

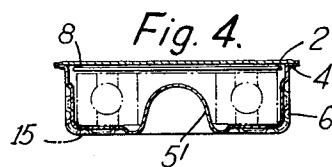
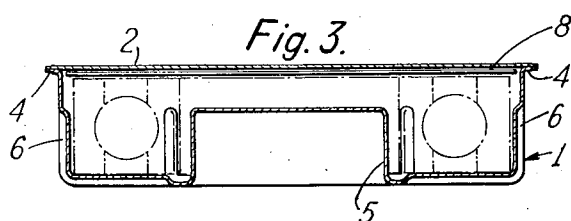
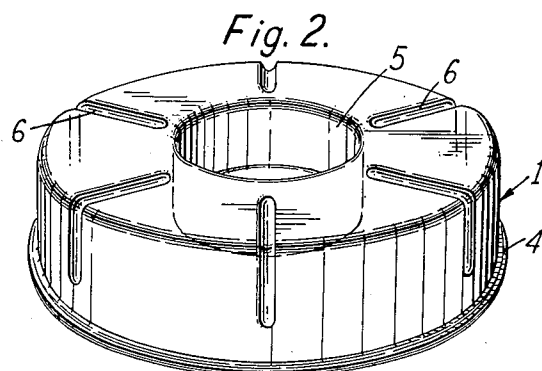
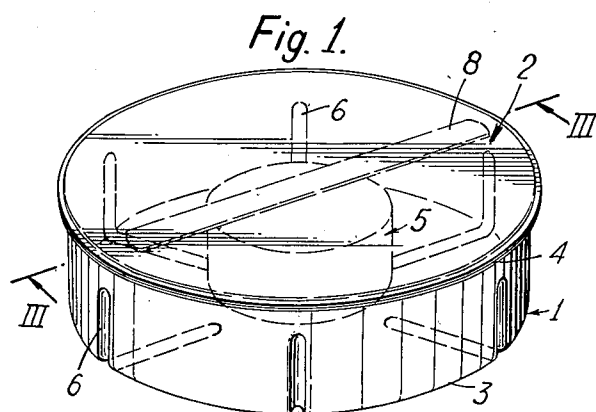
April 9, 1963

E. L. HAWLEY
METHOD AND MEANS OF PACKING AND PRESERVING
CORRODIBLE OBJECTS OR COMPONENTS

3,084,791

Filed April 3, 1959

4 Sheets-Sheet 1



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Fig. 5.

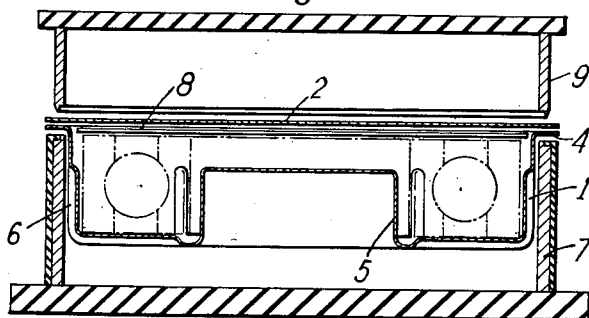


Fig. 6.

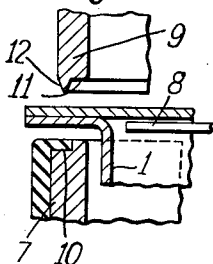


Fig. 7.

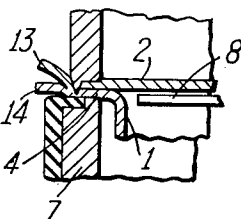


Fig. 8.

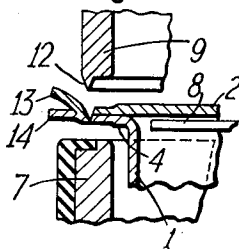


Fig. 10

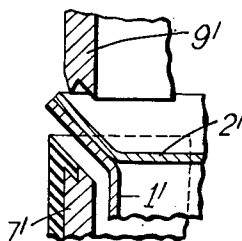


Fig. 9.

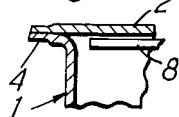
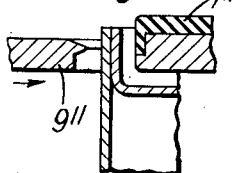


Fig. 11.



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Fig. 12.

