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C. BATCHELLER

2,284,254

METHOD OF TREATING COMPOSITE STRIP PRODUCTS

Filed July 20, 1938

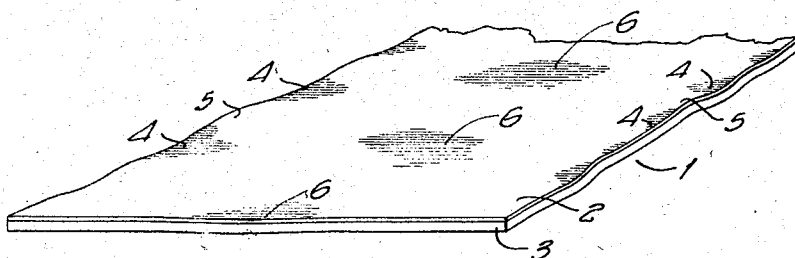


FIG. 1

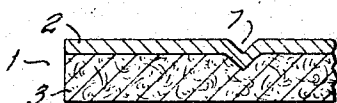


FIG. 2

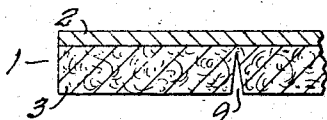


FIG. 6

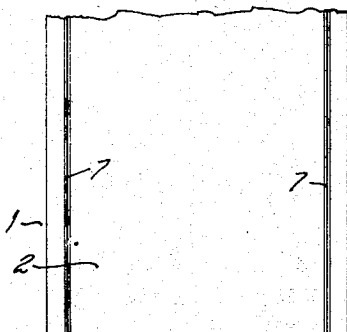


FIG. 3

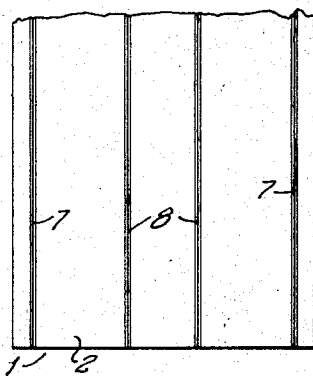


FIG. 4

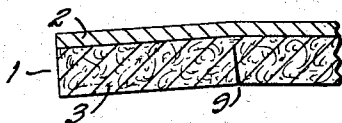


FIG. 7

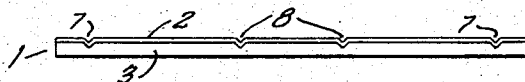


FIG. 5

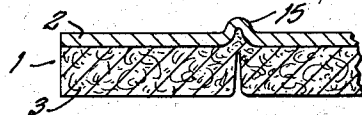


FIG. 9

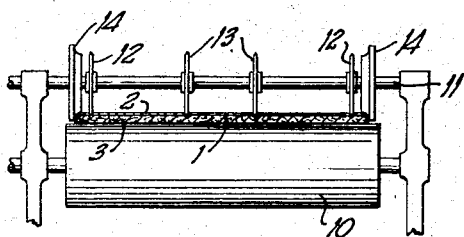


FIG. 8

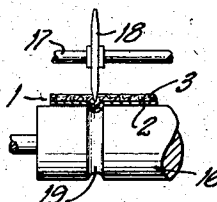


FIG. 10

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2,284,254

METHOD OF TREATING COMPOSITE STRIP PRODUCTS

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Application July 20, 1938, Serial No. 220,326

4 Claims. (Cl. 154—2)

My invention particularly relates to a method of providing the facing element of a flexible, composite strip product which comprises a facing element of thin, flexible, preferably corrosion-resistant, metal with a substantially even, unwarped surface.

