only depicted in FIG. 7 for clarity of the drawings.

Shuttled into position, as best shown in FIG. 7, generally simultaneously with the male mold member 202 and in the direction of arrow B' is a plug assist 210. The plug assist 210 can be shuttled on a track and moved by an actuator attached to the lower platen 121. Also simultaneous with the shuttling of male mold member 202 between first and second female mold units 172, 182 and cradle member 190, a first sheet supporting and shuttling member 212 is shuttled between

male mold member 202 and the cradle member 190 of second female mold unit 182. First sheet supporting and shuttling member 212 carries a first plastic sheet 215. At this point, first female mold unit 172 is shifted in the direction of arrow A' and, with the application of heat and a vacuum through male mold member 202 in a manner known in the art of thermoforming, first plastic sheet 215 is vacuumed onto male mold member 202. In coordination, plug assist 210 is moved in the direction of arrow D' to assure that plastic sheet 215 conforms to the desired shape as defined by male mold member 202. As shown in FIG. 7A, the plug assist 210 is then retracted in the direction of arrow E' and is shuttled out in the direction of arrow F' (see FIG. 7A). By this process, an inner refrigerator door liner 218 is formed on male mold member 202. At this point, it should be noted that inner refrigerator door liner 218 is not shown on male mold member 202 in FIG. 7A for clarity only. Due to the configuration of male mold member 202, refrigerator door liner 218 is formed with dike portions 220, 221 and an annular flange portion 223. As we discuss more fully below, annular flange portion 223 will be later bent to form an inturned edge 225 and refrigerator door liner 218 is later trimmed at inturned edge 225 (see FIG. 14). An annular recess 227 (shown only on one side of FIG. 8 for clarity) is also formed in annular flange portion 223 during the vacuum forming process.

When first plastic sheet 215 is appropriately formed and a cooling process has taken place, female mold 182 and platen 121 is shifted in the direction of arrow G' and upper platen 120 is shifted in the direction of arrow H' as shown in FIGS. 8 and 9 and sheet retaining members 147, 148 are shifted to their release positions. At this point, lower platen 121 is shifted downwardly in the direction of arrow B" in FIG. 9 wherein refrigerator door liner 218 is retained within cradle member 190. Although not shown in detail, male mold member 202 preferably includes tab portions 229 that can pivot relative to the remainder of male mold member 202 in order to enable refrigerator door liner 218 to be removed from annular recess 209 and male mold member 202. Next, male mold member 202 and first sheet supporting and shuttling member 212 are shuttled out from between first and second female mold units 172, 182. Thereafter, a second sheet supporting and shuttling member 231 shuttles a second plastic sheet 234 between first and second female mold units 172, 182. When second sheet supporting and shuttling member 231 is in place between first and second female mold units 172, 182, upper platen 120 is shifted toward lower platen 121 as illustrated in FIG. 10 so as to come into contact with second plastic sheet 234 and a vacuum is applied through first female mold unit 172 in a manner known in the art such that second plastic sheet 234 is drawn into first female mold unit 172 in order to form outer refrigerator door panel 91 (see FIG. 11). As soon as the vacuum is applied, lower platen 121 is extended such that inner refrigerator door liner 218 and outer refrigerator door panel 91 contact each other as shown in FIG. 12. With the application of heat, the inturned edge 225 of inner refrigerator door liner 218 is melted to the inwardly turned annular sidewall portion 94 of outer refrigerator door panel 91 (also see FIG. 14). Once these two portions of refrigerator compartment door 88 are joined, pressure is immediately applied through a blow pin (not shown) into the interior of the newly formed refrigerator compartment door 88 to enhance the details of outer refrigerator door panel 91. Next, both upper and lower platens 120, 121 are retracted and the final product, which is still attached to second sheet supporting and shuttling member 231, is shuttled out from between first and second female mold units 172, 182 as shown in FIG. 13.

The interconnection between inturned edge 225 of inner refrigerator door liner 218 and inwardly turned annular sidewall 94 of outer refrigerator door panel 91 is perhaps best shown in the enlarged view of FIG. 14. Once the thermoformed refrigerator compartment door 88 is removed from between first and second female mold units 172, 182, this joined area between inner refrigerator door liner 218 and outer refrigerator door panel 91 is trimmed along line 240 which can then be rounded or beveled. When assembled to the cabinet 83, the trim line 240 is hidden from frontal and side view and a seam defined by the joined area is located between annular side wall portion 94 and dike portions 220 and 221 and extends substantially perpendicular to an outer wall portion of door panel 91 as clearly shown in this figure.

