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DRUM SEAL

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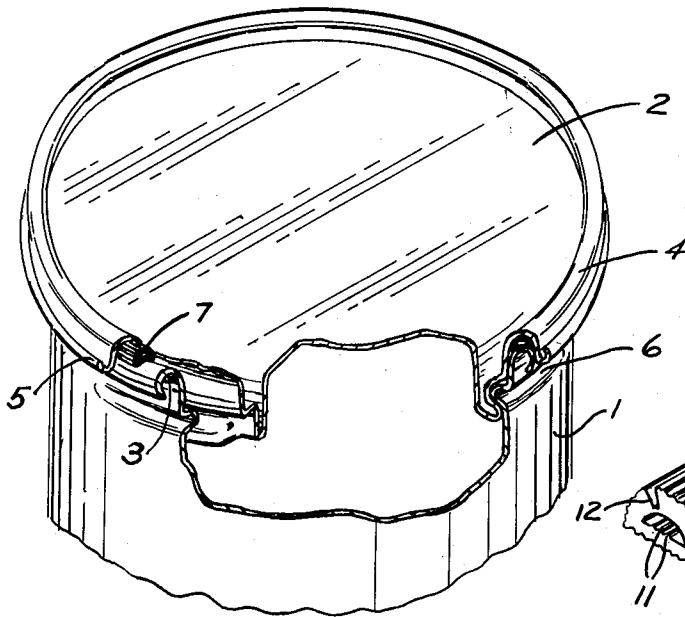


Fig. 1

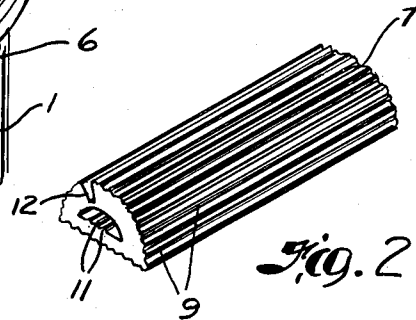


Fig. 2

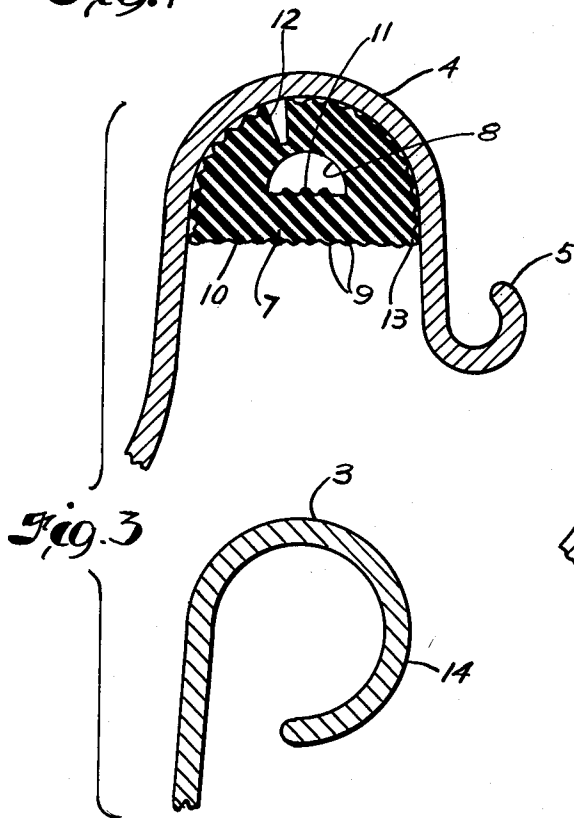


Fig. 3

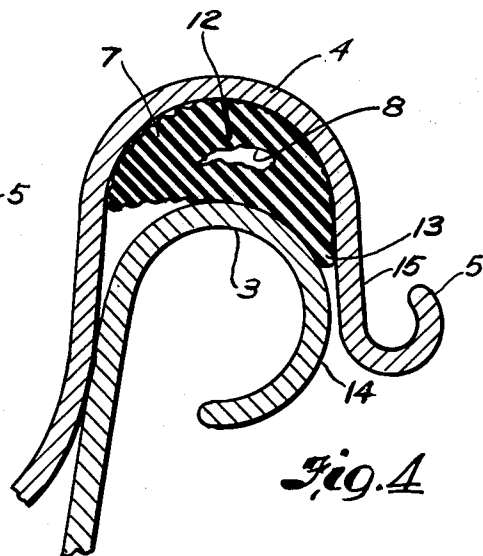


Fig. 4

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DRUM SEAL

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4 Claims. (Cl. 288—23)

This invention relates as indicated to a drum seal, and more particularly to a seal for the lids or covers of metal drums which must be airtight and capable of resisting substantial pressures.