Under cold rolling processes, exceedingly thin gauge ferrous and non-ferrous metal strips may be produced of a thickness order of from about 0.002" to 0.015" and in lengths of 500' and greater. Such thin strip products when made from an alloy steel containing about 8% or more of chromium have a highly polished, lustrous surface and may be used extensively for building trim, furniture application and like purposes because of their high resistance to corrosion, lightness in weight per unit of surface area, cheapness as compared to like corrosion-resistant alloy steels of heavier gauge and aesthetic and enduring properties as compared to ordinary carbon steels. Such thin, "paper-thin" gauge strips when combined with a suitable backing of flexible, yieldable material form a very useful, composite product which is particularly adapted for such uses.

Corrosion-resistant metals such as chromium-containing alloy steels, when cold rolled to such extremely thin gauges, work-harden to a considerable degree in the rolling process with the result that the strip is quite "springy." In thicknesses of the order above referred to, such strips are substantially thicker than, but by no means as flimsy as, foil and where their surface areas are substantial it is difficult to make them lie flat and they are otherwise difficult to work. However, when such strips are combined with a suitable backing as, for example, of the character hereinafter pointed out, they may be easily worked; may be cut, for example, with ordinary shears and may be rolled, coiled, bent and used practically with the same facility as ordinary stiff paper or light cardboard.

A suitable and cheap, flexible, yieldable backing element, which will render the composite product workable in the manners above pointed out may comprise a felted, cellulose-rag, fibre sheathing product, either impregnated with some substance, such as asphalt, or dry. Other backings may be, for example, a loosely felted mineral fibre mat, a heavy woven fabric, latex impregnated paper, or a rollable, paper board product. The backing is affixed to the thin metal facing by means of a suitable adhesive or cement, the union or bonding of the facing and the backing

elements being preferably affected by heavy external pressure.

Among the adhesives which are very suitable are clay base asphaltic emulsions of the "stable" type, synthetic resins and even special latex cements, all of which, because they are capable of yielding to some degree without rupture, produce a very strong and effective bond but do not reduce the flexibility of the finished composite product when dry.

A composite product comprising a facing element of thin, corrosion-resistant, alloy steel of the character above pointed out having affixed thereto, by means of an adhesive of the foregoing character, a backing of the type herein referred to may be easily worked, cut and the like; is flexible and may be rolled, coiled or bent without rupturing and this is made possible in part because of the character of the backing materials which are flexible, easily cut and possess that degree of "give" or slight extensibility and compressibility which is necessary to permit the composite product to be rolled or coiled without rupturing.

Such composite strip products, however, when fabricated in widths, for example, of about 27", provide substantial surface areas which, due primarily to the methods involved in the formation of the metal facing, are uneven and warped. Marked warping occurs in the marginal zones of the strip and substantially throughout the length thereof. Under such conditions, the strips when affixed to a wall or other supporting surface with their side edges in abutting relationship do not provide a neat appearance. Furthermore, warped areas occur in the central zones of the strips so that, when mounted, for example, on a flat surface, the strips have an uneven and slightly rolling or undulating appearance.

It is, therefore, the primary object of my invention to provide a method whereby the major portion of the surface of the facing of such composite products may be rendered substantially even and unwarped and another object resides in providing a method for treating such products whereby not only are the above results produced in an extremely cheap and efficient manner but the properties of rollability, flexibility and workability, above referred to, of the strip are preserved and, also, the appearance of the finished, strip product is in no way impaired but, on the other hand, rendered decorative.

The manner in which these and other objects are attained in the practice of the method of my invention as set forth in the following will best

be understood by reference to the accompanying drawing in which—

Fig. 1 is a somewhat exaggerated, fragmentary perspective view of a composite, strip product;

Fig. 2 is an enlarged, fragmentary sectional view of a marginal portion of the composite product illustrating one manner in which it may be treated in accordance with my invention;

Fig. 3 is a fragmentary plan view of the strip product illustrating marginal scores therein;

Fig. 4 is a view similar to Fig. 3 but illustrating an exemplary arrangement of a completely treated strip product;

Fig. 5 is a somewhat enlarged end elevation view of Fig. 4;

Fig. 6 is a view similar to Fig. 2 but illustrating a modified manner of treating or scoring the strip product;

Fig. 7 illustrates the configuration of the marginal portion of the strip shown in Fig. 6 after it has been scored;

Fig. 8 illustrates one form of apparatus for carrying out my method;

Fig. 9 is a view similar to Fig. 6 but illustrating a modified treatment of the strip product; and

Fig. 10 illustrates a modified apparatus for treating the product as shown in Fig. 9.

