Aug. 17, 1943. E. L. MACK ET AL 2,326,955

COATED FOIL

Filed June 11, 1938

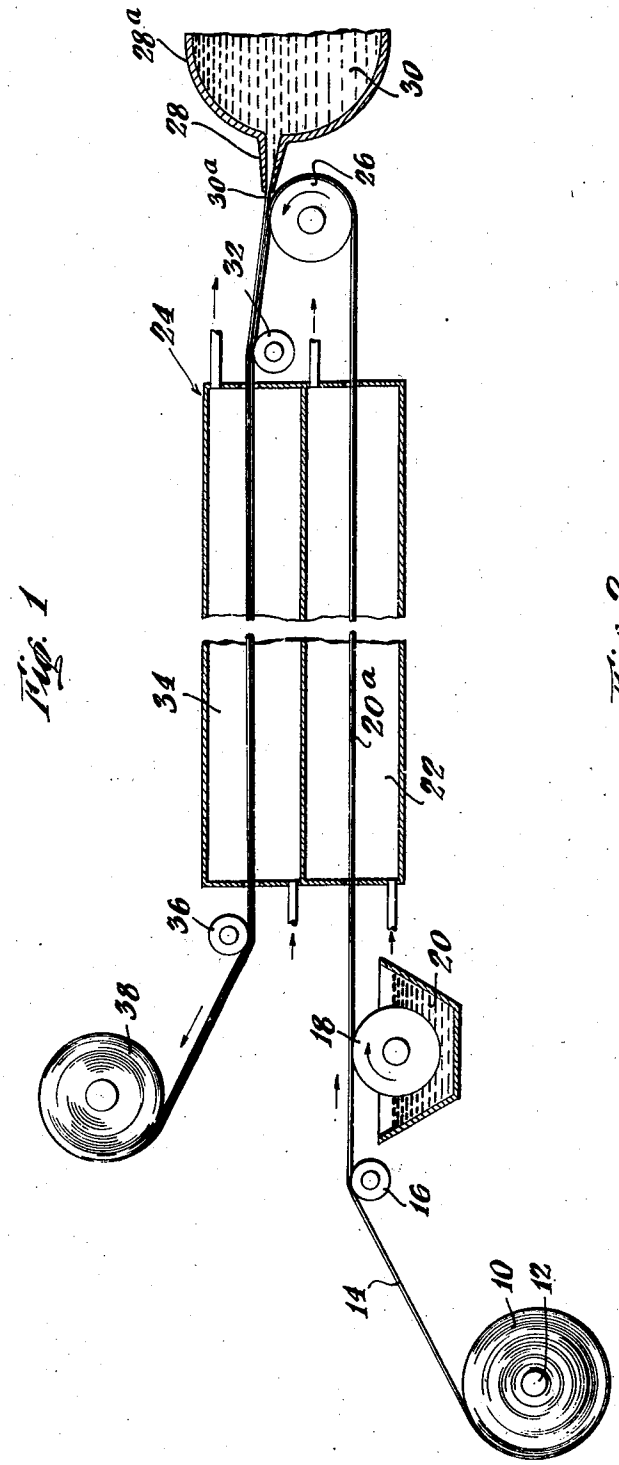


Fig. 1

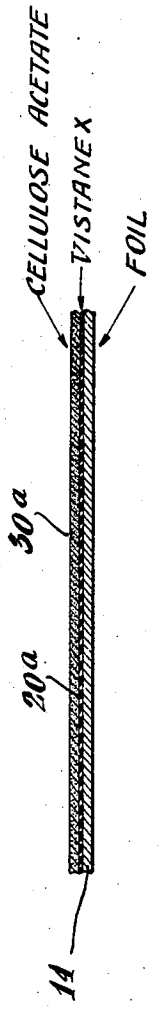


Fig. 2

INVENTORS
Edward L. Mack
BY Earle H. Morse
John C. Bliss
ATTORNEY

Patented Aug. 17, 1943 2,326,955

UNITED STATES PATENT OFFICE

2,326,955

COATED FOIL

Edward L. Mack, Douglaston, N. Y., and Earle H. Morse, Nutley, N. J., assignors to Reynolds Research Corporation, Richmond, Va., a corporation of Delaware.

Application June 11, 1938, Serial No. 213,160

16 Claims. (Cl. 117—74)

This invention relates to a new and improved product comprising a coated metal foil and particularly relates to an unannealed or partially annealed foil of aluminum coated with a thin layer of preferably transparent resilient material such as rubber or "Vistanex," a polymerized straight chain petroleum hydro-carbon, which is in turn overcoated with a cellulose derivative film such as cellulose acetate plus an appropriate plasticizer, or generally similar film having like qualities, and to a method of forming such coated foils. Vistanex is the trade-name for a polymerized straight chain hydrocarbon, namely, polyisobutylene, and is a substantially permanently tacky adhesive of relatively high viscosity which is substantially non-oxidizable at normal room temperature. In the practice of the invention those equivalents of cellulose acetate which are recognized in the art may be employed.