Not only liquids but many types of materials are now shipped and stored in metal drums having tightly fitting lids which must be air- and water-tight. It is usually desired that such drums be capable of reuse, and indeed only a portion of the contents may be removed at any one time, with the drum being sealed between periods of use. A most satisfactory type of drum for this purpose is provided with a lid adapted to be locked in place by interengaging camming lugs or ribs when the lid is turned. Such drums can be opened without the employment of special tools, and without breaking or deforming the locking means. Various sealing strips have been inserted between the interengaging lips of the drum and lid, but such seals have not proven satisfactory in ensuring an airtight closure. Generally speaking, it is desired that the seal be capable of resisting air pressure of at least fifteen pounds and preferably more.

It is accordingly a principal object of my invention to provide a novel drum seal adapted to be utilized with drums of the type generally indicated above and which will resist distortion during locking of the lid in place.

It is a further object of my invention to provide such seal which will be capable of resisting pressure substantially in excess of fifteen pounds per square inch and which will be capable of repeated reuse in the field.

Another object is to provide such seal which will be relatively inexpensive of manufacture and easy to install.

Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features herein-after fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a fragmentary perspective view of a metal drum of a type now commercially available having a cylindrical body and a circular lid adapted to be locked thereon by means of camming lugs when rotated relative thereto;

Fig. 2 is a perspective view of a short length of my new sealing strip;

Fig. 3 is a transverse sectional view through the opposed lips of the drum and lid, the latter having my new sealing strip mounted therein; and

Fig. 4 is a view similar to Fig. 3 but showing the manner in which such strip is distorted in use when the lips of the drum and lid are lockingly interengaged.

Now referring more particularly to Fig. 1 of the drawing, the type of drum with which my new sealing strip will preferably be employed comprises a cylindrical con-

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tainer 1 adapted to have a circular sheet metal lid 2 mounted and secured thereon. Such container is provided with an outwardly rounded or downturned lip 3 adapted to be received into the downwardly opening lip 4 of such lid, such latter lip being of generally U-shaped conformation in transverse cross-section as shown in Figs. 1, 3 and 4. The extreme edge 5 of such upper lip may be recurved to finish the same. Slightly angularly disposed bulges 6 in the sides of container 1 are adapted to receive corresponding protuberances on lid 2 whereby such lid will be drawn down tightly upon the drum when rotated relative thereto.

Now referring more particularly to Figs. 2, 3 and 4 of the drawing, my new sealing strip 7 will be formed of resilient plastic material, ordinarily rubber, and may be extruded in long continuous lengths. When cut into sections and the ends joined together to form continuous rings by means of the usual cements, annular sealing rings are thereby afforded adapted to be fitted into such inverted U-shaped lips 4 of drum lids such as 2. It will be appreciated however, that in some instances it may be preferred to form the drum body proper with a U-shaped lip to receive the sealing strip, whereupon the lid will be provided with a rounded lip such as lip 3 to cooperate therewith.

As best shown in Fig. 3, my new sealing strip 7 will be of semi-circular cross-section and will contain a longitudinal hollow 8 transversely dimensioned to comprise approximately one-third the thickness of the sealing strip. Such hollow 8 is also normally of semi-circular shape as shown.

The entire outer surface of the sealing strip is formed with small longitudinally extending ribs 9, and the inner side of the hollow 8 parallel to the generally flat side 10 of the strip may also be provided with several longitudinally extending ribs 11 for identification purposes. A narrow longitudinally extending groove 12 of narrow V-shaped cross-section is provided in the outer surface of the strip slightly to one side of the center line as shown in Fig. 3. The inner void within the seal is preferably not of exactly symmetrical half-round shape but may bulge inwardly somewhat in the region of such groove.