In accordance with the present invention, a gasket, generally indicated at 243 in FIG. 14, is adapted to be press fit within annular recess 227. To further hide trim line 240, gasket 243 may be designed to include a portion 245, as shown in FIG. 14, that overlies trim line 240 and which is flush with sidewall 94. Once gasket 243 is secured, a unitary, aesthetically appealing all-plastic refrigerator door is formed. FIG. 14 also illustrates that, in accordance with the preferred embodiment of the invention, the internal chamber 247 defined between outer refrigerator door panel 91 and inner refrigerator door liner 218 can be filled with a heat insulating material. In the preferred embodiment, foam 249 is injected into internal chamber 247 and extends even into dike portions 220, 221 in order to provide, in addition to enhanced thermal specifications for refrigerator compartment door 88, additional structural rigidity without significantly increasing the weight of refrigerator compartment door 88.

FIG. 15 depicts a preferred embodiment for the gasket utilized with refrigerator compartment door 88. According to this preferred embodiment, the gasket includes a base 252 terminating in an upwardly angling portion 255 at one end thereof. Base 252 is formed with an elongated connection member 260 composed of sidewall portions 262, 263 joined by a plurality of spaced, interconnecting portions 265-267. The gasket is adapted to be mounted within annular recess 227 by press fitting connection member 260 therein. The undercut formed by sidewall portion 262 functions to hold the gasket in place. The spaces provided between sidewall portions 262, 263 and interconnecting portions 265-267 enable connection member 260 to be readily deflected inwardly upon insertion of connection member within annular recess 227 in order to facilitate in the interconnection between the gasket and refrigerator compartment door 88.

For sealing purposes, the gasket includes a primary seal member generally indicated at 280 and a secondary seal member generally indicated at 282. Primary seal member 280 is attached to one end of base 252 by a first flap member 285 and is attached to an intermediate portion of base 252 by means of a second flap member 286 and an enlarged attachment member 287. Secondary seal member 282 is also secured to base 252 at one end through attachment member 287 and at another end thereof to upwardly angling portion 255. Primary seal member 280 is adapted to engage the face (not labeled) of cabinet 83 and secondary seal member 282 is adapted to engage a liner of cabinet 83 when refrigerator compartment door 88 is closed. If cabinet 83 is made from metal, primary seal member 280 is preferable provided with an internal chamber 290 which houses a magnet (not shown) for enhancing the sealing characteristics in a manner known in the art.

From the above discussion, it should be readily apparent that forming an all-plastic refrigerator door in accordance

with the present invention minimizes the number of manufacturing steps necessary and results in reduced manufacturing costs. In addition, since the refrigerator door is completely made from plastic, it will be a more durable than conventional metal/plastic doors and can be more versatile in design. One of the key benefits to the manufacturing process is that the door can be manufactured such that the joining seam whereat the outer door panel meets the inner liner faces toward the inside of the refrigerator. Due to this positioning of the seam, the gasket could be advantageously designed to cover the seam so as to provide an extremely aesthetically appealing overall assembly.

Although various materials could be utilized in connection with the present invention to form the refrigerator door, in the preferred embodiment, outer refrigerator door panel 91 is composed of a high impact polystyrene layer of approximately 95-98 mils in thickness having an acrylic cap layer of polymethylmethacrylate in the order of 2-5 mils. The refrigerator door liner 218 is preferably formed of high impact polystyrene. In addition, a foam barrier layer of a styrenic alloy may be used on the inside surface of both the outer refrigerator door panel 91 and the inner refrigerator door liner 218 when certain corrosive foams are injected within internal chamber 247. It is also possible to use polyvinylchloride as the material for either of these components. If polyvinylchloride is utilized, no cap layer or foam barrier will be necessary. However, the use of the polystyrene over the polyvinylchloride is preferred based on cost factors. Instead of the polymethylmethacrylate used for the cap layer, it is also possible to utilize styrenemethylmethacrylate.

As indicated above, the refrigerator door constructed in accordance with the invention will be more energy efficient than conventional doors utilizing metal panels which inherently conduct more heat into the unit. This efficiency characteristic is further enhanced by locating the thickened portion of the door that contains the handles closer to the periphery of the door than the dike. Obviously, the plastic also provides a corrosion resistant door that does not require painting. When foam is injected within the door, the door shells are inherently stronger, even more so than the conventional design.

