

Oct. 10, 1950

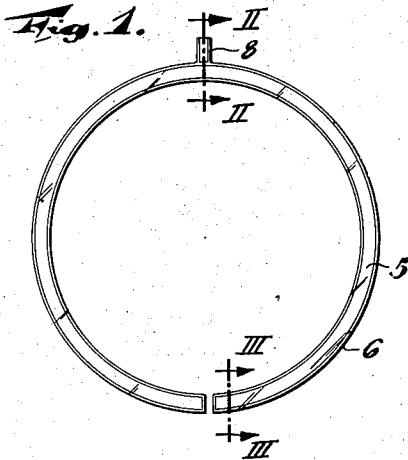
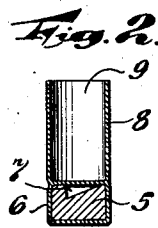
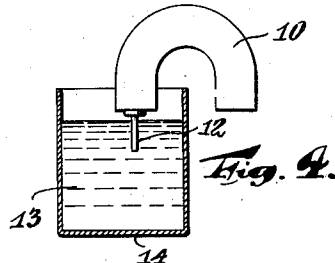
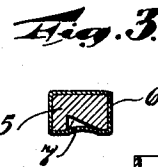
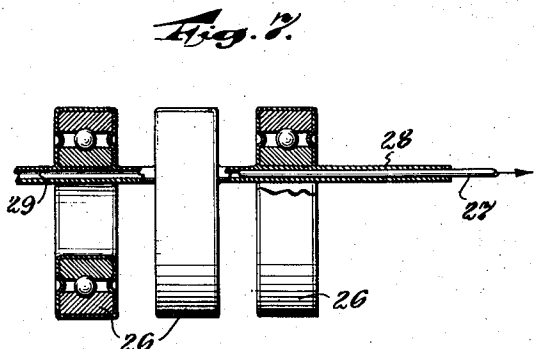
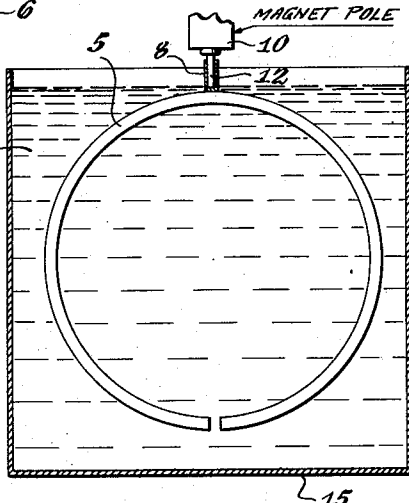
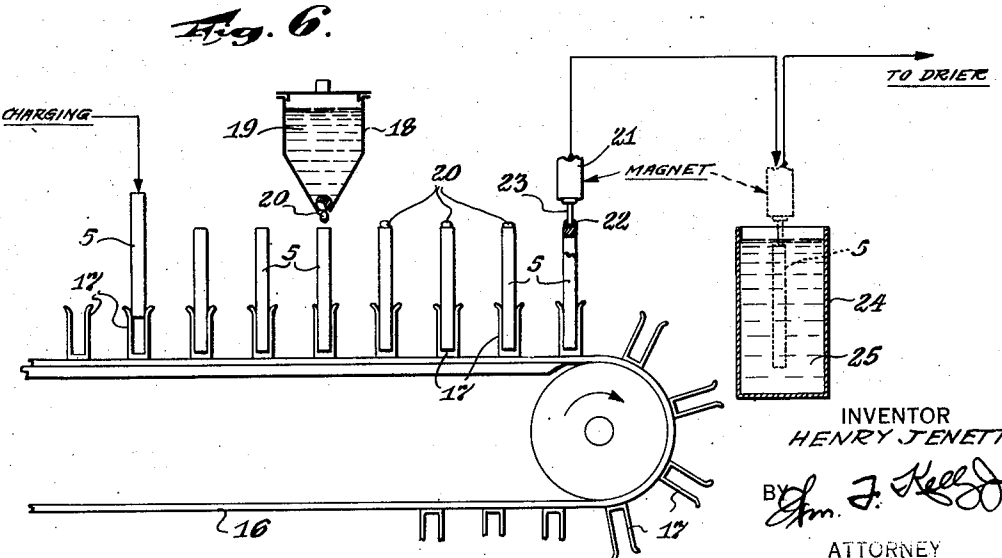
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2,525,358

SELF-SEALED PACKAGE AND METHOD OF PRODUCING

Filed July 2, 1946

2 Sheets-Sheet 1



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SELF-SEALED PACKAGE AND METHOD OF PRODUCING

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2 Sheets-Sheet 2

Fig. 8.

