

PATENT SPECIFICATION

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- (21) Application No. 19990/77 / (22) Filed 12 May 1977/
(23) Complete Specification filed 28 April 1978
(44) Complete Specification published 5 Nov. 1980
(51) INT CL³ E06B 7/23
(52) Index at acceptance EIJ GN
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(54) CONTAINER DOOR SEAL

(71) We, SCHLEGEL (UK) LIMITED, a British Company, of Ring Road, Seacroft, Leeds, LS14 1LY, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a door seal specifically designed for use on cargo container doors, but which could be put to many other uses.

Normally, cargo containers have very large doors at one or both ends of the container and these are traditionally made of multiply wood, and in order to prevent dust from entering the interior of the container and so as to keep the container generally airtight and watertight, a seal is normally provided around the periphery of the door (or doors) on the end of the container for engagement with the container body around the door opening. This seal, as well as sealing the interior of the container when the door is closed, should also be capable of sealing from the elements the edges of the door to which it is applied and in particular, capable of preventing moisture from reaching the edges of the door. Needless to say, if water reaches the end faces of the plies making up the door, the door will quickly deteriorate.

Various proposals have been put forward to meet the above requirements and one proposal is to provide a dual durometer one-piece H-section seal which does work satisfactorily. The problem with this seal, however, is that if the portion of the seal for sealing the container, or for that matter the portion for sealing the edge of the door, becomes damaged, then the whole seal has to be replaced. An alternative proposal has been to provide an extruded flexible container seal portion which can be attached to an extruded metal portion which can be attached to an extruded metal portion which is fitted to the edge of the door to seal the door. This seal, however, suffers from the disadvantage that the extruded metal portion is rigid and cannot accommodate tolerances in door thickness and therefor it

is difficult to provide an entirely watertight seal with the door. Also, metal extrusions are expensive and, being rigid, are awkward to fix to the door and to handle prior to fitting.

The door seal of the present invention has been evolved to overcome the problems which have been experienced with prior proposed seals.

According to the present invention, we provide a seal for a container door, said seal comprising a base, a first pair of spaced sealing arms extending generally parallel to each other and at right angles to the plane of the base away from opposite end portions thereof and at least one further resiliently deformable sealing arm extending in the opposite direction to one of the first pair of sealing arms, the spacing between said first pair of sealing arms being such as to form a close fit on one of the members between which the seal is required and wherein one of the arms of the first pair has a tip portion connected to the remainder of the arm by a portion formed of a softer material than the remainder of the arm.

Preferably, said at least one further sealing arm is one of a second pair of sealing arms, extending from said base respectively in the opposite directions to respective arms of said first pair.

While the seal may be of one-piece construction, it is preferred that it is formed of at least two inter-connectable parts such as is disclosed in the complete specification of our Patent Application No. 1,553,281.

Preferably, the tip portion has an inner surface which is inclined inwardly towards the opposite arm of the pair so that the portion can take up manufacturing tolerances. If desired, the root of the arm having the tip portion can be hollow.

The invention is now described by way of example only with reference to the accompanying drawing which shows a three-part container door seal.

Referring to the drawing, the seal is comprised of a first portion 1, a second portion 3 and a third portion 5. The first portion 1 is of generally rectangular U-shaped cross-

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section with a base 7 and an external up-
standing arm 9 and an internal upstanding
arm 11. The distance between the inner faces
of the arms 9 and 11 is predetermined so as
to be slightly greater than the average thick-
ness of an edge portion of a container door
to which it is to be applied and the arm 11
is arranged to be located against the inside
face of the door. The portion 1 is formed by
a dual durometer plastics extrusion process
and the base 7, arm 9 and main part of the
arm 11 are formed of resiliently deformable
but hard plastics material. The tip 13 of the
arm 11 is also formed of the same resiliently
deformable plastics material and is connected
to the main portion of the arm 1 by means
of a portion 15 of softer plastics material.
The inner face 14 of the tip 13 is inclined
inwardly towards the arm 9 so that the tip
13 can take up any manufacturing tolerances
in the edge of the container door to which the
portion 1 is to be attached. Because the ex-
ternal arm 9 is formed of the harder plastics
material, it gives a positive precise location on
the container door and its inner face is pre-
ferably formed with two internal grooves 10 to
accommodate adhesive by means of which the
portion 1 is adhered to the door edge.
For a similar purpose, an internal portion 17
of the inner face of the arm 9 is not quite in
alignment with an outer portion 18 of the
arm 9 to ensure that there is sufficient space
for the adhesive in the event that the portion
1 is a very tight fit on the door.

The arm 11 is shown as being hollow. This
is not essential and if a greater space between
the arms 9 and 11 is required, the arm 11
need not be hollow. It is intended that the
tip portion 13 will always be pressed against
the inner face of the door with a considerable
force due to the resiliency of the portion 15,
thus causing the inner face of the arm 9 to
bear tightly against the outer surface of the
door.

The outer face of the base 7 is provided
with a channel 19 for mating engagement
with the crossbar of a T-sectioned projection
21 on the second seal portion 3 and with
an overhang 23 arranged to overlie one arm
of the crossbar of the projection 21 when the
two parts are assembled together. The pro-
jection 21 extends outwardly from a base 25
of the second portion 3 and upstanding from
one edge region of the base 25 is a resiliently
deformable first arm 27, both the inner and
outer faces of which are generally arcuate
and extend in towards the centre line 29 of
the seal and merge at a tip 31.