Although described with respect to a preferred embodiment of the invention, it should be readily understood that various changes and/or modification can be made to the present invention without departing from the spirit thereof. For instance, the specific manner in which the gasket is attached to the thermoformed door can readily varied without departing from the spirit of the invention. An important aspect of the method of manufacturing the refrigerator door as described above is that it enables a particular positioning of the joining seam of the outer door panel and the refrigerator liner wherein the seam is located in a position where it cannot be viewed in the normal door closed posture to

provide an aesthetically appealing configuration. In general, the invention is only intended to be limited by the scope of the following claims.

We claim:

1. A unitary plastic refrigerator door comprising:
 - a thermoformed outer refrigerator door panel including an outer wall portion and an inwardly turned, annular sidewall portion; and
 - a thermoformed inner refrigerator door liner integrally formed with at least one dike portion and an annular flange portion positioned outwardly of said at least one dike portion, said annular flange portion including an intumed edge portion being joined with the annular sidewall portion of said outer refrigerator door panel along a seam located between said annular sidewall portion and said at least one dike portion, said seam extending substantially perpendicular to said outer wall portion of said outer refrigerator door panel,
- wherein an internal chamber is defined between said outer door panel and said inner refrigerator door liner, said refrigerator door further including a filler material located throughout said internal chamber.
2. A unitary refrigerator door as claimed in claim 1, wherein said seam is located inward of said annular sidewall portion.
3. A unitary refrigerator door as claimed in claim 2, wherein said seam is substantially parallel to said annular sidewall portion.
4. A unitary refrigerator door as claimed in claim 1, further comprising:
 - a door gasket; and
 - means for securing said door gasket to the annular flange portion of said refrigerator door.
5. A unitary refrigerator door as claimed in claim 4, wherein said securing means comprises at least one recess formed in the annular flange portion of said inner refrigerator door liner and at least one connection element carried by said gasket that is adapted to be press-fit into said at least one recess.
6. A unitary refrigerator door as claimed in claim 4, wherein said door gasket includes a portion that extends over and visibly covers said seam.
7. A unitary refrigerator door as claimed in claim 1, wherein the outer wall portion of said outer refrigerator door panel includes a thickened portion and a handle member formed in said thickened portion.
8. A unitary refrigerator door as claimed in claim 7, wherein said refrigerator door has an associated periphery, said handle member being located closer to said periphery than said at least one dike portion of said inner refrigerator door liner.