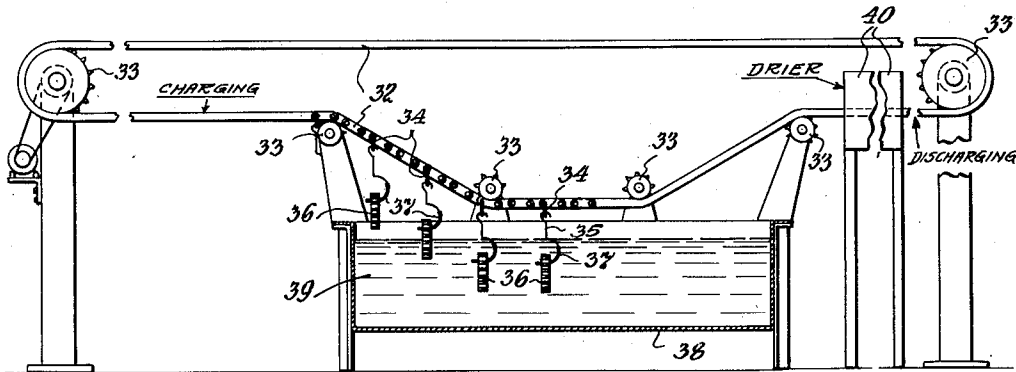


Fig. 9.

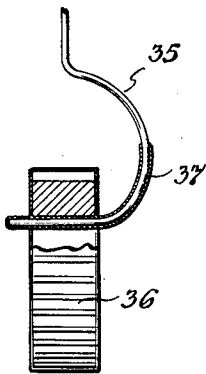
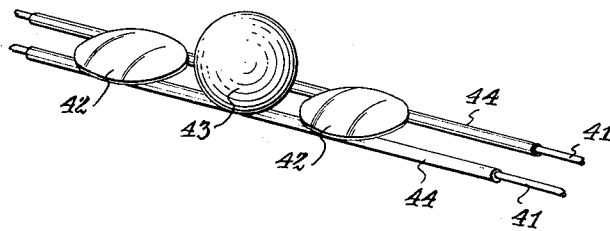


Fig. 10.



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SELF-SEALED PACKAGE AND METHOD OF PRODUCING

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Application July 2, 1946, Serial No. 681,082

9 Claims. (Cl. 206—46)

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The present invention relates to the packaging of materials in plastic foils, and is especially directed to improvements in the application of such packaging materials in the liquid form and to the self-sealed packages thus formed.

In the packaging industry it is now well known to apply strip-coating compositions directly to articles or packages requiring protection from moisture, noxious fumes, oxidation or corrosion caused by atmospheric changes or any other deleterious conditions, such for example as unsanitary handling, as well as from abrasion and ordinary wear and tear encountered in transit or in storage. The skin-tight coverings resulting from the application of the above referred to compositions directly to the article have numerous advantages over the older methods of packaging protection employing specially treated wrappers such as parchmentized, waxed, glassined, or resinated papers, or foils derived from chemically treated or regenerated cellulose, or those derived from various types of modified rubber or of synthetic elastomers and the like.

The direct application of protective materials to the articles offers not only a great saving in material but it cuts down the volume of air surrounding the packaged item to a minimum, thereby reducing the corrosion and oxidation hazards; it saves shipping and storage space as well as giving full dimensional visibility and enhancing the appearance of the article. Moreover, such direct application of the protective film eliminates the leakage caused by imperfect seams or bulky corners and, last but not least, it obviates the necessity of employing elaborate wrapping and sealing machinery, required for the use of prefabricated envelopes, bags, tubes or similar wrappers.

The strip-coating media most commonly used in the direct application of packaging materials in liquid form fall into three general categories as follows:

(1) Hot melts, consisting of plastic compositions, comprising varying proportions of cellulose esters or ethers, plasticizers, oils, waxes, gums or resins, colorants and other modifying agents, all of the components being substantially non-volatile in character, the masses becoming liquid upon the application of the relatively high temperature at which they are applied and solidifying on the articles upon cooling.

