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H. E. COLLINS ETAL

3,425,379

METHOD OF MAKING A METALLIC CONTAINER

Filed Aug. 18, 1964

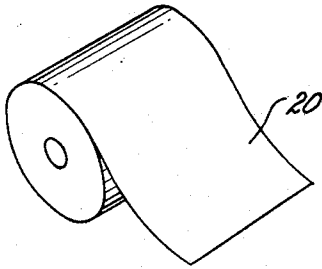


FIG. 1

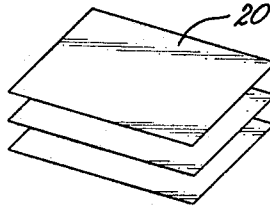


FIG. 2

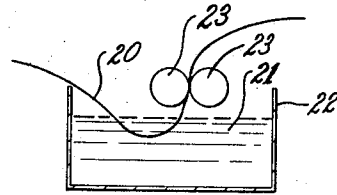


FIG. 3

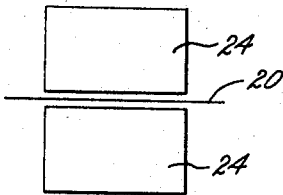


FIG. 4

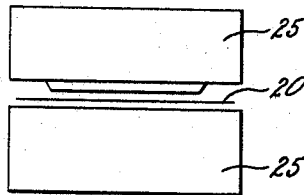


FIG. 5

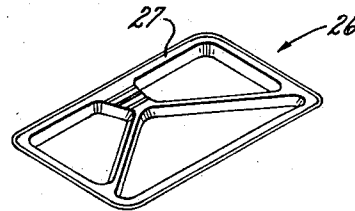


FIG. 6

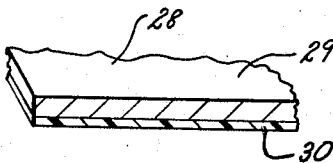


FIG. 7

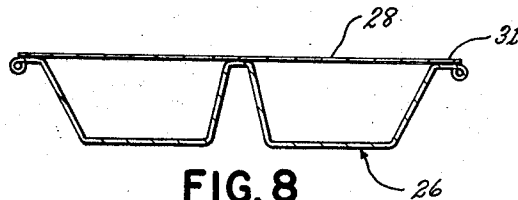


FIG. 8

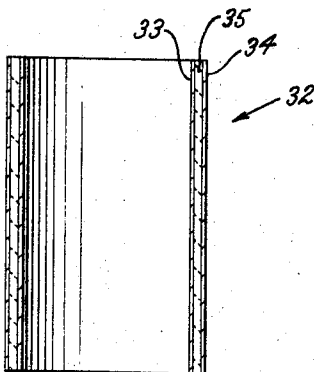


FIG. 9

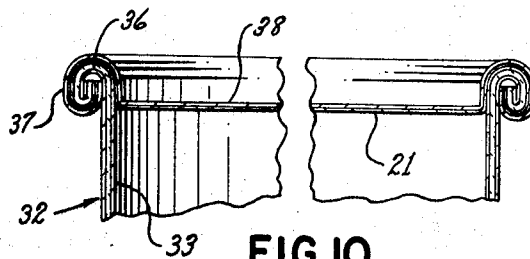


FIG. 10

INVENTORS  
HERBERT E. COLLINS  
FRED WARD HOLLOWAY, JR.  
BY *Blum, Palmer*  
*Mattheis*  
THEIR ATTORNEYS

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**METHOD OF MAKING A METALLIC CONTAINER**  
Herbert E. Collins and Fred Ward Holloway, Jr., Rich-  
mond, Va., assignors to Reynolds Metals Company,  
Richmond, Va., a corporation of Delaware

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14 Claims

## ABSTRACT OF THE DISCLOSURE

An aluminum-containing sheet or foil has a coating applied to both sides thereof. The coating includes oleic acid or an ester of oleic acid. The coating can comprise a suitable solvent, such as hexane, toluol or isopropanol. The coating is applied to the sheet and then dried as by passing the sheet through a solvent, such as hexane, toluol or isopropanol. The coated sheet can then be placed in a forming die to draw it into a receptacle or the like. The coated sheet resists rupturing in the die because of its coating. A cover may be sealed to the flange of the receptacle and the coating enhances the sealing characteristics of the flange. The cover may be an aluminum containing foil or sheet with a polyethylene layer to be heat sealed to the flange.

This invention relates to an improved metallic part or the like as well as to an improved method of making such part or the like.

It is well known that metallic receptacles for food and the like can be formed by drawing a sheet of aluminum-containing foil or the like into an open ended compartmentalized receptacle having a surrounding horizontal flange to which a cover member can be hermetically sealed by an interposed layer of heat sealing material carried by the cover member whereby the food product inside the receptacle is hermetically sealed therein.

