

Description

Background of the Invention

The present invention relates in general to sealing arrangements and more particularly to an improved enclosure and dust seal assembly especially suited for application in personalized, hand-held radio apparatus which includes a molded plastic enclosure.

In portable radio equipment, as well as many other applications, seal arrangements are included to block out moisture and dust so as to protect the internal component parts thereof. An example of such is illustrated in US-A-4225970 which is assigned to the present applicant.

Probably the most prevalent is the use of a formed gasket which fits snugly into a provided groove and which is compressed to a required degree by a continuous tongue included on a mating part, such as a cover or the like. However, it will be appreciated that the gasket structure is relatively expensive and particularly so since it is specifically designed to fit but one contour, and thus has but one practical application. Moreover, such gaskets are frequently spliced together by adhesive, as well as requiring still additional adhesive for affixing and retaining the gasket in place. Build up of adhesive of course effects undesirable tolerances. In addition, seal effectiveness of the gasket remains largely a function of how tight the apparatus fasteners are, which control the degree of compression of the gasket.

It must also be kept in mind that gaskets of any type wear out with time and accordingly require field replacement. Gaskets that are glued in place are difficult to replace for that reason alone.

One alternative to the use of gaskets of the foregoing type has been the standard O-ring. O-rings are elastic and thus are easy to set in place. Conventionally they are seated in a formed groove effected in the apparatus during its molding operation. The assembly process then is relatively simple because the O-ring has a uniform shape, a uniform cross-section, and may be fabricated of an impregnated lubricant compound. The O-ring is always less expensive than a specially designed gasket arrangement. Moreover, its effectiveness is not determined by fastener tightness. It might also be pointed out that it additionally minimizes the human factors involved in an otherwise relatively complicated assembly operation.

However, the O-ring is not always suited to every application. This is particularly so regarding small, hand-held personalized apparatus having a molded plastic housing. This is because the O-ring must be seated in formed groove. If the enclosure is relatively large there is little difficulty in providing for such groove in the molding operation of the housing. Below a certain size, however, it is in fact difficult, and in certain instances, impossible to mold in such grooves because of the tooling involved and other factors. One solution to the molding problem is simply to provide a flat surface with essentially right angle corners, instead of the formed groove and wherein the O-

ring structure is glued firmly in place at such right angle corners. This is as undesirable, in terms of difficulty of field replacement, as the glued-in contoured gasket arrangement.

Summary of the Invention

Accordingly, it is an object of the present invention to provide a moisture and dust seal assembly for an enclosure of an apparatus which overcomes the foregoing deficiencies.

A more particular object of the present invention is to provide a moisture and dust seal assembly for an enclosure which utilizes an O-ring that does not require a formed molded-in groove nor that the O-ring itself must be glued in place, which greatly facilitates easy and convenient replacement.

US-A-4225970 describes a moisture and dust seal assembly for an apparatus having a molded plastic enclosure formed by first and second enclosure members, an O-ring and a wall-like member on the interior surface of one of the enclosure members extending outward therefrom forming a closed loop configuration with a plurality of right angle corners.

The invention is characterized by the O-ring being positioned about the outside surface of the wall-like member and retained by the elasticity of the O-ring; and

a flat ribbon-like member in the form of a closed loop overlying said right angled wall-like member and extending outwardly a predetermined distance from the edge of said wall in a manner to form a groove-like space to retain said O-ring.

Brief Description of the Drawings

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, however, together with further object and advantages thereof, may be best understood by reference to the following description when taken in conjunction with the accompanying drawings in which:

Fig. 1 is a view in perspective of a radio apparatus with front cover, which cover includes a seal arrangement which has been constructed in accordance with the present invention;

Fig. 2 is partial enlarged exploded view of the front cover showing the moisture and dust seal assembly and;

Fig. 3 is a fragmentary and cross-section view of the cover showing the constituent parts of the improved moisture and dust seal arrangement.