* * * * *

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Dec. 13, 1960

E. T. HERMAN

2,963,754

REFRIGERATOR DOOR SEAL

Filed Nov. 14, 1957

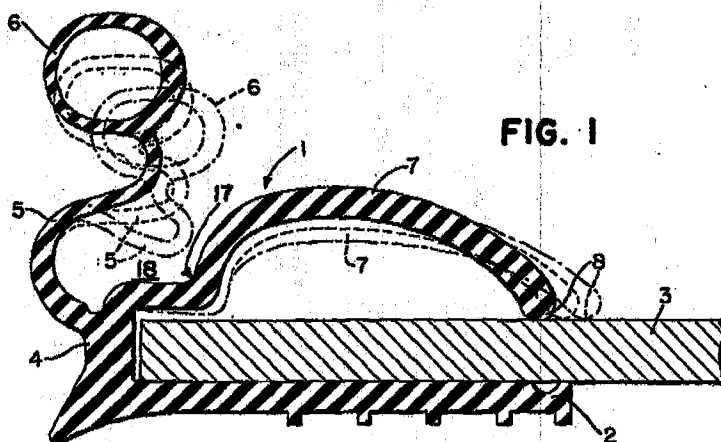


FIG. 1

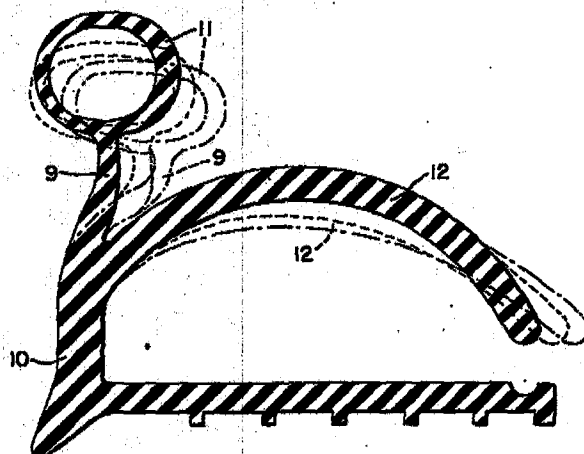


FIG. 2

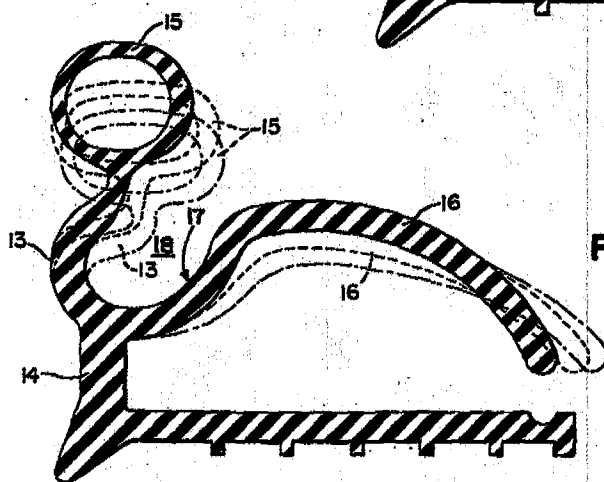


FIG. 3

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2,963,754

REFRIGERATOR DOOR SEAL

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Filed Nov. 14, 1957, Ser. No. 696,501

2 Claims. (Cl. 20-69)

This invention relates to a gasket for refrigerator or freezer cabinets and the like. More particularly it relates to an improved gasket for effecting a seal between the door and cabinet under the more stringent specifications presently demanded by the manufacturers.

The refrigerators and freezers presently being manufactured include door mountings that require very low forces to open, due to legislation passed by Congress. As a result the forces acting to compress the seal around the door when it is closed are low so that the seal must be effected initially under minimum unit pressures on the gasket. Under such conditions, the compression set and normal softening of the gasket must be counteracted in the design and/or material selection to provide a gasket which will be effective for substantial periods of time. It is therefore an object of this invention to provide a gasket that effectively seals under low unit pressures between the door and cabinet of a refrigerator.

Another object of the invention is to provide a gasket that inherently compensates for compression set in the gasket to maintain an effective seal after long use.

A still further object of the invention is to provide a gasket that meets the more rigid specifications now in effect.

Other objects of this invention will appear hereinafter as the description of the invention proceeds, the novel features, arrangements and combinations being clearly set forth in the claims hereunto appended.

In the drawings:

Fig. 1 is a cross-section of one form of a refrigerator gasket made in accordance with the invention;

Fig. 2 is a cross-section of one modification of the invention; and

Fig. 3 is a cross-section of another modification of the invention.

The gasket 1 as seen in Fig. 1 is an extruded section of resilient material such as rubber, natural or synthetic, polyethylene, polyvinyl chloride, etc. The use of such materials for gaskets of this type is well known. For the purposes of illustration, the gasket 1 includes a flange 2 which underlies the door panel 3 so as to provide means for attaching the gasket to the refrigerator door. Particular means provided to attach the gasket to the door will depend upon the particular door structure and may be varied accordingly without affecting the sealing portion of the gasket.

Along the edge of the flange 2 is a vertical section 4 which extends approximately to the upper edge of the door panel 3. Extending in a generally vertical direction from this vertical section 4 is an ogee portion 5 which curves first outwardly and then inwardly to support a tubular sealing portion 6 substantially over the vertical portion 4. The ogee section 5 is relatively thin in order to make it very flexible when it is subjected to pressure by closing the door.

Also, at the upper end of the vertical section 4 is a laterally inwardly extending cantilever portion 7 which

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overlies the inner surface of the door panel 3. The inner end of the cantilever portion 7 lies on the surface of the door panel and is unattached. The cantilever section 7 cooperates with the ogee portion 5 to provide the desired sealing stresses when the door is closed and a finished appearance to the door structure.