However, it has been found that such hermetically sealed receptacles will not withstand ordinary abuse because a relatively weak heat sealed bond exists between the receptacle and its cover whereby flavor loss and product spoilage results.

Further, it is well known that when such a sheet of metallic foil or the like is drawn into the aforementioned compartmentalized open ended receptacle, some means must be utilized to provide lubrication between the sheet of material and the die forming means so as to prevent rupture of the relatively thin sheet of metallic foil during the drawing operation.

In the past, receptacle manufacturers have coated the sheets of metallic foil with stearic acid in order to provide the necessary lubrication between the sheet of material and the forming dies. However, it has been found that when such treated foil receptacles are thereafter utilized in combination with a heat sealable lid or the like, the heat seal resulting therebetween is relatively weak and provides an inferior finished product.

According to the teachings of this invention, an improved coating for the metallic foil is provided whereby not only does the coating provide lubrication means between the sheet of material and the forming dies so as to prevent rupture of the sheet of material during its subsequent drawing operation, but also the coating of this invention enhances the adhesive properties between the receptacle and the cover therefor whether the cover is heat sealed thereto or secured by other adhesive as desired.

In addition, it has been found that the coating of this invention tends to render the sheet of material corrosive resistant.

Accordingly, it is an object of this invention to provide improved metallic container part or the like having one

or more of the novel features of this invention as set forth above or hereinafter shown or described.

Another object of this invention is to provide an improved method for forming such a container part or the like, the method of this invention having one or more of the novel features set forth above or hereinafter shown or described.

Other objects, uses and advantages of this invention are apparent from a reading of this description which proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIGURE 1 is a perspective view illustrating metallic foil stock in roll form.

FIGURE 2 is a perspective view illustrating foil stock in sheet form.

FIGURE 3 is a schematic, cross-sectional view illustrating one method of applying the coating of this invention to the metallic material of FIGURE 1 or 2.

FIGURE 4 is a schematic side view illustrating one method for drying the coating which has been applied to the sheet of material in the manner illustrated in FIGURE 3.

FIGURE 5 is a schematic side view and illustrates the coated sheet of material in a forming press that forms the sheet of material into an open ended compartmentalized receptacle.

FIGURE 6 is a perspective top view illustrating the formed receptacle of this invention.

FIGURE 7 is a fragmentary, cross-sectional, perspective view of one embodiment of the cover member of this invention.

FIGURE 8 is an axial cross-sectional view of the improved container of this invention formed from the receptacle of FIGURE 6 and the cover member of FIGURE 7.

FIGURE 9 is a cross-sectional view of a container body formed from a plurality of plies in a spirally wound manner or convolutely wound manner as desired.

FIGURE 10 is an enlarged, fragmentary cross-sectional view illustrating the container body of FIGURE 9 joined to a container lid or the like.

While the various features of this invention are hereinafter described and illustrated in connection with metallic foil being utilized to form container parts, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to improve other objects or the like.

Therefore, this invention is not to be limited to only the embodiments illustrated in the drawings, because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to FIGURES 1 and 2, the metallic foil stock, such as aluminum-containing metallic foil or the like, can be supplied in roll form as indicated by the reference numeral 20 in FIGURE 1 or in sheet form as indicated by the reference numeral 20 in FIGURE 2.

In either event, the metallic foil 20 is adapted to have a coating of this invention applied on the opposed sides thereof in any suitable manner such as by spraying, dipping, roller application, reverse rolling application, gravure cylinder rolling, or other means of metering the application of the coating thereon.

For example, reference is made to FIGURE 3 of this invention wherein the coating 21 of this invention is contained in a receptacle 22 and the metallic foil 20 is first passed through the coating 21 and then through a nip of a pair of rollers 23 so as to properly meter the amount of coating 21 thereon. In this manner, the coating 21 is applied to both sides of the sheet of metallic foil 20 to permit the metallic foil 20 to have improved characteristics for a purpose hereinafter described.

It has been found according to the teachings of this invention, that if the coating 21 includes oleic acid or an ester of oleic acid, the resulting coating 21 on the sheet of material 20 will readily permit the sheet of material to be drawn into a receptacle form or the like without a rupturing thereof because the coating provides a lubrication means between the sheet of material 20 and the forming die means, the coating 21 also readily permitting the formed sheet of material 20 to be adhesively secured to other structure or the like and also rendering the sheet of material 20 substantially corrosive resistant.

For example, the coating 21 can comprise about 2% by weight of glycerol monooleate in about 98% by weight of a suitable solvent, such as hexane, toluol or isopropylalcohol, whereby the coating applied to the sheet of material 20 in the manner illustrated in FIGURE 3 can be subsequently dried by passing the same through oven drying means 24 in FIGURE 4 wherein the solvent is evaporated and the ester of oleic acid is set up on the sheet of material 20.

