

March 24, 1970

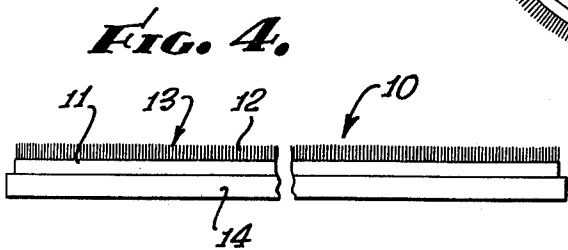
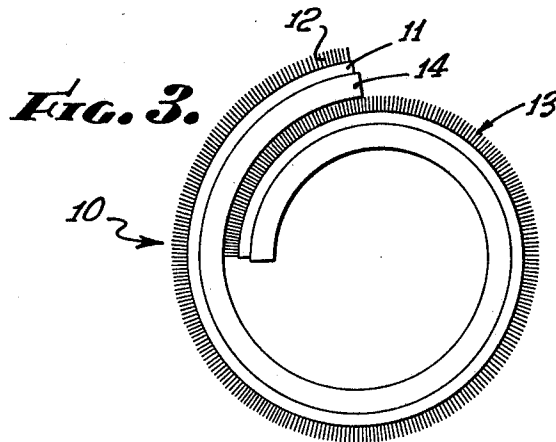
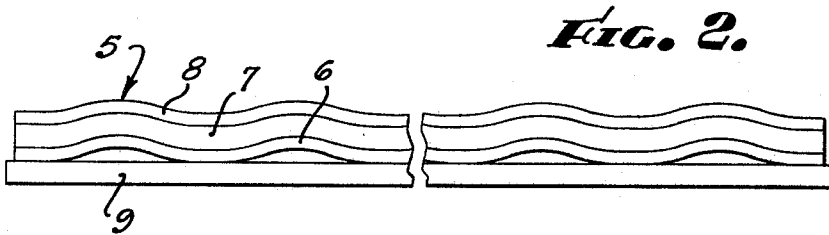
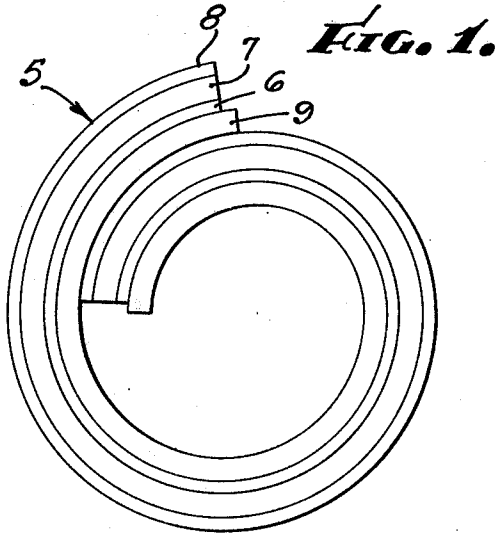
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3,502,207

FLOCKED PROTECTIVE COVERINGS

Filed April 19, 1966

2 Sheets-Sheet 1



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FLOCKED PROTECTIVE COVERINGS

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2 Sheets-Sheet 2

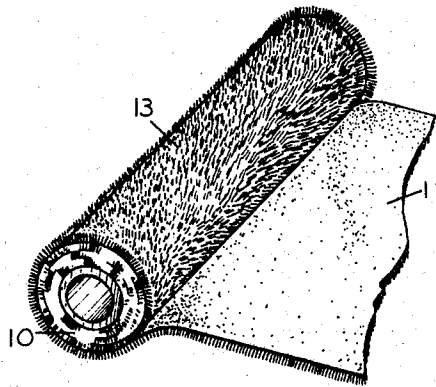


FIG. 5

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FLOCKED PROTECTIVE COVERINGS

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Continuation-in-part of application Ser. No. 191,598, May 1, 1962. This application Apr. 19, 1966, Ser. No. 556,250