Heretofore annealed metal foils particularly aluminum foils of thin gauge have often been found inappropriate for use with the high speed packaging methods which it is desired to use in packaging various consumer goods as the foil web tends to rupture and to break. It has been found a distinct advantage to have the foil wrapping material as strong as possible. Various coatings have been applied to foils but in many instances such coatings do not adhere firmly to the highly polished surface of the metal foil. When unannealed aluminum foil is used, although it is stronger it has an unpleasant rattle, is brittle and hard, and cracks and crinkles. This applies also to unannealed zinc foil. The edges of unannealed foil also are likely to cut the fingers of persons handling the same. Partially annealed foil is stronger than fully annealed foil but naturally in part has the undesirable attributes of unannealed foil.

Therefore, it is an object of our invention to provide a new and novel product, namely a partly annealed or unannealed aluminum, aluminum-zinc, or zinc foil, or metal foils of like attributes which is coated with a thin layer of resilient rubber-like transparent material such as rubber or "Vistanex," which layer is in turn overcoated with a layer of cellulose derivative or film of like qualities, such new metal foil product having extremely desirable new characteristics including lessened rattle, increased strength, a smooth and soft handling effect including an attractive draping quality, an increased luster and also a desirable folding characteristic in that after it has been folded the line of fold may be smoothed out rather than being more or less permanent; also, this new product when the fingers of handlers contact its edge does not tend to cut.

It is also an object of our invention to include, if desired, in the cellulose derivative coating sufficient plasticizer so that the cellulose derivative base layer is rendered thermoplastic in character for its obviously desirable heat sealing quality so that packages may be sealed merely by application of heat and pressure and without the employment of an additional adhesive.

It is a further object of our invention to provide such a coated foil with printing matter underneath the coating by applying the printing matter to selected areas of the foil before coating the same; if desired the cellulose derivative base layer can be printed upon directly.

It is still a further object of our invention to continuously produce such coated foils by an efficient, rapid, and economical method as hereinafter described.

These and various other objects and advantages will be readily understood from the following description taken in connection with the accompanying drawing of preferred embodiments in the invention, in which modifications may be made without departing from the scope of the appended claims.

In the drawing:

Fig. 1 is a diagrammatic showing of an apparatus for the production of a coated metal foil made in accordance with our invention.

Fig. 2 is a cross-section of a coated foil illustrating an embodiment of our invention.

In these figures, a roll of unannealed aluminum foil 10 is carried upon a spool 12. The aluminum foil in this example may be of .0007" thick and the web 14 of aluminum foil is led over guide roller 16 to a "Vistanex" applicator roll 18 revolving in a bath 20 of "Vistanex" solution comprised preferably of 5% solution of "Vistanex" by weight in gasoline, thus applying a coating 20A of "Vistanex" to the foil web 14, which layer or coating of "Vistanex" when dry may be .0002" thick. The coated web is led into lower compartment 22 of the drying apparatus indicated generally as 24, and the volatile solvent is driven off, leaving a tacky rubbery-like transparent "Vistanex" coating; it is difficult if not impossible to roller-coat the cellulose derivative base coating upon the tacky "Vistanex." For commercial production spray coating, or coating with relatively high viscosity solutions from a wide slit-like extrusion nozzle slightly spaced from web 14, as described and claimed in our co-pending application, Serial No. 148,382, "Method and apparatus for forming films and film coatings," is desirable. Therefore, the coated foil is preferably led over roller 26. Extrusion nozzle 28 of pressure hopper 28A is slightly spaced, say ¾", from roller 26 and cellulose derivative base solution 30 is forced through nozzle 28, overcoating the "Vistanex" coating 20A with a layer of cellulose derivative base film 30A. Alternately spray-coating methods may be utilized for coating the

cellulose derivative layer upon the "Vistanex" coating.

The cellulose derivative base solution **30** may comprise about 25 parts of cellulose acetate, 10 parts of dimethyl phthalate by weight and 65 parts of acetone by weight and coatings of cellulose derivative base film of .0007" have been found to give a particularly satisfactory product. The web **14** is then led over guide roller **32** through upper compartment **34** of the drying apparatus **24** where the acetone is driven off, past guide roller **36** to the rewind **38**, thus giving a coated unannealed metal foil which includes a layer of foil .0007" thick, a layer of "Vistanex" .0002" thick co-extensive therewith, and a layer of cellulose derivative base film .0007" thick overlying the layer of "Vistanex."