Description of the Preferred Embodiment

Referring now to the drawings, a miniaturized, hand-held radio apparatus 10 is shown which incorporates the improved moisture and dust seal arrangement of the present invention. It is understood, however, that the inventive seal assembly is not limited to such portable radios but has a widespread application potential. The portable radio 10 includes a base 12 for retaining the various component parts therein. The radio 10 also includes a mating top cover or lid 14 which

mates with the base 12 in an entirely conventional manner. That is, the cover 14 has a lip 14A which fits over and mates with, the outer edge or lip 12A of base 12. A plurality of posts or stantions 16 affixed to cover 12 are designed to insert through appropriate apertures 18. The free end of the post 16 are threaded to accept a machine screw fasteners (not shown) inserted through appropriate apertures in the bottom of the base 12, so as to maintain base 12 and cover 14 fitted together in an assembled relation.

As indicated, cover 14 includes a moisture and dust seal arrangement 20 on the underside thereof. The seal assembly is in the form of a closed loop, as illustrated, with four essentially right angle corners. As shown more clearly in Fig. 2, the seal assembly comprises an upstanding vertical wall 22 formed in the interior or backside of cover 14 a predetermined distance from the inturned lip 14A. A series of stake post or pillars 24 are positioned at appropriate locations about the wall 22. Each of these posts includes a reduced nipple portion 24A at the top end.

O-ring 30 is positioned about the wall 22 in the space between the wall and the inturned lip 14A (best seen in Fig. 3). The O-ring is appropriately dimensioned such that a slight stretching is required for it to fit around the wall 22 and be retained within the referenced space. Preferably, the O-ring is made of an impregnated lubricant compound and has a substantially uniform shape and cross-section.

To complete the assembly, a flat ribbon-like member 32, in the shape of a closed loop, is provided which is dimensioned to overlies the top of the vertical edge of the wall 22 and extend a predetermined distance outwardly from the edge thereof in the space between the wall 22 and lip 14A. By member 32 extending beyond the edge of wall 22, a groove-like space is provided between the wall 22 and lip 14A so as to retain the O-ring 32 in its desired position and from where it can be removed only by stretching it beyond the edge of member 32. Accordingly, no adhesive is required for O-ring 30 and it may be replaced at any time, easily and conveniently.

To permanently affix member 32 to the top of wall 22, the reduced neck portions 24A of posts 24 extend into corresponding apertures 32A of member 32. Neck portion 24A may then be heat staked by a soldering iron or the like to melt the plastic and form a permanent fastening means for member 32A. It is of course obvious that other methods of securing the member 32 are available, such as by screws extending through apertures 32A and corresponding threaded openings in posts 24. Still other methods will come to mind as well.

In effecting the sealing action, as shown in Fig. 3, the lip portion 12A of the base 12 inserts between the inturn lip 14A of cover 14 such that the O-ring 30 is effectively compressed between the lip 12A and the vertical wall 22. As mentioned previously, the O-ring 32 preferably is made of an impregnated lubricant compound so that friction on its surface is held to a minimum to facilitate the slid-

ing action of the lip 12A in the closure operation of the cover 14 on base 12.

Accordingly, it will be appreciated that an improved moisture and dust seal assembly has been disclosed which is especially suited for application in a small, hand-held personalized radio apparatus or the like which includes a molded plastic enclosure. Requirement for a molded-in groove during molding operations for retaining an O-ring has been eliminated. Instead, a flat vertical wall is provided as a closed loop with a plurality of right angle corners around which the O-ring may be positioned and held in place by an overhanging ribbon-like member affixed to the top of the wall. The O-ring is effectively retained in its intended place, but may easily and conveniently be replaced at any time simply by stretching it beyond the edge of the overhanging top portion. Expensive single-application gaskets are avoided and the assembly operation of the seal assembly is easily effected by no more than a simple heat staking operation.