Int. Cl. C09j 7/00; B44d 1/44

U.S. Cl. 206—59

12 Claims

ABSTRACT OF THE DISCLOSURE

This application describes an exceedingly pliant protective covering for finished surfaces of metal or plastic sheeting, comprising a distensible adhesive film base and a discrete layer of flocking attached imbeddedly to one surface thereof, the other surface being normally pressure sensitive and self-adhesionable to said sheeting. The specification also discloses the winding of pressure sensitive product into a roll without separable interliner and its capacity to be unwound therefrom when suitably structured.

CROSS REFERENCES TO RELATED APPLICATIONS

This application is a continuation-in-part of my pending application Ser. No. 191,598, filed May 1, 1962, and now abandoned. A joint application in which I am a co-inventor, Ser. No. 706,707, filed Feb. 16, 1968, includes certain subject matter disclosed in my applications identified above, a continuation of a joint application Ser. No. 504,407, filed Oct. 24, 1965, and now abandoned.

This invention relates to adhesive webs designed to protect finished surfaces of sheet metal, plastic, glass and the like, certain of which are windable into coils for storage and shipping. More particularly it pertains to an improvement in backfacing such an adhesive web with a discrete layer of randomly deposited flocking in lieu of release coating the back face, thereby permitting said web to be wound upon itself into a roll and unwound therefrom into engaging application with another surface. In certain applications the technique eliminates the need for a paper base which is traditional in such products, and thus permits a construction which is exceedingly pliant, controllably distensible and non-distortingly amenable to changes in laminar curvilinearity when used in the manner described.

Adhesive webs for the described purpose normally consist of a layer of pressure sensitive adhesive composition applied to one side of a paper web serving as a base member for the layer of adhesive, the other side being somewhat unified and release coated so as to form a barrier preventing the ever-tacky adhesive from bonding too securely to the back face of the carrier when it has been wound into a roll. In the use of non-creped forms thereof applied to coilable stainless steel strip, such masking paper tends to buckle and to become distorted when the coil is unwound and laid flat, due to the difference in the respective circumferences when coiled and the paper's lack of compensating pliancy.

In the course of developing such a product, I observed degradation in the release properties of standard back coatings such as some silicones when subjected to prolonged wound contact with certain pressure sensitive adhesive compositions. It then occurred to me that the chemical aspect of the problem might be circumvented by flocking the back surface of the paper base member in lieu of applying a release coating per se. The first reduction to practice gave evidence of the validity of the concept. Following this discovery the flocking was

applied to the back surface of a filmed layer of pressure sensitive adhesive composition without an interposed base member. This combination proved not only to be effective, but possessed of highly desirable characteristics for the subject purpose.

The following objectives pertinent to the subject invention derive from these discoveries.

The first and primary objective of the invention is to provide a pliant protective covering for metal or plastic sheeting, capable of non-buckling adherence thereto when the protected sheeting is subjected to changes in curvilinearity.

A corollary objective is to increase reliability and to minimize the cost of such protection.

A third object is that the backfacing of coverings of the general class described may be made transiently protective of an unmasked surface contraposed thereto as when in coiled contact therewith or when sheeted and stacked.

Another important object is that the exposed backfacing have a relatively low coefficient of friction to an opposed non-adhesive surface in order to facilitate the sliding of one flat length of metal across another.

A further object, and an additional reason for eliminating any tendency for the protective covering either to buckle or to sever, is to prevent damage to the sheeting in consequence thereof by maintaining full adhesional contact and uniform thicknessed integrity of the protective covering, thereby reducing the likelihood of its being disturbed or damaged in the handling of the protected sheets.

Still another object is to provide surface protection during fabrication of articles made from such sheeting, including the forming or drawing thereof with the covering in situ wherein it is preferable that it be pliant so as not to resist contraction and thereby cause it to buckle, that it be distensible so as to permit its being stretched, and that it be smoothly uniform in thickness so as to avoid a patterned imprint under pressure such as could occur if the covering were creped or creased.