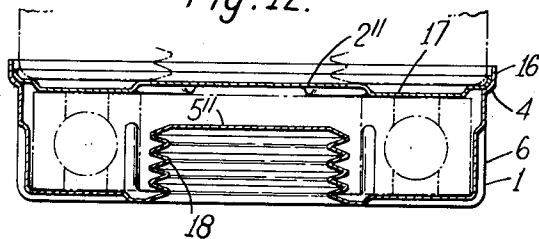
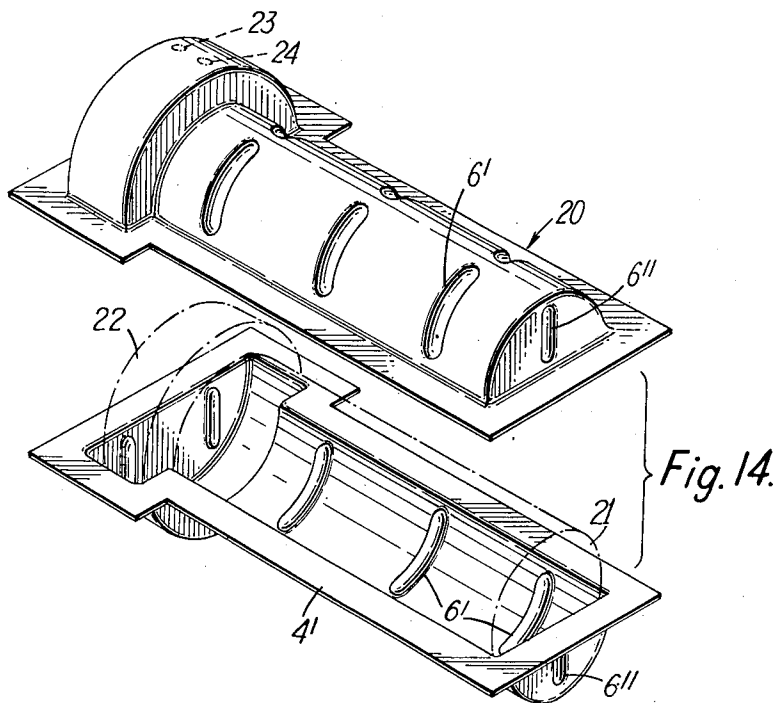
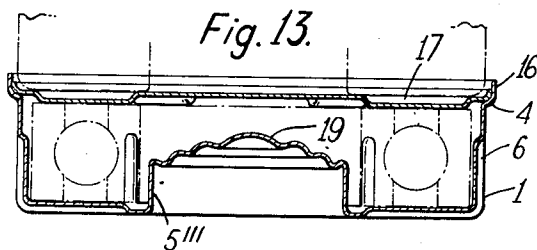


Fig. 13.



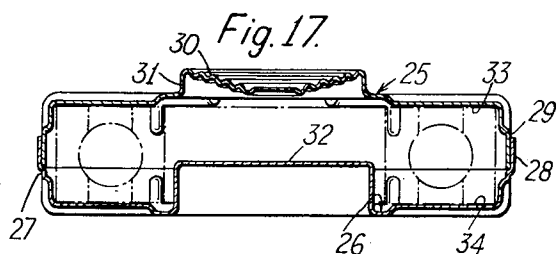
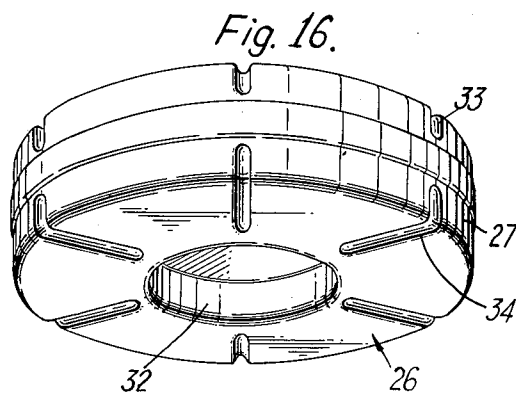
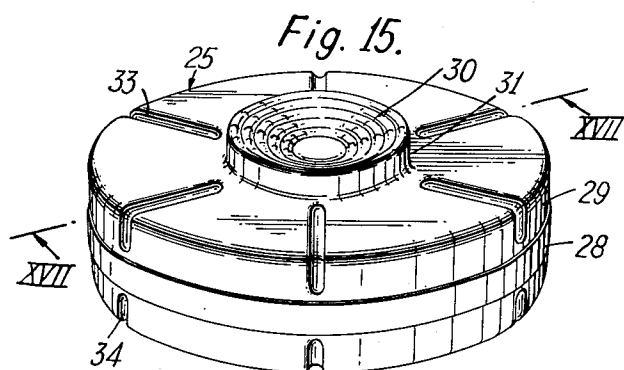
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METHOD AND MEANS OF PACKING AND PRESERVING CORRODIBLE OBJECTS OR COMPONENTS

Edwin Lawrence Hawley, Herne Bay, England, assignor to E.P.S. (Research & Development) Ltd., Sittingbourne, England, a British company

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Claims priority, application Great Britain Apr. 11, 1958
2 Claims. (Cl. 206—46)

This invention concerns a new or improved method and means of packing and preserving corrodible objects or components (all hereinafter referred to as "components") and has particular reference to the packing and preservation of highly finished or delicate, unprotected (uncoated) metal components of machines and other apparatus, such as, for example, anti-friction bearings (for instance, ball and roller and like races) and hydraulic valve gear.