(2) Liquid coatings, comprising various proportions of plastic matter as above described and of volatile organic solvents, the compositions remaining liquid at room temperature and forming

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films or solid coatings on the articles upon the evaporation of the solvents.

(3) Reversible gels, comprising varying proportions of plastic matter and volatile solvents, the compositions being liquefiable at moderate temperature and reverting from this liquid state to a transitory gel stage upon application to the articles, then forming solid coherent films, upon the evaporation of the solvents.

All three types of these above enumerated strip-coating media have the faculty of "knitting," i. e., adhering to themselves whenever seams overlap, which property is generally taken advantage of in the so-called "double-dipping" process, consisting of immersing one end of the article or package in the coating medium and then dipping the other end to form an over-lapping seam. Wherever seams are undesirable, too costly, or not feasible for any reason whatever, the so-called "single-dip" method may be resorted to, the article being suspended from a cord or any other suitable support and immersed in toto, care being taken that the support be coated as well, part of the way at least, in order to insure a good seal at the point of contact of the latter with the article.

However, this particular method of packaging is subject to certain inherent disadvantages, principally because of the wicking action of the commonly used fibrous cords, which will carry moisture to the coated article. Even plastic strands which are sometimes substituted cannot entirely overcome the wicking action. When metallic filaments are substituted, the wicking action is minimized but there is the difference of contraction and expansion to contend with. Furthermore, since such filaments are fairly rigid, they result in jarring of the seal with frequent breakage thereof when the article is handled.

It is accordingly the primary object of the present invention to provide a self-sealing method of packaging articles of any configuration.

Another object of the present invention is the provision of a method for dip-coating an article of any desired configuration to form a self-sealed package.

Another object of the present invention is the method of single-dipping an article to form a completely sealed package, wherein the seal is maintained under all conditions until deliberately broken in order to use the article.

A further object of the present invention is the provision of a packaged article having a self-formed permanent seal.

Still further objects of the present invention will become obvious to those skilled in the art by

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reference to the accompanying drawings wherein:

Figure 1 is an elevational view of an article such as a piston ring having a self-sealed protective coating in accordance with the present invention.

Figure 2 is a sectional view taken on the line II—II of Figure 1.

Figure 3 is a sectional view taken on the line III—III of Figure 1.

Figure 4 is an elevational view showing a portion of the equipment used in one step of the method of the present invention of fabricating a self-sealed packaged article.

Figure 5 is an elevational view of a portion of the apparatus used in another step in the fabrication of a self-sealed packaged article such as that shown in Figure 1.

Figure 6 is a schematic illustration of another form of apparatus which may be employed in performing one step in the fabrication of a self-sealed packaged article such as the piston ring of Figure 1.

Figure 7 is a view partly in cross-section of an article such as a plurality of roller bearings to which a self-sealed protective coating is applied in accordance with the present invention.

Figure 8 is a schematic illustration of another form which an apparatus may take in fabricating a self-sealed packaged article, such as a ring gear, in accordance with the present invention.

Figure 9 is an enlarged fragmentary view partly in cross-section of a portion of the apparatus and article being coated as shown in Figure 8, and

Figure 10 is a perspective view of an article such as spheres and glass lenses, together with a support which may be used for providing a self-sealed protective coating thereon, in accordance with the present invention.

Referring now to the drawings in detail there is shown in Figures 1 to 3, inclusive, an article coated with a self-sealed protective plastic coating, such as a piston ring. It will be observed particularly from Figures 2 and 3 that the entire surface of the piston ring 5 is enshrouded with a protective coating 6 of uniform thickness, which bridges the customary oil groove 7. In addition the piston ring 5 has a small tab 8 resulting from the support employed during the immersing of the piston ring but the orifice or recess 9 within such tab does not extend to the surface of the ring but on the contrary the uniform thickness of the protective coating forms a bottom wall of the recess thus constituting a self-seal for the article.

In order to fabricate the self-sealed protective coating for the piston ring 5, for example, and to support the article to be coated, a permanent or electric magnet 10 may be utilized. A detent or the like of small diameter, such as a rod or the like 12, is held by the magnet and immersed for a part of its length in the coating material 13 within a suitable tank 14, as shown in Figure 4. This material 13 may be any of the strip-coating media above referred to, e. g. a hot-melt compound based on cellulose aceto-butyrate, plasticizer and colorants, or it may be a lacquer but preferably it is one of the types of strippable coatings described and claimed in my copending application Serial No. 628,381, filed November 13, 1945, now abandoned. After withdrawal from the coating bath, the supporting rod or detent 12 will thus have a coating of the same material and thickness as desired for the completed article.