A still further objective is to simplify perfect lamination by providing controlled distensibility since the combining of relatively non-distensible elements, one of which is as imperfect as paper, often requires a combination of skill, intelligent application of force and patience.

Another object is to permit winding the self-adhesive protective covering into a roll and unwinding it therefrom at the point of application.

Still another objective is the utilization of randomly deposited flocking for multiple purpose, inclusive of its being substituted for release coating, providing reinforcement for a supporting film, in combination therewith permitting elimination of paper support elements and the cost incident to impregnation and/or surface treatments thereof, and additionally providing cushionable protection both for finished surfaces and for unmasked surfaces contraposed thereagainst.

Still another object is that the backfacing may be chemically inert to pressure sensitive adhesives and releasable therefrom when such adhesives are suitably structured.

A further object concerns application of the flocked backfacing teaching broadly to web-based pressure sensitive adhesive product.

A final object is to utilize treated or coated flocking whenever applicable as a lesser-affinitive backfacing for products of the character described.

To illustrate and describe how these and other objects of this invention may be accomplished, reference now is made to the accompanying drawings comprising visual comparisons for clearer illustration of the advantages of the present invention over the old art.

FIGURE 1 is a side view of conventional masking sheet applied to metal sheeting wound into a coil.

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FIGURE 2 is a side view of the same masking sheet and metal sheeting after being unwound and laid flat.

FIGURE 3 is a side view of a pliant covering embodying the principles of this invention and applied similarly to metal sheeting wound into a coil.

FIGURE 4 is a side view of the same covering and metal sheeting after being unwound and laid flat.

FIGURE 5 is a perspective view of a roll of protective covering in accordance with the present invention with its flocked back surface in disengageable wound contact with the adhesive surface.

In reference to the drawings, in FIGURE 1 a conventional masking paper 5 consisting of a pressure sensitive adhesive layer 6 secured to a base member 7 such as paper, the opposite or outer surface being coated 8 with low-affinitive material, thereby causing the back face 8 to be releasable from the frontal surface of the adhesive 6 when the composite 5 is unwound from its manufactured roll. In FIGURE 1, said paper 5, concomitant with its having been unwound has been applied as a protective medium for, and attached to, the finished surface of metal sheet 9 and thence interwound into the shown coil.

In FIGURE 2, in which the several elements are identically part numbered, the coiled winding has been unreeled and laid flat. The linear difference in wound mean circumference between the base member 7 and the metal sheet 9 is readily evident by the buckling 15 which occurs when the metal is laid flat as shown in the illustration. The excess length of the masking paper 5 (as dominated by that of the base member 7) accumulates at spaced intervals, first peaking upward and then tending to overlay itself and to form triple-thicknessed creases when the metal sheets are stacked one upon another, which can be most troublesome and in some cases injurious to the metal sheet.

It will be apparent that such buckling is a function of linear incompressibility and that of necessity it entails some slippage at the interface. Bearing in mind this phenomenon, the spaced intervals between such disengaged or raised areas becomes a function of the masking paper's linear or planar stiffness, or its ability to push itself along in a plane parallel to that of the supporting metal sheet, being resisted in such movement by the strength of the adhesive.

It also will be apparent that whenever the protective backing is tensioned by opposite change in curvilinearity, the forces present are reversed as between the basic elements. The negative consequences of tensioning the backing, which applies positive force at the adhesional interface, stem from the certain application of such forces in shear, resulting in tension relief of a non-distensible backing either by creep or slippage and withdrawal from the ends of the metal sheet, or by breakage of the protective mask.