The glycerol monooleate is available under the trade name of Glycerol Monooleate O of the Chemical Division of the Armour Industrial Chemical Company, Chicago, Ill.

Another coating containing oleic acid is available under the trade name of Hamidraw No. 301-2B-FDA from the Harry Miller Corporation of Philadelphia, Pa.

After the coated sheet of material 20 has the coating 21 dried thereon by the oven means 24, the coated sheet of material 20 can be placed in a conventional forming die means 25 in the manner illustrated in FIGURE 5 wherein the sheet of material 20 can be drawn into a receptacle 26 comprising a compartmentalized structure having an outer surrounding flat horizontal flange 27, the coated sheet of material 20 not rupturing in the die means 25 because the coating 21 acts as a lubricating means between the sheet of material 20 and the forming dies 25 to prevent such rupturing.

Thereafter, a suitable cover member 28 can be hermetically sealed to the horizontal flange 27 of the receptacle 26 by any suitable adhesive means to hermetically seal desired products in the receptacle 26.

For example, the cover member 28 illustrated in the drawings comprises a sheet of metallic foil 29 having a film 30 of polyethylene laminated thereto. Such cover member 28 is adapted to be placed over the filled receptacle 26 in the manner illustrated in FIGURE 8 and have its outer peripheral portion 31 heat sealed to the peripheral flange 27 whereby the heat sealable polyethylene 30 hermetically seals the cover member 28 to the filled receptacle 26, the coating 21 on the formed receptacle 26 enhancing the heat sealing of the cover member 28 to the receptacle 26.

While the cover member 28 has been previously described as being secured to the horizontal flange 27 of the receptacle 26 by a heat sealing means 30, it is to be understood that the coating 21 of this invention is also readily adaptable to permit other types of adhesives to secure the cover member 28 thereto.

However, in one example of this invention, it has been found that the receptacle 26 can be made from aluminum-containing metallic foil having a thickness of approximately 0.0045 of an inch thick and that the cover member 28 can be made from a layer 29 of aluminum-containing metallic foil of approximately 0.00035 of an inch thick with the polyethylene layer 30 being approximately 1/4 mils thick.

The coating 21 being applied to such a sheet 20 of metallic foil can be in a range from 0.02 to 0.08 lb. per ream of foil 20.

For example, it has been found that when the coating 21 is formed from 1% by weight of the aforementioned Harry Miller composition and 1% by weight of the Armour Industrial Chemical Company composition

in a 98% by weight hexane solvent, the following results were obtained.

It was found that by coating a sheet of material 20 with the coating 21 in the above manner, and, after drying the coating, another sheet of material could be heat sealed thereto with different heating head temperatures, pressures and time of dwell with the following results:

| Heating head temperature in degrees | Pressure applied by heating head in p.s.i. | Dwell of heating head in seconds | Pounds per square inch that heat seal resisted |
|-------------------------------------|--------------------------------------------|----------------------------------|------------------------------------------------|
| 325-----                            | 20                                         | 1/2                              | 1.62                                           |
| 325-----                            | 20                                         | 1                                | 2.05                                           |
| 325-----                            | 30                                         | 1/2                              | 1.91                                           |
| 325-----                            | 30                                         | 1                                | 2.37                                           |
| 325-----                            | 40                                         | 1/2                              | 2.03                                           |
| 325-----                            | 40                                         | 1                                | 2.26                                           |
| 350-----                            | 20                                         | 1/2                              | 1.85                                           |
| 350-----                            | 20                                         | 1                                | 2.27                                           |
| 350-----                            | 30                                         | 1/2                              | 1.75                                           |
| 350-----                            | 30                                         | 1                                | 2.59                                           |
| 350-----                            | 40                                         | 1/2                              | 2.08                                           |
| 350-----                            | 40                                         | 1                                | 2.42                                           |
| 375-----                            | 20                                         | 1/2                              | 2.15                                           |
| 375-----                            | 20                                         | 1                                | 2.44                                           |
| 375-----                            | 30                                         | 1/2                              | 2.38                                           |
| 375-----                            | 30                                         | 1                                | 2.64                                           |
| 375-----                            | 40                                         | 1/2                              | 2.66                                           |
| 375-----                            | 40                                         | 1                                | 2.74                                           |
| 400-----                            | 20                                         | 1/2                              | 2.31                                           |
| 400-----                            | 20                                         | 1                                | 2.54                                           |
| 400-----                            | 30                                         | 1/2                              | 2.33                                           |
| 400-----                            | 30                                         | 1                                | 2.74                                           |
| 400-----                            | 40                                         | 1/2                              | 2.44                                           |
| 400-----                            | 40                                         | 1                                | 2.67                                           |

When utilizing only the Harry Miller composition together with a toluol solvent, the following results were obtained when the heat sealing head had a temperature of 350° F., an applying pressure of 40 p.s.i. and with a 1 second heat seal dwell.