Where corrodible components are not required for immediate use and have to be transported and/or stored, there is grave danger, especially when the transport or storage is to take place in humid atmospheres or where temperatures fluctuate considerably, of corrosion of the components taking place and, once corroded, even if only slightly, many components cannot be used with safety. Moreover, the presence of dust, fingerprints or other contaminants on the surface of the metal components is likely, in the presence of air, especially unfiltered humid air, to initiate rapid corrosion of the components, rendering them unfit for use in many cases.

Conventional methods of preserving corrodible metal components include coating them with grease-like materials or with a plastic strippable coating. However, these methods have not proved fully effective in preventing corrosion, especially in extreme conditions such as are met in tropical countries, and furthermore, when the components have been treated by these methods, labour and time have to be expended on them to clean them or strip the grease or plastic coating from them before they can be used. Moreover, with these conventional methods of preserving metal components, not enough precautions have been taken in the past to ensure that the components are packed in a dust-free, fingerprint-free and generally uncontaminated condition with a complete exclusion of air from contact with the components.

An object of this invention is to provide an improved method and means for packing corrodible components whereby the components will be protected against corrosion. A further object of the invention is to preserve against corrosion and general deterioration components having moving parts, such as ball and roller races, and to maintain them in a lubricated condition ready for use.

Further objects and advantages of the invention will become apparent hereinafter.

According to one aspect of this invention there is provided a method of packing and preserving corrodible metal components, such method comprising placing the component in a substantially moisture impermeable casing and supporting said component in such casing so as to be substantially entirely spaced on all surfaces from the walls of such casing but so that the component is incapable of any substantial movement within the casing relatively thereto, said component being enveloped in a protective substance and said casing being hermetically sealed with the said component therein.

According to a further aspect of the invention there is provided a method of packing and preserving corrodible metal components, for example, ball and roller anti-friction races, such method comprising placing the component in a substantially moisture impermeable casing having at least a part of at least one wall of a substan-

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tially transparent character and supporting said component in such casing so as to be substantially entirely spaced on all surfaces from the walls of such casing but so that the component is incapable of any substantial movement within the casing relatively to the latter, surrounding the component on all surfaces with a corrosion inhibiting liquid entirely filling said casing, and hermetically sealing the casing thereby to prevent the entry of air or other gases and moisture thereto.

Conveniently the said casing will be made in at least two parts of which overlapping portions will be hermetically sealed together after the packing of the component within the casing.

Desirably the casing will be formed of a thermoplastic material such as polyvinyl chloride or any of those alternative materials subsequently mentioned herein, and the casing will preferably be moulded or pressed from such material and means will be provided within the casing for spacing the component substantially entirely from all surfaces of the casing whilst permitting access of the corrosion inhibiting liquid to all parts of the component.

The said spacing means will preferably be formed integrally of the casing and may be in the form of projections or ribs.

According to a further feature of the invention the casing may be formed of a thermoplastic material capable of being welded by high-frequency di-electric welding techniques, the casing being hermetically sealed by this technique.

In a preferred embodiment of the method according to this invention, the casing is made in two parts, namely a receptacle part capable of entirely receiving the component to be packed and a cover part for hermetic sealing on to said receptacle part, and the method includes the steps of placing the component in said receptacle part and filling the latter with corrosion inhibiting liquid to overflowing, applying the said cover part to the receptacle part of the casing and sealing the casing parts hermetically together by high-frequency di-electric welding.

The corrosion inhibiting liquid preferably comprises a substantially transparent Technical White Oil and desirably includes one or more additional corrosion inhibitors selected from the group comprising oil soluble alkali and alkaline earth salts of oil soluble petroleum sulphonic acids, and/or one or more additional corrosion inhibitors selected from the group comprising fatty oils of vegetable or animal origin which are essentially glycerides of fatty acids of high purity and extremely low free acid value.

The corrosion inhibiting liquid may also include an anti-oxidant to counteract any tendency for the liquid to discolour. This anti-oxidant may comprise nonyl phenol.

In an alternative form, the method according to the invention may include the steps of placing the component in the said casing, introducing into the casing one or more tablets or capsules of a material capable of emitting a corrosion inhibiting gas or vapour, and sealing the casing. The said material may conveniently comprise a vapour phase inhibitor such as cyclohexylamine carbonate. The component will preferably be enveloped in a protective grease before being placed in the casing, such grease desirably being composed at least mainly of lanolin.

The invention also resides in the casing and packs made in accordance with this invention as will hereinafter be more fully described.

