June 4, 1940. W. W. ROWE 2,202,870

CREPED ARTICLE INCLUDING METAL FOIL

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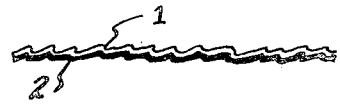


FIG. 1.

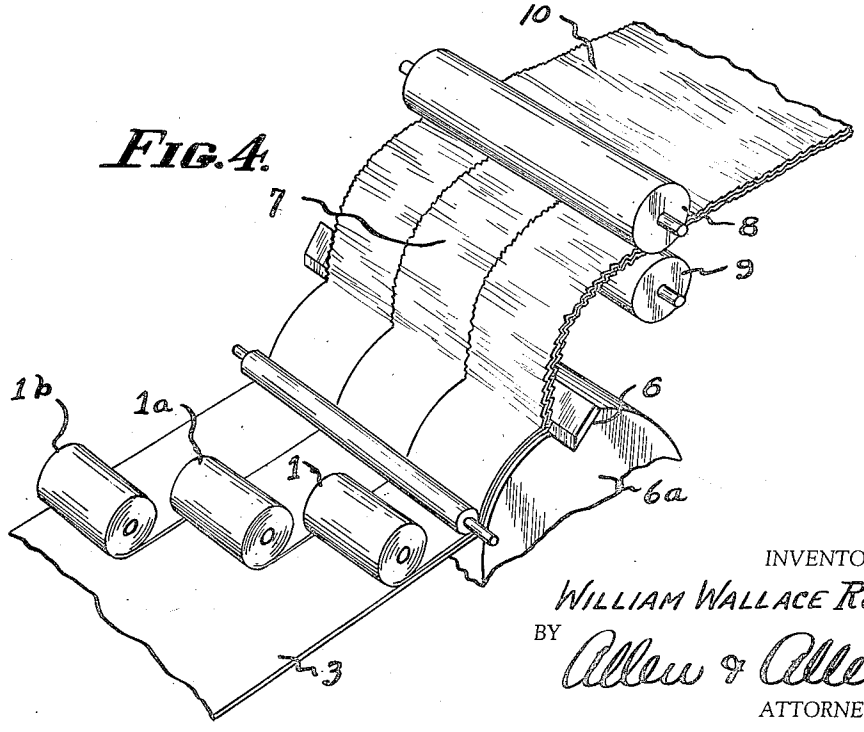


FIG. 2.



FIG. 3.

FIG. 4.



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CREPED ARTICLE INCLUDING METAL FOIL

William Wallace Rowe, Cincinnati, Ohio, assignor to The Paper Service Company, Lockland, Ohio, a corporation of Ohio

Application August 5, 1935, Serial No. 34,688

1 Claim. (Cl. 154—55)

My invention relates to creped articles including metal foils, usually, though not necessarily on the exposed surface thereof. The various specific objects of my invention will be apparent to one skilled in the art upon reading these specifications. The invention herein set forth adapts creped materials to new fields for which they have hitherto been considered unsuitable, and in particular to various decorative, insulative and isolative uses. I shall describe my invention in connection with certain exemplary embodiments which, however, are not limiting.

Reference is made to the drawing wherein:

Figure 1 is a sectional view of a creped foil.

Fig. 2 is a sectional view of an exemplary composite product.

Fig. 3 is a sectional view of another form of exemplary product.

Fig. 4 is a purely diagrammatic illustration of certain process steps useful in the manufacture of my products.

Hitherto, while foils have been embossed between rolls and otherwise decorated, there has been no attempt prior to my work to apply creping thereto. I have found it possible, however, to crepe metal foils as such by binding them to a creping surface by an adhesive of suitable strength, and removing them from said surface by a doctor or the like whereby to crepe them. There are a number of suitable adhesives, including, but without limitation, rubbers and rubber dispersions, resins, bitumens and the like; and the fineness of the creping can be controlled, for any given foil, by the configuration or angle of the creping knife, and by the nature and quantity of the positive adhesive. Metal foils may be made to respond very well to the process of my Reissue Patent No. 17,633.

Metal foils may also be doubly creped along diagonal lines in accordance with the teachings of the patent to William C. Kemp, entitled The art of producing multi-lateral stretchability in paper webs or the like, No. 2,008,181, issued July 16, 1935, and I prefer this by reason of the exceedingly attractive surface texture imparted to foils by this procedure.