Extending upwardly from the other edge
region of the base 25 is a second inwardly
directed arm 33 which is shorter than the
first arm 27 and, being thinner than the arm
27, is more easily deformed. In use, the arm
33 is arranged to be deformed inwardly to-

wards the centre line 29 so as to form a seal
with the inwardly directed face of the portion
of the container defining the door opening
when the door is closed, whereas the tip 31
of the arm 27 is arranged to deform slightly
outwardly and form a seal with the outwardly
directed face of the portion of the container
defining the door opening.

It is preferred that the first portion 1 is
formed of a hard plastics material so that the
four corners of the seal (for a rectangular
door) can be mitred and connected together
in known manner, for example with a glue or
solvent, whereas it is preferred that the
second portion 3 be formed of a rubber
material so that the four corners can be
mitred if necessary and then connected to-
gether by means of a moulding operation. The
main reason for making the portion 3 of
rubber is that the portion can be made very
slightly undersize so that after the portion 1
has been fitted to the door the portion 3
can be stretched and applied onto the portion
1 and the natural resiliency of the rubber
will then hold the seal tightly on the door.
Also, of course, the arms 27 and 33 must be
resiliently deformable.

It will of course be appreciated that the
two portions 1 and 3, due to their generally
mating groove 19 and projection 21 will, to a
certain extent, remain connected together.
However, so as positively to connect the two
parts together the third portion 5 is provided
and this is preferably formed from a hard
plastics generally U-shaped extrusion having
a base 35, a first short upstanding arm 37
and a second long upstanding arm 39 generally
parallel to the arm 37. The arm 37 is arranged
to form a tight fit within a groove 41 formed
in a corner region of the first seal portion
1 and as shown is provided with a plurality
of gripper fins 43 to assist in retaining the
arm 37 in the groove 41. If desired, the
portion 5 may be a dual durometer extrusion,
in which case at least some of the fins 43
would preferably be formed of a softer
material than the remainder of the portion. The
arm 39 is arranged to overlie the exposed outer
face portion 45 of the base 7 and to extend
over the other part of the head of the T-
shaped projection 21 on the seal portion 3
so as to extend towards the centre line 29 of
the seal in the opposite sense to the overhang
23. It will thus be appreciated that the por-
tion 5, due to its arm 37 engaging the groove
41, will effectively be locked to the portion
1 and by virtue of its arm 39 and the over-
hang 23 engaging beneath the edge portions
of the head of the projection 21 located in
the groove 19, the portion 3 will be positively
attached to the portion 1.

By providing the door seal in at least two-
parts, and preferably three parts, it is possible
to replace the container sealing portion, i.e.

the third portion 3, very simply whenever this becomes damaged. Since this portion provides the outer perimeter of the seal it is most likely to damage and of course even when it is removed for replacement, the portion 1 will remain on the door and provide an effective door seal. In other words, the edge of the door is sealed from the elements at all times thus giving the door a considerably longer life than known seals.

It will be appreciated that the second portion 3 could be connected to the first portion 1 by means other than that specifically described above, e.g. the third part could be of a different shape, or could be omitted altogether, and replaced by an integral part on the first or second portions 1 or 3, and that the various materials from which the portions are extruded could be different from those specifically described. It is however, important that at least the portion 3 is formed of resiliently deformable material.

Further advantages of making the seal portion 3 of rubber, e.g. EPDM, are that it can withstand temperatures of approximately -40°C to $+60^{\circ}\text{C}$ and it is resilient to UV light. Also, it can be stretched into place, kinking is eliminated and the sealing properties of the first portion 1 are increased once it has been applied to the portion 3.

From the foregoing it will be appreciated that there are considerable advantages in having a two or three part container door seal. If desired, however, the first portion 1 could be made integral with the second portion 3 and the third portion 5 could be omitted altogether. In this case, the whole of the first portion 1 could be formed of the same material as that of the portion 3 or the arms 27 and 33 could be of a softer material, e.g. of the same material as the portion 15. Obviously, if the seal is of one-piece construction it would either be a dual durometer plastics extrusion or a dual durometer rubber extrusion.

WHAT WE CLAIM IS:—

1. A seal for a container door, said seal comprising a base, a first pair of spaced sealing arms extending generally parallel to each other and at right angles to the plane of the base away from opposite end portions thereof and at least one further, resiliently deformable sealing arm extending in the opposite direction to one of the first pair of sealing arms, the spacing between said first pair of sealing arms being such as to form a close fit on one of the members between which the seal is required and wherein one of the arms of the first pair has a tip portion connected to the remainder of the arm by a portion formed of a softer material than the remainder of the arm.

2. A seal according to claim 1 which is formed in two separate interconnectable parts.

3. A seal according to claim 1 or 2 which is formed of three separate interconnectable parts.

4. A seal according to claim 2 or 3 wherein said at least one further sealing arm is one of a second pair of sealing arms, extending from said base respectively in the opposite directions to respective arms of said first pair.

5. A seal according to claim 1, 2, 3 or 4 wherein the tip portion has an inner surface which is inclined inwardly towards the opposite arm of the pairs so that the portion can take up manufacturing tolerances.

6. A seal according to claim 1, 2, 3, 4 or 5 wherein the root of the arm having the tip portion is hollow.

7. A seal substantially as hereinbefore described with reference to the accompanying drawing.

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