In order that the nature of the invention may be more readily understood, certain embodiments of the same will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a ball race pack according to this invention;

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FIGURE 2 is another perspective view of the pack shown in FIGURE 1, the pack being inverted as compared with FIGURE 1;

FIGURE 3 is a section on the line III—III, FIGURE 1;

FIGURE 4 is a view similar to FIGURE 3 but showing a smaller and slightly modified form of pack according to this invention;

FIGURE 5 is a diagrammatic vertical sectional view illustrating the method of hermetically sealing the packs illustrated in FIGURES 1 to 4;

FIGURES 6 to 9 are enlarged diagrammatic views illustrating the various stages in the operation of the apparatus shown in FIGURE 5 during the sealing and trimming of a pack such as illustrated in FIGURES 1 to 4;

FIGURES 10 and 11 are views similar to FIGURE 6 illustrating slightly modified arrangements for hermetically sealing the packs shown in FIGURES 1 to 4;

FIGURE 12 shows in vertical section a modified form of the casing employed in the pack illustrated in FIGURES 1 to 3;

FIGURE 13 illustrates in vertical section a slight modification of the casing shown in FIGURE 12;

FIGURE 14 illustrates the two parts of a pack casing for receiving a small piece of hydraulic equipment, the casing being constructed according to this invention;

FIGURE 15 is a top perspective view of a still further modified form of casing for a pack made in accordance with this invention;

FIGURE 16 is an underneath perspective view of the casing shown in FIGURE 15; and

FIGURE 17 is a section on line XVII—XVII, FIGURE 15.

Referring to FIGURES 1 to 3 of the drawings, it will be seen that the casing there illustrated is formed in two parts, a receptacle part 1 and a cover part 2, these parts being dissimilar. The receptacle part 1 is of dished, generally cylindrical, form having radiused lower corners 3 and an outwardly extending narrow peripheral flange 4 at its upper edge.

Centrally the casing part 1 has an upstanding blind hollow boss 5 formed integrally with the rest of the receptacle part of the casing, the axial depth of the said boss being less than that of the receptacle part 1 so that the boss does not reach the top of the casing.

At equiangularly spaced intervals around its periphery the receptacle part 1 of the casing is furnished internally with narrow vertical ribs 6 of which there are conveniently six and which terminate short of the upper edge of the peripheral wall of the said receptacle part of the casing and are extended inwardly along the upper surface of the bottom of the receptacle 1 towards, but not up to, the hollow boss 5. The ribs 6 may be continuous as shown, or may be of interrupted form, e.g. in the form of small hemispheres.

The receptacle part 1 of the casing is made of a mouldable thermoplastic material and is preferably transparent or semi-transparent throughout so that the contents of the receptacle part of the casing are clearly visible from the exterior of the same.

The casing, i.e. the receptacle part 1 and the cover part 2 are preferably made from a semi-rigid polyvinyl chloride but it may be made of co-polymers of polyvinyl chloride or of any other similar and appropriate thermoplastic material such as polyvinylidene chloride, polyvinylacetate, polythene, polythene terephthalate, polystyrene and modified polystyrene, or nylon.

The wall thickness of the casing will depend to some extent on the size of the ball race (or other component in other cases) that is to be placed in the casing. However, where the race is of about $6\frac{1}{2}$ " in diameter and of about 7 lbs. in weight, and where the casing is formed of the said semi-rigid polyvinyl chloride, the wall will desirably be of a minimum of about $\frac{1}{16}$ " in thickness.

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Conveniently the receptacle part 1 of the casing may be moulded by the well-known vacuum moulding process, a sheet of the thermoplastic material used being heated to the temperature required to effect the necessary softening of the material, and the material then being drawn into or over an appropriate mould or die by the creation of an appropriate vacuum, the ribs 6 being formed by pressing the material of the receptacle part of the casing 1 inwardly with respect to the peripheral wall and base of the casing.

Alternatively, the receptacle part of the casing may be formed by pressing sheet material to the required form, or by injection or other suitable moulding techniques according to what is most economical or desirable for the particular material being used and the apparatus which the receptacle produced is to contain.

The cover part 2 of the receptacle is a simple disc of the polyvinyl chloride or other material used and is preferably entirely transparent or semi-transparent, the diameter of the disc being substantially equal to the external diameter of the flange 4 of the receptacle part 1 of the casing.

The hollow boss 5 is not essential but where the component to be contained in the casing is of ring-like form, as in the case of a ball- or roller race, the hollow boss 5 can conveniently be provided and is desirable since it reduces the capacity of the casing and thus reduces the volume of corrosion inhibiting liquid that is required to fill the casing.

In packing a ball race or the like in a casing such as shown in FIGURES 1 to 3, the casing 1 is appropriately chosen to suit the race being packed, the internal diameter of the casing being such that when the race is coaxially placed in the receptacle part 1 thereof, the race will be centralized in the casing by the ribs 6 without the ribs exerting any appreciable pressure upon the periphery of the race, there preferably being a very small clearance between the ribs and the periphery of the race. The axial depth of the receptacle part of the casing should also be somewhat greater than the maximum depth of the race so that the latter will rest upon the inwardly directed portions of the ribs 6 at the base of the receptacle part of the casing whilst having its upper surface spaced slightly below the upper surface of the rim or flange 4 of such receptacle part. Moreover, the external diameter of the said hollow boss should be less than the internal diameter of the ball race but the periphery of the boss may have circumferentially spaced ribs or projections (not shown) for engaging lightly against the inner periphery of the said race.