A creped foil has certain novel and valuable characteristics. It has, for one thing, a new appearance and visual texture, due to the crinkles therein, which appearance is highly valuable in decorative materials such as wall coverings, and the like. This appearance and texture can be considerably varied, both by varying the nature of the creping operation and also by a number of after treatments. Again the foil is rendered expansible by the creping, and when doubly creped may be rendered expansible in all directions, having substantially any desired amount of residual stretchability. This is a new characteristic of metal foils, and is of importance from a decorative standpoint in that the foil can be made very readily to conform to highly irregular surfaces without apparent pleats or folds; and is important from the standpoint of purely utilitarian usage in that the product, by reason of its expansibility is not liable to disruption upon distortion. The number of reflecting surfaces or facets of the foil is increased by creping. The foil may be creped without disruption, and therefore can retain all of its original proofness. The persistence of the creping, or other adhesive on the foil is not objectionable for this reason, while it may be highly advantageous for other reasons; and the adhesive does not strike through nor stain the opposite surface of the foil. These advantages are added to the foil without loss of any of its original qualities.

I have shown in Figure 1 a creped foil 1, having upon one face a layer 2 of the creping adhesive.

A creped foil is particularly advantageous for juncture to other webs. This is especially desirable in view of the thinness and delicacy of many foils. The backing web imparts strength both as against breaking and tearing, and likewise imparts bulk and body. The backing web may be creped or uncreped as desired, or may be a laminated structure, part of which is creped, and part uncreped. In many instances it will be found preferable to laminate the foil to a backing web, and then to crepe the composite product.

A peculiar characteristic of metal foil is that when bent it tends to stay bent. This is of interest in a creping process because it means that when the crinkles are put into such a web they tend to remain there permanently. Paper has the same characteristics only to a very much smaller degree. Consequently in the combination of paper, for example, and foil, the foil helps the composite web to retain the expansibility originally imparted thereto by the creping step. It is not particularly difficult to impart a desired amount of stretch to a web; but with paper or cloth webs the retention of this strength during subsequent processing or during subsequent steps in the process is a serious problem. The conjoint creping of a web of foil and a web of backing substance is all the more desirable for this reason.

In forming a duplex or multiplex article in-

cluding a foil, I prefer to follow the procedures and use the apparatus set forth in a companion application in my name entitled Processes and machines for making creped composite webs, Ser. No. 34,689, filed August 5, 1935.

I have illustrated in Fig. 2 a composite article comprising a layer of paper 3 bearing or not, as desired, a layer of creping adhesive 4 thereon, cemented by means of an adhesive 2 to the layer of foil 1, the whole being conjointly creped. Such products are especially advantageous as decorative wrappings and coverings, and as wall coverings and the like.

Certain highly reflective foils, as is known, have an insulating effect which they retain in large measure when creped. The composite product of Fig. 2 thus makes an insulating material which can be used either exposed on the inner or outer surfaces of a space to be insulated, or in the interior of a wall construction. When universally stretchable, as when made in accordance with the teachings of the Kemp application referred to, or when corrugated, for example, in addition to being creped, the material will be capable of resisting distortion without disruption because it can expand in all directions, and can be very easily applied. It likewise can be readily applied as a wall covering by cementing, and where a residual layer of the creping adhesive 4 is of thermoplastic character, it can be heat sealed to a wall or other structure. Also where the creping adhesive is covered with a light cellulose wadding, as in my copending application, Ser. No. 668,106, filed April 26, 1933, the heat sealing can take place through this wadding. Where the adhesive is one of a character requiring the addition of another agent to develop tackiness, it may be so treated before application. Universal stretchability in the composite material will make it conform very readily to highly irregular surfaces, and also greatly facilitates the butting of the edges of adjacent strips or rolls of material so applied. Likewise the material may be used for external coverings of buildings or other structures, where protection is desired from intense solar radiation.

In Fig. 3 I have indicated the material of Fig. 2 backed to a web of cloth 5. Such material, while having little, if any, over-all stretchability, is nevertheless very durable and highly resistant to tearing, distortion, and puncturing strains. It therefore finds special uses where these qualities are important, and in particular in the manufacture of fabricated articles, such as bags, or the like.