The lessons thus taught, combined with the described discoveries, led to the preferred embodiment of the invention as illustrated in FIGURES 3 and 4, wherein the pliant protective covering 10 consists of a filmed layer of ever-tacky adhesive composition 11 and a discrete layer of fibrous flocking 12 randomly deposited upon, and reliably anchored to, one surface of said composition, the two said layers thus comprising an integral combination 10 which is both pliant and distensible, one surface of which is self-adhesionable to the metal sheeting 14 against which it has been applied prior to being wound into the coil shown in FIGURE 3, and from which the protected sheeting later may be unwound and laid flat into the position shown in FIGURE 4. It will be noted that no buckling occurs since this type of covering lacks the stiffness which occasions such behavior.

FIGURE 5 shows a roll of protective covering 10 with its adhesive surface 11 being disengaged from wound contact with the flocked back face 13. This figure also should be deemed illustrative of a paper-based adhesive

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web having a flocked back face which similarly is disengageable when unwound.

Protective coverings for the purposes herein described customarily are applied in wide widths and often must be removed from large sheets. Such usage therefore demands relatively low specific adhesion to the protected surfaces. Since this invention derived from working with adhesive compositions applicable to such purpose, it will be apparent to those who are skilled in the art that what I claim is quite feasible and easily accomplished. It will be equally evident that releasability of a flocked backfacing from interwound contact with an ever-tacky adhesive composition will become progressively marginal as a direct function of cold flow. It will be understood therefore that I make no claim to that which obviously is impractical and that only a paucity of cold flow is tolerable when such an adhesive composition is subjected to interwound engagement with the flocking in the manner described.

In order to assist others to practice the herein teachings, including those who may be less knowledgeable of the art and to whom it otherwise might not be obvious, I may say that my work was done initially with compositions based upon plastic rather than rubberlike polymers. Such compositions are ideally suited to the described purposes, especially since they are heat-liquefiable and so applicable at 100% solids. Thus when utilized in the preferred embodiment previously described, wherein the flocking constitutes the remainder of the finished product, the adhesionable capacity of the composition may be used advantageously for anchorage of the flocking, thus obviating the need for a separate tie-coating. Prior to being cold set, when the thermoplastic adhesive is perfectly amorphous, anchorage of the flocking is relatively secure, although it is preferable that some imbedment be developed by application at moderately elevated temperature which in production practice may be done in tandem during the cooling cycle following the film's formation. It also will be understood that the flocking may be applied and secured to the back surface of a tensionable film or to that of paper-supported product by any of the techniques commonly practiced in the art.

Although a number of types of contact sensitive compositions may be found suitable for the applications herein described or for other applications wherein the herein teachings may be found to have utility, including either film development or the depositing of a coating layer upon a suitable base member and therein casting the adhesive composition in solution, emulsion or dispersion form and thereafter drying the composition, or thereafter fusing as required in organosols and plastisols, or in heat-liquefiable form and thereafter allowed to solidify upon cooling, that which presently is preferred for the usage described and utilized in the initial development of the invention comprises a heat-liquefiable composition consisting essentially of 20 to 25 parts of vinyl chloride-acetate copolymer such as Vinylite VYNS-3 and/or VYLF, 75 to 80 parts of polyester plasticizer having a very high molecular weight such as Fexol R2H, and 1 to 3 parts of stabilizer(s) such as commonly are used in vinyl compositions. It will be noted that in a given range of such copolymers, that having the higher intrinsic viscosity although requiring more plasticizing will tend to be capable of higher cohesion at a given level of pressure sensitivity. Therefore in the preferred embodiment of the invention, Vinylite VYNS-3 would be selected and the said plasticizer incorporated in approximate ratio of 4:1 thereto. To those who are skilled in the art it also will be apparent that even higher-viscosities copolymers may be utilized advantageously when suitably plasticized, and wherein disparate tack-producing modifiers may be incorporated to enhance the adhesion of the composition. It also will be noted that relatively small amounts of pigments may be used when desired.