The receptacle part 1 of the casing is placed, preferably before placing the ball race itself into such receptacle part, within an annular electrode 7 (see FIGURE 5) of a high-frequency di-electric plastic welding apparatus diagrammatically illustrated in the said figure, the receptacle part of the casing being a relatively close fit within the electrode 7 and its flange 4 being adapted to engage upon the upper edge of such electrode so that the receptacle part of the casing is suspended in the electrode.

Before placing the ball race in the receptacle part 1 of the casing care should be taken to make sure that the ball race has not been contaminated in any way such as to initiate corrosion, whilst the casing should be dust-free and absolutely clean. The packing operation should also be performed in a dry and dust-free atmosphere.

After depositing the ball race in the receptacle part 1 of the casing, a strip 8 is laid substantially diametrically across the top of the ball race to act as a spacer between the cover disc 2 and the ball race when the cover disc is sealed on to the receptacle part 1 of the casing as herein-after described, the spacer strip 8 having rounded ends and an overall length rather less than the internal diameter of the receptacle part 1 of the casing and its thickness being slightly less than the depth of the gap left between the top of the ball race and the upper surface of the flange 4 of the receptacle part 1 of the casing. This spacer strip

8 is free to move about to a limited extent within the casing, and the arrangement is such that the corrosion inhibiting liquid (subsequently referred to) may circulate freely about the strip.

If desired, the spacer strip 8 may be furnished with a series of spaced projections on the upper and/or lower surface or surfaces thereof further to facilitate the flow of corrosion inhibiting liquid therearound and to ensure that it only contacts the ball race over a very small area.

All the spacing ribs or projections above described preferably have only line or point contact with the ball race or other component packed in the casing. When the strip 8 has been placed in position the casing is filled to overflowing with a substantially clear or transparent corrosion inhibiting liquid (hereinafter described) which has been de-aerated in any suitable manner (e.g. under vacuum) and, if desired, subjected to a dehydrating process.

When filling the receptacle part 1 with the corrosion inhibiting liquid, it may be observed that a few air bubbles are displaced from within the ball race placed in the receptacle part and that these air bubbles appear in the surface layer or meniscus of the corrosion inhibiting liquid which surface layer will, if the receptacle part 1 is initially dry as it should be, and if the corrosion inhibiting liquid is fed or poured into the receptacle part carefully, stand somewhat proud of the upper surface of the peripheral flange 4 of the said receptacle part.

If the cover disc 2 is now slid edgewise on to the top surface of the flange 4 of the receptacle part 1 of the casing with the disc 2 moving in the plane of the said flange, the air bubbles contained in the meniscus of the said corrosion inhibiting liquid and the liquid above the level of the flange 4 are wiped off the surface of the liquid in the said receptacle part 1 thereby excluding all or substantially all air from the interior of the casing.

When the cover disc 2 has been fully slid into register with the periphery of the flange 4, an upper annular electrode 9 is caused to descend on to the upper surface of the cover disc adjoining the periphery thereof and by bringing the high-frequency di-electric welding apparatus into operation, the peripheral portion of the cover disc 2 is hermetically welded to the flange 4 of the receptacle part 1, whereafter the electrode 9 is withdrawn.

A preferred form of the electrodes 7 and 9 and their manner of operation is indicated diagrammatically in FIGURES 6 to 8. From these figures it will be seen that the lower electrode 7 is in the form of a hollow cylinder having an intumed flange 10 at its upper edge whilst the electrode 9 is also in the form of a hollow cylinder having its lower edge 11 adapted to co-operate with the flange 10 to compress between the electrodes the marginal peripheral portions of the cover disc 2 and the flange 4 of the receptacle part 1 of the casing during the high-frequency di-electric sealing of these parts together.

Moreover, the electrode 9 has an annular dependent chamfered rib 12 constituting an annular knife which, when the upper electrode 9 descends to effect the high-frequency di-electric welding above referred to, also impresses itself deeply into the outer marginal portions of the cover disc 2 and flange 4 which are supported from underneath by the flange 10 of the electrode 7, the rib or knife 12 severing or substantially severing the outer marginal portions 12, 13 (see FIGURES 7 and 8) of the said disc 2 and flange 4 from the latter parts.

If the outer marginal parts 12 and 13 are not entirely severed from the cover disc 2 and flange 4 during the di-electric welding, they can readily be torn off either before or after withdrawal of the electrode 9. When trimmed in this way, the sealed joint between the cover disc 2 and the flange 4 has substantially the neat cross-sectional form fragmentarily illustrated in FIGURE 9.