If it is desired to make the cellulose derivative layer "heat sealing" or thermoplastic with moderate heat, various plasticizers may be employed, but we have found that 25 parts of cellulose acetate, 18 parts dimethyl phthalate, and 57 parts acetone, by weight, serve satisfactorily.

It will be recognized that various foil gauges may be advantageously employed to form a new and improved foil wrapping material made in accordance with our invention; foil ranges will ordinarily vary between .0005" thick to .002" thick with the "Vistanex" and cellulose derivative coatings proportionately varying in thickness for various desired effects. The "Vistanex" may vary between .0001" thick to .0005" thick, and the cellulose derivative layer may vary between .0005" thick to .002" thick. Also, various resilient rubbery materials, preferably transparent, may be substituted for the "Vistanex," such as rubber dissolved in an appropriate solvent, for example a volatile hydrocarbon. Of course, dependent upon the method of coating employed, solutions of various viscosities may be utilized, as will be recognized by those skilled in the art. The cellulose derivative layer tends to adhere firmly to the "Vistanex" layer which latter is soft and rubbery and tends to be tacky; a further advantage is that foils which have some traces of oil from rolling can be employed as a base for our new product, without cleaning, because of the adherent qualities of "Vistanex."

A coated unannealed or partially annealed foil made as described has a high luster, is strong for use in packaging machinery, has good foldability, is sound-deadened by particularly the "Vistanex" layer, and the coatings are exceptionally adherent one to another and to the foil. While the new product described includes a coated thin metallic foil of high temper, such coatings applied to low temper foils strengthen the foil, give a high luster, and are firmly adherent. If desired the foil may be printed upon in selected areas before being coated, or the printing may be applied to the cellulose derivative base film.

It will be understood that while the illustrated forms of the invention which we have described represent certain preferred embodiments, we do not wish to limit ourselves to the details as shown since it is obvious that the same may be widely varied without departing from the spirit of the invention as described and claimed in the appended claims.

We claim:

1. As a new product a thin metal foil of relatively high temper, a coating of "Vistanex" thereupon and an overcoating of cellulose derivative film upon the said Vistanex coating.

2. The product as defined in claim 1 wherein the foil is unannealed aluminum foil.

3. The product as defined in claim 1 wherein the foil is partially annealed aluminum foil.

4. The product as defined in claim 1 wherein the foil is unannealed zinc foil.

5. The product as defined in claim 1 wherein the foil is partially annealed zinc foil.

6. As a new wrapping material having improved strength and luster, a thin metal foil of relatively high temper, a relatively permanently tacky, elastic, flexible, resilient, transparent, firmly metal adherent coating co-extensive therewith, and an overcoating of cellulose derivative base film upon said transparent coating.

7. A wrapping material as defined in claim 6 wherein the said transparent coating is rubber.

8. A wrapping material as defined in claim 6 wherein the said transparent coating is "Vistanex."

9. A wrapping material as defined in claim 8 wherein the foil is not more than partially annealed aluminum foil of a thickness between .0005"–.002" and wherein said transparent coating comprises "Vistanex" of a thickness between .0001"–.0005" and wherein said cellulose derivative layer is of a thickness between .0005"–.002".

10. A wrapping material as defined in claim 6 wherein said cellulose derivative film includes a plasticizer and is thermoplastic under moderate heat conditions so that the same is "heat sealing."

11. As a new wrapping material having improved strength and luster, a metal foil, a relatively permanently tacky, elastic, flexible, resilient, transparent, tenaciously metal adherent coating co-extensive therewith, and an overcoating of cellulose derivative base film upon said transparent coating.

12. A wrapping material as defined in claim 11 wherein said cellulose derivative base film includes a plasticizer and is thermoplastic under moderate heat conditions so that the same is "heat sealing."

13. A new wrapping material which includes a metal foil of relatively high temper, a first layer of relatively permanently tacky, elastic, flexible, resilient highly adhesive transparent material superposed thereupon, and a second layer of cellulose derivative base film superposed upon said first layer.

14. A material as defined in claim 13 wherein said first layer is tacky at ordinary room temperatures and said second layer is thermoplastic under moderate heat conditions so that the same is "heat sealing."

15. As a new wrapping product, a thin flexible metal foil between .0005"–.002" thick normally having a crackle or rattle, a relatively permanently tacky metal adherent, flexible, resilient, elastic, continuous film coating between .0001"–.0005" thick thereupon, and a thin overcoating of cellulose derivative film between .0005" to .002" thick upon said first permanently tacky coating, whereby the rattle of the foil is substantially lessened and the same has improved creasing, draping and strength characteristics.

16. A product as defined in claim 15, wherein the permanently tacky film coating is "Vistanex."

EDWARD L. MACK.
EARLE H. MORSE.