The article such as the piston ring 5 is then

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picked up by the detent 12, since the coating thereon in no way affects the magnetic field of the magnet 10, and the ring 5 is then immersed in toto in the coating material, which may be within the same tank 14, or in a somewhat larger tank 15 as shown in Figure 5, to a point above the lower end of the detent 12. Upon removal from the tank 15, the detent 12 is retracted from the sleeve thus formed leaving the tab 8 shown in Figure 1, the precoating on the base of the detent, which initially constituted an intermediate layer, now forming an integral part of the entire coating on the piston ring 5 and a self-seal for the latter at the point of contact of the support with the coated article.

In lieu of predipping of the support I may utilize an endless conveyor 16, as shown in Figure 6, with such conveyor being provided with suitable fasteners 17 to retain the piston rings 5 in a vertical position. During movement of the conveyor with the rings in position thereon, the latter pass beneath a hopper or the like 18 which contains a quantity of the coating material 19 of any of the types above mentioned. As each such ring 5 passes a droplet 20 of the coating material 19 gravitates to the outer peripheral surface of the ring where it sets up sufficiently before reaching the magnet 21 to form a relatively thin patch 22 so that the magnet together with its detent 23 picks up the ring 5 at the point of the patch 22. The suspended ring is then immersed within the coating tank 24 containing the same type of material 25 as that within the hopper 18 and after withdrawal from the tank and suitable setting of the compound, the detent 23 is retracted. If the article has been dipped to the level of the patch 22, a smooth surfaced completely self-sealed article is obtained. However, if the recessed tab 8 is desired the article may be dipped to a point above the patch 22 to provide a tab of any desired length.

Although a permanent or electric magnet has been shown and described as the support for the article to be coated it will be appreciated that such type of support is restricted to magnetizable articles. However, for non-magnetic materials I may employ a support providing sufficient suction to hold the weight of the article to be coated. On the other hand, to coat a finely machined bearing 26 or the like as shown in Figure 7, or any other oddly shaped article, either metallic or otherwise, a thin steel wire or the like 27 is first coated with a strippable coating 28 of any of the type above mentioned. The bearing 26 or similar article is then supported on this coated wire 28, either singularly or in multiple, and immersed in the dip-tank containing the coating composition. When removed therefrom and upon setting, a uniform seamless protective coating is produced. The supporting wire 27 can then be withdrawn, as shown by the arrow in Figure 7, leaving a fine tubular channel 29 which is an integral part of the envelope enshrouding the bearing 26 or other article, which leaves no bare spot where the article and coated supporting wire contacted, thus again forming a self-sealed packaged article.

In instances where continuous dipping or relatively heavy articles such as gears or the like is desired the operation as illustrated in Figure 8 may be resorted to. For example, a conveyor in the form of an endless chain 32 passes around suitably positioned sprockets 33. Extending laterally of the chain are a plurality of loops 34 which are engaged by partially precoated hooks

or the like 35, as can be seen more readily in Figure 9. The ring gears 36 to be coated are in turn supported by the hooks 35 at their precoated portions 37 and owing to the path of the chain 32 and the length of the hooks 35, the ring gears 36 are carried through a dip-tank 38 containing the strip-coating material 39 at the proper depth, so that the ring gears are totally immersed. They then pass through a suitable tunnel 40 to accelerate setting of the composition either by cooling or by evaporation of the solvent. The coated gears together with their respective hooks 35 are removed from the discharge end of the conveyor chain 32 at which point they have the appearance as shown in Figure 9. The hook 35 is then retracted again leaving a sleeve which is integral with the envelope and forming a self-seal at the point where the precoated hook 35 and the ring gear 36 contacted.

Similar methods may be employed for supporting other oddly shaped articles such as spheres, glass lenses or fine wire springs, nail files, hacksaw blades and the like such as shown in Figure 10. By utilizing precoated wires or tubes 41 as a support, the various articles such as a glass lens 42 or ball 43 can be individually or continuously dipped by supporting them on the precoated wires or tubes, and feeding the articles through the dipping tank and the wire or tube subsequently withdrawn. The hollow sleeve 44 thus remaining in no way interferes with the continuity of the resulting protective coating on the article which is self-sealed and will serve as tear-tabs.