1 indicates generally a composite, flexible strip product of the character hereinabove pointed out and which comprises a facing strip 2 preferably of corrosion-resistant alloy steel and a backing 3 of yieldable, flexible material. Initially, when formed, warping occurs in the marginal portions of the strip thereby providing it with undulating edges comprising depressions such as indicated at 4 with crests or ridges 5 therebetween. Furthermore, in the central portion of the strip products will be found areas, such as indicated by the shaded portions 6, which are somewhat concave or depressed below the surrounding surface portions causing the strip to have an undulating appearance, at least in part, in the central portions thereof. Strip products which are warped in this manner do not present a desirable even, metallic surface appearance and, of course, if mounted with their side edges in abutting relationship, the assembly of adjacent strips does not appear neat nor orderly.

I have found that it is possible substantially to eliminate such undesirable, warped conditions and provide the strip with a substantially smooth, even surface by producing a linear deformation in or adjacent the zones of said strip wherein warping occurs. It is only necessary to produce linear or line-like deformations in the strip or a deformation in a comparatively narrow zone thereof although, of course, deformations of greater width may be formed and these deformations preferably extend longitudinally of the strips. When so arranged to extend substantially throughout the length of the strip, such deformations may be formed economically and, at the same time, they enhance to some degree the aesthetic properties of the finished product.

I prefer to create these deformations by scoring the strip product. This operation may be easily and cheaply carried out although the composite elements of the strip may be compressed together in zones of a width appreciably wider than can be obtained by scoring and, instead of producing a groove or depression, elevations or ridges may be formed in the metal facing element of the strip product. Such ridges, of course, may be linear or line-like.

In the following, therefore, although I will described my method with reference to subjecting the strip product to a scoring operation, it is to be understood that, in accordance with the principles of my invention, I may subject the strip to operations which will produce deformations of the characters above pointed out.

In treating a strip product, primarily for the purpose of removing or eliminating warping in the marginal zones thereof, a score, indicated at 7, is formed in the marginal zone of the strip extending in a direction generally lengthwise thereof and substantially parallel to its edge. A score 7 is preferably formed on each side of the strip and they are preferably spaced a short distance from the side edges thereof, say about $\frac{1}{2}$ " to 1". The facing element of the strip product is preferably subjected to the scoring operation thereby forming substantially V-shaped grooves or depressions therein as illustrated in Fig. 2 and, in scoring, the facing is preferably caused to penetrate the backing a distance sufficient to render the major portion of the surface thereof substantially even and unwarped but insufficient materially to affect the flexibility, bendability and rollability of the strip product. With this arrangement, though the grooves or deformations may extend lengthwise of the strip, they do not prevent rolling, bending and coiling of the strip in part or in its entirety.

In order to provide the central portion of the strip product with a substantially even surface and eliminate warping therein, where it is of substantial width, similar linear deformations such as grooves or depressions, like those indicated at 7, are formed in the central zone of the strip and preferably extend lengthwise thereof. Assuming that the strip product be of a width of about 24", I have found that two substantially parallel grooves or scores, as indicated at 8 in Fig. 4 may be formed in the central zone of the strip, spaced about 6" apart. Scores 8 may be formed in like manner as scores 7 in the facing 2 of the strip product and serve substantially completely to eliminate undulations or warping which may otherwise exist in the central zone of the strip product. By providing the strips with the scores 7 and 8, the major portion or substantially the entire surface of the composite strip product, save, of course, for the scores therein, is substantially even and unwarped as illustrated in Fig. 5.