Claims

1. A moisture and dust seal assembly for an apparatus having a molded plastic enclosure formed by first and second enclosure members, an O-ring and

a wall-like member (22) on the interior surface of one of the enclosure members (14) extending outward therefrom forming a closed loop configuration with a plurality of right angle corners;

characterized by the O-ring (30) being positioned about the outside surface of the wall-like member and retained by the elasticity of the O-ring (30); and

a flat ribbon-like member (32) in the form of a closed loop overlying said right angled wall-like member (22) and extending outwardly a predetermined distance from the edge of said wall in a manner to form a groove-like space to retain said O-ring (30).

2. A moisture and dust seal assembly in accordance with claim 1 wherein a plurality of stake posts (24a) are positioned about said wall-like member (22), which posts (24a) include reduced neck portions for extending into corresponding apertures (32a) in said ribbon-like member (32).

3. A moisture and dust seal assembly in accordance with claim 2 wherein said neck portions are adapted for melting by heat staking to permanently affix said ribbon-like member (32) to the top of such wall-like member (22).

4. A moisture and dust seal assembly in accordance with claim 1 wherein said O-ring (30) is fabricated from an impregnated lubricant compound.

5. A moisture and dust seal assembly in accordance with claim 1 wherein said O-ring (30) is dimensioned to be compressed between said wall-like member (22) and an edge portion of said other mating member (12) when said first (14) and said second mating members (12) are assembled to form an enclosure (10).

mates with the base 12 in an entirely conventional manner. That is, the cover 14 has a lip 14A which fits over and mates with, the outer edge or lip 12A of base 12. A plurality of posts or stantions 16 affixed to cover 12 are designed to insert through appropriate apertures 18. The free end of the post 16 are threaded to accept a machine screw fasteners (not shown) inserted through appropriate apertures in the bottom of the base 12, so as to maintain base 12 and cover 14 fitted together in an assembled relation.

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Accordingly, it will be appreciated that an improved moisture and dust seal assembly has been disclosed which is especially suited for application in a small, hand-held personalized radio apparatus or the like which includes a molded plastic enclosure. Requirement for a molded-in groove during molding operations for retaining an O-ring has been eliminated. Instead, a flat vertical wall is provided as a closed loop with a plurality of right angle corners around which the O-ring may be positioned and held in place by an overhanging ribbon-like member affixed to the top of the wall. The O-ring is effectively retained in its intended place, but may easily and conveniently be replaced at any time simply by stretching it beyond the edge of the overhanging top portion. Expensive single-application gaskets are avoided and the assembly operation of the seal assembly is easily effected by no more than a simple heat staking operation.

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a flat ribbon-like member (32) in the form of a closed loop overlying said right angled wall-like member (22) and extending outwardly a predetermined distance from the edge of said wall in a manner to form a groove-like space to retain said O-ring (30).

2. A moisture and dust seal assembly in accordance with claim 1 wherein a plurality of stake posts (24a) are positioned about said wall-like member (22), which posts (24a) include reduced neck portions for extending into corresponding apertures (32a) in said ribbon-like member (32).

3. A moisture and dust seal assembly in accordance with claim 2 wherein said neck portions are adapted for melting by heat staking to permanently affix said ribbon-like member (32) to the top of such wall-like member (22).

4. A moisture and dust seal assembly in accordance with claim 1 wherein said O-ring (30) is fabricated from an impregnated lubricant compound.

5. A moisture and dust seal assembly in accordance with claim 1 wherein said O-ring (30) is dimensioned to be compressed between said wall-like member (22) and an edge portion of said other mating member (12) when said first (14) and said second mating members (12) are assembled to form an enclosure (10).