In effecting the seal when the refrigerator door is closed, the gasket 1 provides a substantial range of deflections with which a satisfactory seal may be effected. The gasket as installed is shown by the solid line in Fig. 1 and the position indicated by the dash line illustrates the approximate minimum deflection necessary which will effect a good seal around the refrigerator door while the broken line position indicates a maximum deflection to effect a good seal. In either of these positions the tubular portion 6 of the refrigerator gasket 1 is flattened to provide substantial surface area contact on the outer surface of the tube with the cabinet. If desired, the contacting surface of the sealing surface may be ribbed, roughened etc. as is well known to assist in effecting the seal. As the ogee portion 5 foreshortens, the tubular portion 6 moves inwardly and somewhat laterally due to the foreshortening of the ogee portion 5. When the surface of the tubular portion 6 contacts the refrigerator cabinet (not shown), the subsequent lateral shift is accomplished by a rolling action rather than slippage over the surface. The ogee portion 5 assumes approximately the shape indicated in which the ogee is foreshortened by increasing the severity of curvature over the undistorted shape. It is apparent that the distortion of the ogee portion 5 of the gasket is accomplished with very low pressures per inch of length so that the sealing between the refrigerator door and the cabinet is effected with low unit pressures.

The cantilever section 7 during the closing similarly flattens as indicated by dashed and dotted lines (slightly exaggerated for sake of clarity) due to the transmission of the stresses through the gasket section so that the inner end 8 of the cantilever section moves slightly inwardly over the door surface as the sealing section is distorted. The relief of these stresses in the gasket assist in returning the gasket to its initial shape when the door is opened.

In the modification shown in Fig. 2 the ogee section 9 is less severe in curvature with the entire direction of curvature being inwardly from the vertical section 10 than that shown in Fig. 1 but the tubular section 11 supported from the ogee section 9, lies substantially over the vertical section 10 of this gasket. The dashed and broken lines illustrate the positions of the gasket under minimum and maximum deflections respectively. In this modification the tubular element 11 is deflected more due to the smaller amount of curvature in the ogee section. The tubular portion 11 also moves laterally as the deflection increases in the same manner as described in connection with Fig. 1. The ogee section 9 tends to fold laterally inwardly over the cantilever arm portion 12 which simultaneously flattens in a similar manner to that desirable for the modification shown in Fig. 1.

In the modification shown in Fig. 3 the ogee portion 13 extends substantially vertically upward from the vertical portion 14 to support the tubular sealing portion 15. In this modification the ogee section 13 curves slightly outwardly then inwardly from its point of origin to cause a substantially direct vertical inward movement of the tubular section when distorted by the closing door. The tubular section 15 flattens when subjected to such pressures to effect the seal against the door. The minimum and maximum deflection positions of the gasket portions are illustrated by the dashed and broken lines respectively including the positions of the cantilever portion 16.

In the modifications of the invention shown in Figs. 1 and 3 the cantilever portions 7 and 16 respectively are attached to the vertical portions 4 and 14 respectively by a joining portion 17. The portion 17 extends for a short distance towards the free end of the cantilever member 7 or 16 over and substantially parallel to the base then swings upwardly in a generally vertical direction so as to form with the ogee section 5 or 13 a pocket or chamber 18. The ogee section collapses into the pocket 18 as the refrigerator door closes to the extent that the ogee and tubular sections are collapsed substantially before contacting the cantilever member. This provides a soft seal for a substantial distance of door travel after the initial contact which is followed with a firm seal if that distance is exceeded.

In any of the modifications of the invention shown the ogee section and tubular section of each form of the gasket cooperate to effect a very soft seal or low unit pressure sealing gasket. The ogee and tubular sections in effect act as a wand to seal readily by distortion when the door is closed. The ogee section causes the gasket to assume a uniform distorted shape throughout its length with the tubular portion actually sealing against the cabinet surface. Gaskets of these configurations can be installed around corners of the door structure without the usual preformed corners or reshaping of the gasket structure in the corner area.

The configuration of any of the gaskets of this invention is such that stresses introduced by the deflection are distributed over a relatively large section so that the unit stress is low. This minimizes the compression set of the gasket material resulting in a seal that is effective for many years. The particular configuration also permits a wide latitude in the deflection without materially affecting the effectiveness of the seal.

While certain representative embodiments and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. A gasket for attachment to a refrigerator door to seal the margin of the door against the cabinet comprising an elongated unitary strip of resilient material of similar cross-sectional shape throughout its length, said shape having a base portion to secure said strip to the door, a vertical portion rising upwardly from and attached to one end of said base portion, a joining portion extending substantially parallel to and overlying said base portion for a short distance, then extending generally in a vertical upward direction away from said base portion, a convexly arched cantilever member having one end attached to the upper end of said joining portion and overlying said base whereby the other end thereof is free to move laterally with respect to said base and the door to which the gasket is secured, and a sealing portion formed integrally with said base extending from the upper end of said vertical portion above the cantilever member, said sealing portion consisting of a free-standing ogee-shaped section with one end attached adjacent the upper end of the vertical portion and extending upwardly therefrom substantially normal to said cantilever member with a closed tubular sealing element of a diameter substantially greater than the thickness of the ogee section integrally formed on the outer end thereof to