I have indicated in Fig. 4, entirely diagrammatically, a method of manufacture of a duplex article of a width greater than the width of any foil obtainable. I have indicated a web of paper 3, to which webs of foil 1, 1*a* and 1*b* are attached in butting or slightly overlapping relationship by means of a suitable adhesive. 6 indicates a creping doctor, 6*a* a creping surface and the creped product is indicated at 7. In the creped product, the lines of juncture between the foil strips are in some instances apparent. In other instances, particularly where the product has been given crossing lines of creping crinkles, certain configurations, or creases, looking somewhat like seams, are likely to be visually apparent. I have found that both of these somewhat disadvantageous appearances may be obviated by giving the product an embossing, after creping, as by passing it between embossing rolls 8 and 9. The embossed product is indicated at 10. Products which have been given multi-lateral stretchability are especially easy to emboss, and take embossings without disruption. It will be understood that embossing may be an additional form of decoration, and also that the metal foil, where it forms an exposed surface of the article, may be further decorated, as by coloring or printing. Also it may be protected where desired, as by lacquering; or it may have applied over its surface, usually prior to creping, a transparent protective film, such as a film of cellulosic substance, or any of the newer transparent films, such as Protectoid or Pliofilm. Usually such films will be secured to the foil face by means of a suitable transparent adhesive.

In general the advantages of products of the character herein described may be summarized as follows: The metal foil is a non-staining and proof layer and prevents staining or darkening of an exposed surface by reason of the adhesive used, or otherwise. Foil is in general much more effective than other webs of similar thickness in excluding light, and consequently products of this nature are excellently adapted to the solution of problems wherein light exclusion is a factor, as in the manufacture of light-tight shades and the like. Many metal foils have resistance to acid, alkali or chemicals. Thus, for example, a bag designed for the shipment of materials having acid reactions may be made of the product of my invention, such as that illustrated in Fig. 3, where the foil 1 is a lead foil, and is disposed interiorly of the bag. Likewise metal foils have very much greater proofnes against moisture and gases, and enable me to manufacture articles where these qualities are important without especial reliance upon asphalt or similar coatings. A foil surface has no lint or fibers to pick up dust and dirt. Impurities will not cling to such surfaces, and such surfaces may be easily cleaned. Foil surfaces have greater resistance to abrasion, than has a paper surface. In the case of metal foils, no odors would be developed in the presence of moisture, as would be the case with paper. In the case of most metal foils, there is little or no deterioration from light or oxidation, and no checking or crazing of the surfaces. A foil is not affected by changes of temperature to which such products are ordinarily subjected, and forms a proof coating not susceptible to softening under high temperature, nor cracking under low temperature. In many uses where the isolative or insulative qualities of metal foils are important, the foils may, if desired, be sandwiched between layers of other webs. Foils also contribute to fire resistance. Many foils, as has been pointed out, have an insulative value. This is especially so in the case of aluminum foils, and these products find utility as auto-top materials, as outer surfacing materials for pipe coverings, as well as for general insulative uses.

A large number of laminated products may be made in accordance with my invention. Thus, the nature of the adhesive as well as the nature of the plies of the laminated product may be widely varied. An exemplary product is a foil joined to paper by means of an adhesive such as Latex, the composite product being creped by means of asphalt as a positive creping adhesive, the asphalt, of course, lying against the paper. The paper may be protected from penetration by the asphalt by means of a stain-resisting coating such as Latex, lying between the paper and the asphalt.

As indicated, the foil may be protected by a transparent film, adhered to the foil, either prior to or subsequent to creping, the two procedures giving products which differ considerably as to appearance. The product may be decorated as with a decoration which is on or in the foil, or on or in the adhesive used to cement the transparent film to the foil, or on or in the transparent film itself. Colored transparent films may be likewise employed. Any or all of the layers of a composite or laminated web may be embossed.

It will be clear that other modifications may be made in my invention without departing from the spirit thereof; and my invention is not limited otherwise than specifically set forth in the claim which follows.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

A multiply article comprising a layer of backing substance and a plurality of sidewise-disposed layers of metal foil, the whole being creped and embossed.

WILLIAM WALLACE ROWE.