Instead of providing the annular rib or knife 12 integrally with the cylindrical electrode 9, it may be formed on the lower edge of an outer cylinder separate from the electrode 9 and slidable thereover so that the electrode

9 may first be brought up to the electrode 7 to effect the sealing operation whereafter the outer cylinder carrying the rib or knife 12 may be advanced towards the sealed joint to trim off the outer portions 12, 13 of the cover disc 2 and flange 4 of the receptacle part 1. Alternatively, any other suitable trimming technique may be employed.

In the embodiments of the invention described with reference to FIGURES 1 to 9, the seal made between the cover disc 2 and the receptacle part 1 is located in a horizontal plane, i.e. in a plane perpendicular to the axis of the receptacle part 1. However, the seal need not necessarily be so located. It may, for example, be located on a conical surface as shown in FIGURE 10 or on a cylindrical surface as shown in FIGURE 11. In such cases the electrodes 7 and 9 will be appropriately shaped as indicated at 7' and 9' in FIGURE 10, and 7'' and 9'' in FIGURE 11. In the arrangement shown in the latter figure it will, of course, be necessary to employ a radially split electrode 7''.

It has been found that the high-frequency di-electric sealing method described above for effecting the hermetic sealing of the receptacle is extremely satisfactory and that a very sound hermetic seal can be achieved by this method in spite of the fact that a film of the corrosion inhibiting liquid may initially lie between the cover disc 2 and the flange 4 of the receptacle part 1 of the casing.

It is preferred to use, where convenient, a flat unformed cover disc 2 in preference to a formed cover member since the former procedure is generally more economical since it simplifies the production and processing of the casing, but where it is intended to provide for the nesting or interengaging stacking of the packs, the flanges 4 of the receptacle parts 1 of the packs and the covers 2 may be formed as in the case of the receptacle part 1' and the cover member 2' diagrammatically illustrated in FIGURE 10, or as shown in FIGURES 12 and 13 subsequently described. Nesting may also be achieved when the casings are constructed as subsequently described with reference to FIGURES 15 to 17.

When using the form of corrosion inhibiting liquid subsequently described, it is found that the volumetric change in the liquid which takes place between -40° C. and $+60^{\circ}$ C. does not exceed 4% and that this volumetric change is small enough to be fully compensated for by the flexibility of the casing, but if a corrosion inhibiting liquid having a greater coefficient of volumetric expansion than that of the liquid hereinafter described is employed, or if the casings are made of more rigid materials than polyvinyl chloride (e.g. of nylon) then additional provision may be made for accommodating the volumetric expansion of the corrosion inhibiting liquid, such provision involving a yielding diaphragm or element which may be of the aneroid type or of the bellows type such as subsequently described respectively with reference to FIGURE 13 or FIGURES 15 to 17 and FIGURE 12.

If desired, instead of employing a separate spacer strip 8 as above described, the cover disc 2 may be furnished internally with spacer ribs or projections to replace the spacer bar 8 as subsequently described with reference to FIGURES 12 and 13, such projections or ribs permitting substantially free circulation of the corrosion inhibiting liquid over the ball race to the maximum extent.

By using a substantially transparent casing and a clear or substantially clear corrosion inhibiting liquid, identification data engraved or embossed or otherwise marked on the component located within the receptacle is readily visible without it being necessary to apply additional markings to the casing or to include any other marking device within the casing although, if desired, such additional markings or data may be provided on or within the casing.

The casing illustrated in FIGURE 4 differs from that shown in FIGURES 1 to 3 only in that it is smaller and has fewer ribs 6 and in that its central hollow boss 5' is of a dome or part-spherical form rather than of the cylin-

drical shape used in the embodiment of FIGURES 1 to 3. FIGURE 4 also indicates in dotted lines at 15 how the ribs 6 could be formed as a series of spaced projections instead of being continuous.

In the embodiment of the invention illustrated in FIGURE 12, the casing is very similar to that shown in FIGURE 1 except that the flange 4 has an upstanding rim 16 within which the cover disc 2" is sealed and which rim serves to receive in nesting relationship the lower portion of a superimposed receptacle as indicated fragmentarily in dot and dash lines in FIGURE 12.

Moreover, the cover disc 2" is furnished at its underside with angularly spaced radial ribs 17 which replace the spacer strip 8 previously referred to.

Moreover, the central hollow boss 5" of the receptacle part 1 of the casing shown in FIGURE 12 is in the form of an expansion bellows to compensate for volumetric expansion within the casing 1, the peripheral wall 18 of the boss 5" being corrugated bellows-fashion.

The construction of the casing illustrated in FIGURE 13 is the same as that shown in FIGURE 12 with the exception that the hollow central boss 5" has its upper end in the form of a flexible diaphragm 19 of the aneroid barometer type, this arrangement compensating for volumetric expansion within the receptacle.

In FIGURE 14 there is illustrated a casing, generally indicated by the reference 20, formed in two symmetrical halves shown separated and which functions in all essentials in the same manner as the casing described with reference to FIGURES 1 to 3 although of a different shape to that casing.