Film thicknesses of the order of 0.003 to 0.006 inch may be considered normal in self-supporting films, the required caliper depending upon a number of factors

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among which must be included the comparative ratio of cohesion to surface adhesion, the amount of reinforcing contributed by the flocking including the depth of imbedment and the orientation of the adhesive-contacting fibrous segments, and the severity of the service to which the final product will be subjected.

Even though my invention teaches means by which low-affinitive release coatings may be avoided in the class of product described, their use when prudence counsels is neither rejected nor excluded. It is contemplated, in fact, that at least the superficial portions of the flocking may be so coated or treated and thereby made lesser-affinitive to the adhesive surface, especially when wound contact therewith might extract an inordinate number of insecurely attached fibrous segments and thereby so imperfect the adhesive surface as to render it unsuitable for the intended use. Since many of the more recently introduced polymeric compositions having high adhesion properties also are endowed with exceedingly low cold flow properties, their use in accordance with the herein teachings would be ideal although assuredly demanding of lessened affinity for the flocking due to their great adhesive strength.

While the basic principles of this invention have been disclosed hereabove and the presently preferable means for reducing it to practice taught, described and illustrated, it should be understood that the actual means may be varied widely within the scope of the basic concepts disclosed.

I claim as my invention:

1. In combination, a length of sheeting having a finished face and carrying a protective covering coextensively thereon, said covering consisting essentially of a tensionable base member having a layer of adhesive disposed upon one side and a discrete deposit of flocking secured to the other side, said adhesive having a surface which is normally pressure sensitive and adapted to be attached to said face by pressurable contact therewith but to permit said covering to be peeled cleanly therefrom when desired.

2. The combination as described in claim 1, wherein said combination is wound into a coil with said covering separating juxtaposed convolutions of said sheeting.

3. The combination as described in claim 1, wherein said covering is pliant and distensible, and in which the flocking comprises the sole fibrous content.

4. An article of manufacture comprising a length of self-adhesive protective covering wound into a roll, said covering consisting essentially of a tensionable base member having a layer of pressure sensitive adhesive disposed upon one side and a discrete deposit of flocking secured to the other side, and wherein superficial portions of said flocking are in wound contact with the apposed surface of said adhesive which has the property of a paucity of cold flow to permit substantial disengagement from said superficial portions when said covering is unwound from said roll.

5. The article of manufacture as claimed in claim 4, wherein said adhesive comprises a heat-liquefiable composition consisting essentially of vinyl resin and plasticizer.

6. The article of manufacture as described in claim 4, wherein said superficial portions are coated and adapted thereby to have a reduced affinity for said adhesive surface.

7. The article of manufacture as described in claim 4, wherein said covering is pliant and distensible, and in which the flocking comprises the sole fibrous content.

8. In combination, a length of sheet metal and a protective covering carried upon one face thereof, said covering comprising a distensible film base and a discrete layer of flocking, wherein said base consists of an adhesive

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composition having the flocking disposed coextensively in and upon one surface, its other surface being normally pressure-sensitive and adapted to be attached to said face by pressureable contact therewith but to permit said covering to be peeled cleanly therefrom when desired.

9. The combination in accordance with claim 8, wherein the sheet metal comprises a coilable strip thereof and the combination as described is wound into a coil.

10. A protective covering for sheet metal comprising a distensible film base and a discrete deposit of flocking, wherein the film base consists of an adhesive composition which carries the flocking coextensively in and upon one surface, its other surface being normally pressure sensitive, and wherein said covering is wound into a roll with superficial portions of said flocking contacting said other surface and adapted to be unwound therefrom without deleterious effect.

11. The protective covering as claimed in claim 10, wherein said adhesive composition comprises a heat-liquefiable composition consisting essentially of vinyl resin and plasticizer.

12. The protective covering in accordance with claim 10, wherein said portions of the flocking are coated and adapted thereby to have a reduced affinity for said other surface without deleterious effect thereupon.

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