From the foregoing it should be obvious that a self-sealed strippable coating is herein provided which completely enshrouds substantially any article irrespective of size or shape. Moreover, such self-seal is fabricated by initially interposing a layer of the strippable material between the support and the article supported thereby, which layer subsequently becomes an integral part of the coating enshrouding the article. Although several types of coating composition have been herein referred to, the method of self-sealing packaged articles in accordance with the present invention is applicable whether the coating composition be of the hot-melt, lacquer, or reversible gel type, whether it be applied by dipping, brushing, spraying or any other manner of application, and whether the coating be intended for decorative, protective or any other purpose, so long as the direct contact between article and supporting or holding device is prevented by the interposition of a layer of compound, which subsequently becomes an integral part of the coating, thus obviating the need of a separate subsequent step of patching, covering, sealing, or otherwise closing the bare spot where the article and the support contacted.

Although several embodiments of the present invention have been shown and described it is to be understood that still further modifications thereof may be made without departing from the spirit and scope of the present invention.

I claim:

1. The method of packaging articles comprising disposing an intermediate layer of coating material for the article to be coated between the article and the support therefor and over a small area approximating that of the contacting surface of the support allowing the intermediate layer to set-up over the small surface area of contact, coating the article carried by the support with the coating material to a level above the point of contact between the intermediate

layer and the article to cause the coating to unite with the intermediate layer and form a self-sealed protective single layer coating completely enshrouding the article.

2. The method of packaging articles comprising disposing an intermediate layer of coating material for the article to be coated between the article and the support therefor and over a small area approximating that of the contacting surface of the support allowing the intermediate layer to set-up over such small surface area of contact, and coating the article carried by the support with the coating material to the level of the intermediate layer to cause the latter to unite with the coating material and form a self-sealed protective single layer coating material and form a self-sealed protective single layer coating of substantially uniform thickness completely enshrouding the article.

3. The method of packaging articles comprising disposing an intermediate layer of coating material for the article to be coated between the article and the support therefor and over a small area approximating that of the contacting surface of the support allowing the intermediate layer to set-up over such small surface area of contact, and coating the article carried by the support with the coating material to the level of the intermediate layer to cause the latter to unite with the coating material and form a self-sealed protective single layer coating of substantially uniform thickness completely enshrouding the article, and stripping the coating from the support.

4. The method of packaging articles comprising immersing the support for the articles to be coated for at least a portion of its length in the coating material to form an intermediate layer of coating material between the support and the article, immersing the article suspended by the support in the coating material to a level above the intermediate layer to cause the latter to unite with the coating material and form a self-sealed protective coating of substantially uniform thickness completely enshrouding the article, and stripping the coating from the support.

5. The method of packaging articles comprising interposing a quantity of coating material between the article to be coated and a support therefor and over a small area approximating that of the contacting surface of the support to prevent direct contact therebetween, allowing the intermediate layer to set-up over such small surface area of contact, and immersing the article depending from the support into the coating material to form a protective single layer coating of substantially uniform thickness completely enshrouding the article and which is self-sealed between adjacent surface areas of the article and the support.

6. The method of packaging articles comprising applying a coating of material to a support for at least a portion of its surface, suspending a plurality of the articles to be coated from the support, passing the articles with the coated portion of the support through the coating material at a level above the coated area of the support to form a self-sealed protective coating of substantially uniform thickness completely enshrouding each article, and withdrawing the support from its partial coating.

7. A package comprising an article having a seamless protective coating of strippable thermoplastic material of substantially uniform thickness completely enshrouding said article, and

provided with a hollow projection forming a self-sealed tab with one wall of said hollow tab constituting the single thickness coating on said article.

8. A package comprising a plurality of devices 5 having a substantially uniform coating of strip-pable plastic material completely enshrouding each device and interconnected by a tube of the same strippable material as the coating enshrouding each device, a portion of the wall of said tube 10 being integral with and forming a part of the coating enshrouding each device, to form a self-seal for each device of the complete package.

9. A package comprising a plurality of devices 15 each having a substantially uniform coating of strippable plastic material enshrouding it and each device being interconnected by a hollow tube of the same strippable material as the coating enshrouding each device, a portion of the wall of said tube being integral with and forming a part 20 of the coating enshrouding each device to form a self-seal therefor and adapted to form a tear-tab for stripping the coating from each device

when the latter is separated from the remaining devices of the complete package.

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