Patentansprüche

1. Feuchtigkeits- und Staubdichtungsvorrichtung für ein Gerät, das ein gegossenes Plastikgehäuse hat, das aus ersten und zweiten Gehäuseteilen, einem O-Ring und einem wandartigen Teil (22) an der Innenseite des einen der Gehäuseteile (14), sich davon nach außen erstreckend und eine geschlossene Schleifengestalt mit einer Mehrzahl von rechtwinkligen Ecken ausbildend, gebildet ist, dadurch gekennzeichnet, daß der O-Ring (30) um die Außenfläche des wandartigen Teils angeordnet ist und durch die Elastizität des O-Ringes (30) gehalten ist; und

daß ein flaches bandartiges Teil (32) in Form einer geschlossenen Schleife über dem rechtwinkligen, wandartigen Teil (22) liegt und sich um eine vorbestimmte Distanz über den Rand der Wand derart erstreckt, daß ein rillenartiger Zwischenraum zur Aufnahme des O-Ringes (30) gebildet wird.

2. Feuchtigkeits- und Staubdichtungsvorrichtung nach Anspruch 1, bei der eine Mehrzahl von Steckzapfen (24a) um das wandartige Teil (22) angeordnet sind, welche Zapfen (24a) reduzierte Halsabschnitte zur Einführung in entsprechende Öffnungen (32a) in dem bandartigen Teil (32) aufweisen.

3. Feuchtigkeits- und Staubdichtungsvorrichtung nach Anspruch 2, bei der die Halsteile dazu eingerichtet sind, durch Hitze geschmolzen zu werden, um steckend das bandartige Teil (32) dauerhaft an der Oberseite des wandartigen Teils (22) festzulegen.

4. Feuchtigkeits- und Staubdichtungsvorrichtung nach Anspruch 1, bei der der O-Ring (30) aus einer imprägnierten Schmierverbindung hergestellt ist.

5. Feuchtigkeits- und Staubdichtungsvorrichtung nach Anspruch 1, bei der der O-Ring so dimensioniert ist, daß er zwischen dem wandartigen Teil (22) und einem Randabschnitt des anderen, dazu passenden Teils (12) zusammengedrückt wird, wenn die ersten (14) und zweiten zueinander passenden Teile (12) zur Bildung eines Gehäuses (10) zusammengefügt werden.

Revendications

1. Assemblage étanche à l'humidité et à la

poussière, pour appareil ayant une enveloppe en matière plastique moulée formée par un premier et un deuxième élément d'enveloppe, un anneau torique et un élément semblable à une paroi (22), sur la surface intérieure de l'un des éléments d'enveloppe (14), s'étendant vers l'extérieur, formant une configuration en boucle fermée avec une pluralité de coins en angle droit, caractérisé par

— le fait que l'anneau torique (30) est disposé autour de la surface extérieure de l'élément semblable à une paroi et est retenu par son élasticité propre; et

— le fait qu'un élément plat semblable à un ruban (32), sous la forme d'une boucle fermée, chevauche ledit élément semblable à une paroi (22), avec angles droits, et s'étend vers l'extérieur, depuis le bord de ladite paroi, sur une distance prédéterminée, de manière à former un espace semblable à une rainure, pour retenir ledit anneau torique (30).

2. Assemblage étanche à l'humidité et à la poussière selon la revendication 1, dans lequel plusieurs ergots (24a) sont disposés autour dudit élément semblable à une paroi (22), ces ergots (24a) comportant des parties amincies formant col qui sont destinées à s'étendre dans des ouvertures correspondantes (32a) dans ledit élément (32) semblable à un ruban.

3. Assemblage étanche à l'humidité et à la poussière selon la revendication 2, dans lequel lesdites parties formant col sont aptes à être fondues par agrafage thermique pour fixer de manière permanente ledit élément semblable à un ruban (32) à la partie supérieure dudit élément semblable à une paroi (22).

4. Assemblage étanche à l'humidité et à la poussière selon la revendication 1, dans lequel ledit anneau torique (30) est fabriqué à partir d'un composé imprégné lubrifiant.

5. Assemblage étanche à l'humidité et à la poussière selon la revendication 1, dans lequel ledit anneau torique (30) est dimensionné pour être comprimé entre ledit élément semblable à une paroi (22) et une partie bord dudit autre élément conjugué (12), lorsque ledit premier (14) et ledit deuxième élément (12) conjugué sont assemblés pour former une enveloppe (10).