When the Harry Miller composition was 1% by weight of the coating 21, the resultant heat seal withstood 1.96 lbs. per square inch; when the Harry Miller composition was 1.5% by weight of the coating 21, the resulting heat seal withstood a pressure of 2.59 lbs. per sq. inch; when the Harry Miller composition was 2% by weight of the coating 21, the resulting heat seal withstood 1.62 lbs. per sq. inch; and when the Harry Miller composition was 2.5% by weight of the coating 21, the resulting heat seal withstood 1.13 lbs. per sq. inch.

Therefore, it can be seen that by utilizing a coating containing an ester of oleic acid, a sheet of metallic foil is readily adapted to be formed into the desired shape without rupture thereof, be readily adhesively secured to other structures and will be substantially corrosive resistant.

While the various features of this invention have been described above in connection with food receptacles of the general type illustrated in FIGURE 6, it is to be understood that the various features of this invention can be utilized with other containers or the like.

For example, reference is made to FIGURE 9 wherein a container body 32 is provided and comprises an inner lining 33 of metallic foil or the like, an outer label or wrapper 34 of metallic foil or the like and an interposed layer 35 of cardboard or the like, the container body 32 being formed by convolutely winding the layers 33-35 or spirally winding the same in the manner conventional in the art.

As illustrated in FIGURE 10, it can be seen that the container body 32 subsequently has the outer end 33 thereof simultaneously formed outwardly and joined to a curled flange 37 of a metallic cover member 38 in a conventional cover sealing manner. However, when the cover member 38 does not have the coating 21 of this invention thereon, it has been found that the lining 33 is more than likely to rupture during the can end sealing operation whereby adverse leaking subsequently results. By utilizing the coating 21 of this invention, the end 36 of the container body 32 is adapted to be readily formed to accept the can end closure 38 without rupture thereof because of the lubricating properties of the coating 21 which

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readily permits the foil of the container body 32 to be so formed. Further, if a sealant is utilized between the body 32 and end closure 38, the coating 21 promotes the sealing therebetween.

If desired, the foil lining 33 and wrapper 34 could also be coated with the coating 21 of this invention.

Therefore, it can be seen that not only does this invention provide an improved container or the like but also this invention provides improved parts for such a container or the like.

In addition, it can be seen that the various features of this invention are readily adaptable for improving the characteristics of other metallic objects or the like whereby this invention is not to be limited to any particular structure or use thereof.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. A method for forming a metallic member comprising the steps of coating said member with one of the group consisting of oleic acid and an ester of oleic acid, and forming said member into the desired configuration with forming means whereby said coating prevents rupture of said member by said forming means by acting as a lubricant therebetween.

2. A method for forming metallic foil or the like comprising the steps of coating said foil with one of the group consisting of oleic acid and an ester of oleic acid, and forming said foil into the desired configuration with forming means whereby said coating prevents rupture of said foil by said forming means by acting as a lubricant therebetween.

3. A method as set forth in claim 2 wherein said ester of said group comprises glycerol monooleate.

4. A method as set forth in claim 2 wherein said ester of said group is disposed in a solvent.

5. A method as set forth in claim 4 wherein said solvent is one of the group consisting of hexane, toluol and isopropanol.

6. A method as set forth in claim 4 and including the step of evaporating said solvent before forming said foil.

7. A method for making an object comprising the steps of coating a metallic member with one of the group con-

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sisting of oleic acid and an ester of oleic acid, forming said member into the desired configuration with forming means whereby said coating prevents rupture of said member by said forming means by acting as a lubricant therebetween, and securing another member to coated part of said metallic member with an interposed adhesive means.

8. A method for making a container or the like comprising the steps of coating a sheet of metallic foil with one of the group consisting of oleic acid and an ester of oleic acid, forming said sheet into the desired container part with forming means whereby said coating prevents rupture of said foil by said forming means by acting as a lubricant therebetween, and heat sealing another container part to a coated portion of said first-named container part whereby said coating enhances the heat seal securement between said container parts.

9. A method as set forth in claim 8 and including the step of providing polyolefin on said other container part to form said heat sealing means.

10. A method as set forth in claim 8 wherein said ester of said group comprises glycerol monooleate.

11. A method as set forth in claim 8 wherein said ester of said group is disposed in a solvent.

12. A method as set forth in claim 11 wherein said solvent is one of the group consisting of hexane, toluol and isopropanol.

13. A method as set forth in claim 11 and including the step of evaporating said solvent before forming said sheet.

14. A method for enhancing the characteristics of a metallic member comprising the step of coating said metallic member with one of the group consisting of oleic acid and an ester of oleic acid.

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RONALD D. GREFE, *Primary Examiner*.