When the lid 2 is placed upon the drum and turned to cam the same into locking engagement, drum lip 3 will engage the relatively flat under surface 10 of the half-round sealing strip 7 and compress and distort such strip to close groove 12 as shown in Fig. 4. Such compressive and distorting forces also force the outer edge portion 13 of the sealing strip into the interstice between the outer portion 14 of the drum lip 3 and the outer portion 15 of the lid lip 4, thereby forming a very secure pressure-resistant seal which has withstood a pressure of twenty-eight pounds per square inch in actual test.

The longitudinally extending ridges or ribs 9 facilitate relative rotation of the lid and drum with a minimum of friction during the locking action. Consequently, there is much less drag exerted on the sealing strip than is the case with ordinary strips, and there is relatively little tendency to stretch and distort the strip as a result of such rotative movement. Furthermore, after the lid has been secured in place, such ribs or ridges greatly assist in maintaining a continuous seal (see Fig. 4), the most important sealing effect being afforded by the portion 13 of the sealing strip. It has been found that even in the case of steel drums formed with vertically extending welded seams, which in the past have tended to rumple and deform other sealing strips, entirely satisfactory results have been obtained.

Various synthetic plastic materials such as neoprene, GR-S, Geon, vinyl plastics, nylon and the like may be employed to form my new seal but rubber will ordinarily be used as being least expensive and eminently

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satisfactory for most applications. The outer surface of the seal may desirably be lightly coated with a liquid silicone lubricant of the type now commercially available for rubber surfaces. Ordinarily no adhesive will be employed to secure the seal in the channel lip. When opposed ends of a length of sealing strip are cemented and joined to form a ring seal, it is important that the ribs or serrations 9 be carefully aligned.

It will be seen that I have provided a novel seal adapted for use in sealing drums and containers wherein the covers are secured by relative rotation, such as a quarter turn, whereby the usual extraneous crimped clamping means may be dispensed with and an airtight seal nevertheless afforded. Such drums are accordingly capable of reuse in the field.

The V-shaped groove 12 is relatively narrow but will preferably have a flat bottom, as shown. When the groove is closed (Fig. 4) the inner wall of void 8 will buckle or bulge inwardly in this region to a greater extent than in the region adjacent edge portion 13.

In effect, my new sealing strip is thick-walled D-shape in cross-section, with groove 12 preferably penetrating nearly but not quite through such wall to the inner void. When the strip is formed to an annulus with the curved side of the D fitting in the inverted U-shaped lip 4 such groove will be slightly to one side of center of the curved surface of such D toward the inner periphery of the annulus. In a typical case such groove may extend $\frac{5}{7}$ of the way through the wall of the strip, as shown. The exact proportions of wall thickness, groove depth, and the like may vary somewhat depending on the over-all size of the article, for example, but a preferred embodiment has been illustrated and described. The wall thickness may desirably be approximately one-third the transverse diameter of the sealing strip, in ordinary sizes, and the depth of groove 12 over one-half the thickness of the wall.

The D-shaped cross-section is much preferred where the drum and cover have curved lips of the type indicated but such cross-section may be somewhat modified in particular installations. In general, my new annular sealing ring will be of resilient material and tubular in form, with a longitudinally extending groove therein of

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substantial depth but which does not penetrate to the inner void.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. An annular resilient flexible strip for sealing members of rounded section which interengage in nesting relation, said strip having a D-shaped cross-section, the walls of said strip being heavy and thick relative to the inner void defined thereby, and a single deep longitudinal groove in the curved surface thereof slightly to one side of center toward the inner periphery of such annulus and extending inwardly toward the inner void more than half-way through the strip wall, said groove providing non-uniform deformation of the strip in transverse compression when engaged between such nesting members with its flat side outermost, so that the strip corner furthest removed from the groove is firmly wedged between the members by being distorted outwardly to a greater extent than the other corner of the strip.

2. A sealing strip as recited in claim 1 in which the wall thickness is approximately equal to one-third the transverse dimensions of said strip and the single deep groove thereof extends approximately five-sevenths through the wall.

3. A sealing strip as recited in claim 1 in which the strip material is rubber.

4. A sealing strip as recited in claim 1 in which the strip is formed of a plastic material.

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