initially contact the cabinet as the door moves toward the closed position, the outer end of said ogee-shaped section being unsupported by other structure and cooperating with the joining portion to form an open-topped pocket therebetween and the size of the opening in said tubular sealing element being at least several times greater than the wall thickness of the element, the ogee section collapsing substantially axially and uniformly along the length of the gasket into said pocket when closing the door on which the gasket is attached to fore-shorten the ogee section in substantially the direction of its initial extension, the tubular element and ogee section being appreciably flattened prior to any substantial flattening of the cantilever member when the door of the refrigerator is closed.

2. A gasket for attachment to a refrigerator door to seal the margin of the door against the cabinet comprising an elongated unitary strip of resilient material of similar cross-sectional shape throughout its length, said shape having a base portion to secure said strip to the door, a vertical portion rising upwardly from and attached to one end of said base portion, a joining portion attached to the upper end of said vertical portion and extending substantially parallel to and overlying said base portion for a short distance, then extending generally in a vertical upward direction away from said base portion, a convexly arched cantilever member having one end attached to the upper end of said joining portion and overlying said base whereby the other end thereof is free to move laterally with respect to said base and the door to which the gasket is secured and a sealing portion formed integrally with said base positioned to extend from the upper end of said vertical portion above the cantilever member, said sealing portion consisting of a free-standing ogee-shaped section with one end attached adjacent the upper end of the vertical portion and extending upwardly therefrom substantially normal to said cantilever member with a closed tubular sealing element of a diameter substantially greater than the thickness of the ogee section integrally formed on the outer end thereof to initially contact the cabinet as the door moves toward the closed position, the outer end of said ogee-shaped section being unsupported by other structure and cooperating with the joining portion to form an open-topped pocket therebetween and the opening of the tubular element being normally slightly oval shaped with the major axis extending substantially parallel to the door surface and being at least several times greater than the wall thickness of the tubular element, the ogee section collapsing substantially axially and uniformly along the length of the gasket into said pocket when closing the door on which the gasket is attached to fore-shorten the ogee section in substantially the direction of its initial extension, the tubular element and ogee section being appreciably flattened prior to any substantial flattening of the cantilever member when the door of the refrigerator is closed.

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No. 07-110203-00000-0000

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Act. 411 PRESENTACION Folios: 90



Industria y Comercio
SUPERINTENDENCIA

REQUISITOS MINIMOS PARA ADMISION A TRAMITE PCT

PATENTE DE INVENCION

[✓]

MODELO DE UTILIDAD

[]

- ◆ Indicación de que se solicita la concesión de una patente [✓]
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud [✓]
- ◆ Descripción de la invención [✓]
- ◆ Dibujos de ser estos pertinentes [✓]
- ◆ Comprobante de pago de las tasas establecidas [✓]

COMPLETA []

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DISEÑO INDUSTRIAL []

- ◆ Indicación de que se solicita el registro de Diseño Industrial []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño []
- ◆ Comprobante de pago de las tasas establecidas []

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ESQUEMA DE TRAZADO []

- ◆ Indicación de que se solicita el registro de un Esquema de Trazado []
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- ◆ Representación gráfica del esquema trazado []
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92

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
GOMEZ DIAZ DORA MARIA

REFERENCIA	Radicación No.	7 110203
	Solicitud internacional	PCT/EP2006/060876
	Fecha inicio fase nacional	21/10/2007
	Trámite	11
	Evento	379
	Actuación	430
	Oficio No.	14682

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La traducción de los capítulos descriptivo y reivindicatorio debe estar acompañada de los respectivos dibujos.
2. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.
3. La solicitud no contiene el poder debidamente otorgado, con el lleno de los requisitos exigidos por los artículos 63 y subsiguientes del Código de Procedimiento Civil. Adicionalmente, deberá presentar el documento que acredita la existencia y representación legal de la sociedad solicitante, cuando ésta fuere persona jurídica.
4. La invocación de prioridad en trámite P.C.T no genera el cobro de tasa alguna, por lo cual el solicitante puede pedir el desglose del recibo correspondiente a dicho pago.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No.10 de 2001.

Continúa en la página siguiente...