The casing 20 is intended to receive an object, for example, a small piece of highly finished hydraulic valve gear 21 of a generally cylindrical character having an enlarged end portion 22. As will be seen, the two halves of the casing 20 are formed to accommodate such an article between them and are provided peripherally with inwardly directed ribs 6' and at their ends with inwardly directed ribs 6" to locate the valve within the casing, when the two parts of the latter are hermetically sealed together, in such a manner that the valve is spaced substantially over its entire surface from the walls of the casing.

The two parts of the casing 20 are furnished with perimetrical flanges 4' by which the parts of the casing are bonded together preferably by high-frequency dielectric welding as above described, the electrodes being appropriately shaped. The filling of this form of casing with corrosion inhibiting liquid is conveniently performed whilst drawing a vacuum in the casing through an aperture in the wall of the latter whilst the filling is effected through another opening in the wall of the casing, these openings being subsequently sealed off after the casing has been completely filled with corrosion inhibiting liquid. The said two holes for drawing a vacuum and filling the casing may be located at any appropriate positions in the casing as, for example, in the positions indicated in dotted lines at 23-24, FIGURE 14.

FIGURES 15 to 17 illustrate a modified form of casing constructed in accordance with the invention for receiving ring-like objects such as ball or roller races, these casings corresponding in general form to that shown in FIGURES 1 to 3 but being rather differently constructed.

In the construction illustrated in FIGURES 15 to 17, the casing is formed of two similar dished parts or halves, an upper part 25 and a lower part 26. The lower part 26 of the casing is in the form of a circular dished receptacle or tray having a cylindrical peripheral wall 27 upstanding from its base, whilst the upper part 25 of the casing is of a generally similar basic shape to the lower part 26 but is inverted with respect to, and is complementary to, the latter. The upper part 28 of the cylindrical wall 27 of the lower casing part is outwardly joggled so as to be capable of receiving as a close fit the dependent circumferential wall 29 of the upper part 25 of the casing.

A built-in yielding wall part 30, in the form of a diaphragm or bellows conveniently of the type used in aneroid barometers, is provided centrally and coaxially in the upper wall of the upper part 25 of the casing, the peripheral wall 31 of this portion of the casing projecting upwardly somewhat from the top of the upper casing part 25.

The lower casing part 26 is furnished centrally with a substantially cylindrical blind hollow boss 32 corresponding in purpose to the hollow bosses 5, 5', 5"', and 5" previously described, and preferably the peripheral wall 31 of the diaphragm 30 is of an external diameter slightly less than the internal diameter of the hollow boss 32 so that when casings such as illustrated in FIGURES 15 to 17 are stacked one upon the other, the diaphragm portions 30 of succeeding casings in a stack are received into the hollow bosses 32 in the superimposed casings, the latter thus being interlocked together against substantial relative lateral movement.

The two parts 25 and 26 of the casing are preferably formed by vacuum forming or moulding polyvinyl chloride sheet material, or any of the other aforementioned materials, to the required form as described for example with reference to FIGURES 1 to 3 of the accompanying drawings, and the two casing parts 25 and 26 are formed with internal ribs or projections 33 and 34 respectively corresponding to the ribs 6 hereinbefore described and serving the same function as the latter, the ribs 33 combining also the function of the spacer strip 8 previously described, or of the ribs 17 described with reference to FIGURES 12 and 13.

The two oppositely dished casing parts illustrated in FIGURES 15 to 17 fit one into the other and are adapted to be bonded together along the overlapping parts of the flanges 27 and 29 lying within the joggled part 28 of the flange 27. The said bonding may be achieved by any appropriate method which will give sound hermetic sealing of the parts together, e.g. by electric conduction or hot gas welding or by means of an appropriate adhesive or cement.

When using a casing of the kind described with reference to FIGURES 15 to 17, the ball race is first positioned in the lower half 26 of the casing and then the upper half of the casing is fitted complementarily to such lower half and the two parts are hermetically sealed together. A small aperture is provided in the wall of the casing either initially or by the insertion of a tubular needle thereto and the casing is placed in an appropriate chamber wherein a vacuum can be, and is, drawn so as to extract air and moisture vapour from the interior of the casing and the ball race in the latter. Whilst the vacuum is maintained, corrosion inhibiting liquid, herein-after described, is introduced (preferably after de-aeration as hereinbefore described) into the casing so as completely, or substantially completely, to fill the latter. The casing is then sealed off.

Although in all the above described embodiments of the invention the said locating ribs or projections have been described as being integrally formed with the casing or casing parts during their manufacture, such ribs or projections could initially be formed separately of the casing or casing parts and subsequently attached thereto by welding, cementing or the like.

It should be understood that, if desired, the casing may be composed of more than two parts. It may for example be formed by a cylindrical body part closed at opposite ends by separately formed parts or caps hermetically sealed on to the body part.

The said corrosion inhibiting liquid preferably comprises basically a vehicle consisting of a Technical White Oil which is water white in colour, has a high order of purity and is obtainable within close specification limits, has lubricating qualities and is obtainable at an economic cost.

The corrosion inhibiting characteristics of the said ve-

hicle are preferably supplemented by the inclusion of one or more additional corrosion inhibitors preferably selected from the group consisting of oil soluble alkali and alkaline earth salts of oil soluble petroleum sulphonic acids, and represented by sodium petroleum sulphonate, and/or the group consisting of fatty oils of vegetable or animal origin which are essentially glycerides of fatty acids of high purity and extremely low free acid value, the latter group being represented by sperm oil, castor oil or rape oil.

Preferably, a combination of additional inhibitors from the said two groups is employed.

Desirably the corrosion inhibiting liquid should also include a small percentage of an anti-oxidant such as for example nonyl phenol, this serving to reduce the liability of deleterious colour changes occurring in the oil under long storage conditions.

One very suitable corrosion inhibiting liquid of this form has the following composition:

2.5% wt./wt. sodium petroleum sulphonate.
0.5% wt./wt. sperm oil.
0.05% wt./wt. nonyl phenol, and
96.95% wt./wt. Technical White Oil.

The corrosion inhibiting liquid having the above specified composition has the following properties:

Specific gravity ----- 0.866 at 60° F.
Viscosity at 70° F. ----- 129 secs. Redwood No. 1.
Viscosity at 140° F. ----- 44.5 secs. Redwood No. 1.
Pour point ----- 6° F.
Open flash point ----- 335° F.
Unsulphatable matter ----- 99.0%.

It will, of course, be appreciated that the composition of the corrosion inhibiting liquid may be varied to suit components formed of various different materials, the above-specified liquid being particularly suitable for use with ball, roller and like races which are formed primarily of metal.

A corrosion inhibiting liquid having a composition as above described is stable and does not gel or precipitate at low temperatures.

Besides being de-aerated, the corrosion inhibiting liquid is preferably also dehydrated, also as previously mentioned.

A corrosion inhibiting liquid having the aforementioned composition also acts to some extent as a desiccating liquid which will compensate for any very low quantity of moisture vapour which might permeate the plastic casing during prolonged storage of the pack in conditions of high humidity, the possibility of the building up or accumulation of moisture vapour in the liquid thus being avoided or reduced.

As a further safeguard against the possibility of even very small penetration of moisture vapour through the walls of the casing, the latter may be made of laminated form, different laminae being, if desired, formed of different plastic materials.

As an additional precaution against initial contamination of the components before being packed they may, where such a step would be useful and practicable, be demagnetized.

In an alternative form of the invention, the above described corrosion inhibiting liquid may be replaced by a corrosion inhibiting gas or vapour. Conveniently, the said gas or vapour may be introduced into the casing by placing in the latter, before it is sealed, one or more tablets or capsules of a material capable of emitting such a gas or vapour, and subsequently sealing the casing with the component therein. The said material may conveniently comprise a vapour phase inhibitor such as

cyclohexylamine carbonate; where the casing is provided with an upstanding bellows or flexible diaphragm as described above with reference to FIGURES 15 to 17 of the accompanying drawings, the said tablets or capsules may be housed within the projection in which the bellows or diaphragm is formed. Desirably, where a corrosion inhibiting gas or vapour is employed, the component will be coated with protective grease before being placed in the casing; such grease will preferably be composed at least partly of lanolin.

I claim:

1. A package of the class described comprising a receptacle part and a cover therefor both formed of a thermoplastic substantially moisture impermeable material, means extending internally of the bottom and sides of said receptacle for positioning a component relatively to the bottom and sides of said receptacle to allow the free circulation of fluid therebetween, a ring-shaped component within said receptacle, said cover overlapping perimetrical portions of said receptacle and being hermetically sealed thereto, strip spacer means independent of said cover and receptacle between the upper portion of said component and said cover, said strip having a width substantially less than the diameter of said component, and a corrosion inhibiting fluid surrounding said component.

2. A hermetically sealed package comprising a casing of moisture impermeable and stiff plastic material, said casing comprising a receptacle part and a cover which is hermetically sealed to said receptacle part, a corrodible metal ball-and-roller anti-friction race ring component within said casing, said receptacle part having a plurality of substantially rigid line contact support means supporting said component in substantially entirely spaced relationship with respect to the side and bottom walls of said receptacle part, substantially rigid line contact support means independent of said receptacle part and supporting said component in substantially entirely spaced relationship with respect to said cover, and a corrosion inhibiting fluid surrounding said component and filling the remaining space within said casing, said casing including a surface portion providing a central hollow boss extending internally of the central aperture of said race ring component, said hollow boss occupying a substantial portion of the zone of said central aperture and said hollow boss surface being entirely spaced from the adjacent surface of said race ring component, said hollow boss surface including a bellows portion for commensurately varying the interior volume of said casing responsive to variations of the volume of said fluid as are due to changes in the temperature thereof.

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