Obviously, strips of appreciably lesser widths than that above assumed may be provided with smooth, even surfaces by providing a smaller number of scores therein and the number and arrangement of such scores or linear deformations may be varied as desired for decorative purposes and the like.

In Figs. 6 and 7, I have illustrated a second manner in which the strip products may be treated to provide them with smooth, substantially unwarped facing elements. The backing element 3 of the composite product may be scored as indicated at 9 practically in those zones where otherwise the grooves 7 would be formed on the reverse side thereof. Following the scoring operation, the marginal portions of the strip between the scores 9 and the edges will be sprung or slightly bent as illustrated in Fig. 7 and, of course, when the strip is affixed to a flat surface, the marginal portions thereof will be bent back substantially in the plane of the central portion of the surface thereof. The pro-

vision of scores in the foregoing manner serves to eliminate distortion or warping in the marginal portions of the strip products and, likewise, similar scores may be provided in the central zone of the backing 3 in substitution for the scores 8 above described.

Fig. 8 discloses one manner in which the strip products may be provided with grooves or scores. 10 indicates a roller over which the strip 1 may be passed and an arbor 11 may be rotatably mounted thereabove, carrying scoring discs 12 and 13. The discs 12 are arranged to form the scores 7 in the marginal zones of the strip 1 and discs 13 may be properly spaced as desired to form the scores 8 in the central zone of the strip product. Beveled, forming wheels 14 may be mounted on the arbor 11 adjacent the discs 12 for beveling the side edges of the strip 1 where it is desired to provide beveled-edge strips which will afford a more pronounced line of demarcation when mounted with their side edges adjacent each other.

By providing grooves or scores in the strip 1 extending longitudinally thereof, it should be apparent that the method above described may be economically and expediently carried out and the means employed may be of a fairly inexpensive and simple construction such as that illustrated in Fig. 8.

In Fig. 9, I have illustrated the strip product 1 provided with a ridge 15 instead of a groove for the purpose of providing the strip with a smooth, even surface over the major portion thereof. To form a linear deformation of this character, a roller 16 may be provided, as shown in Fig. 10, over which the strip 1 is passed with the facing element 2 thereof in contact with the roller. An arbor 17 carrying a forming tool 18 may be rotatably mounted over roller 16 with the tool in cooperative relationship to a circumferential groove 19 in the roller and in sufficiently close proximity to produce the ridge deformation in the strip 1 as illustrated. A multiplicity of grooves and forming tools, of course, may be provided simultaneously to form a plurality of ridges in the strip 1 in the same manner as the scoring operation is carried out with the apparatus of Fig. 8.

It should be noted that the strip product may be deformed in the manners above indicated to render the major portion of the strip surface substantially even and unwarped while, at the same time, the deformations may be of insufficient depth or height materially to affect the flexibility, rollability and bendability of the strip. For example, assuming that the facing of a composite strip of a thickness of about $\frac{1}{8}$ " is scored or grooved, such grooves may be formed of a depth up to about $\frac{1}{2}$ " to provide a smooth, unwarped surface over substantially the major portion of the strip and yet the strip may be flexed, rolled and bent with substantially the same facility as before being grooved.

By linearly deforming the strip product, the surface of the facing element thereof is rendered substantially smooth and even over the major portion thereof while the deformations, scores or ridges, serve additionally to provide a desirable decorative effect, serving to reduce the plainness of a surface formed entirely of such strip products arranged side by side in abutting relationship.

Hence, while I have described my invention in its preferred embodiments, it is to be understood that the words which I have used are words of description and not of limitation and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. The method of eliminating undulations in a rollable composite strip product comprising a facing of thin gauge corrosion-resistant alloy steel and a backing of comparatively yieldable sheet material adhesively secured to said facing which comprises producing a substantially linear deformation of said product extending through said undulations in a direction longitudinally of said product; the depth of said linear deformation being insufficient to prevent said product from being easily rolled in the direction thereof.

2. The method of eliminating undulations in a rollable composite strip product comprising a facing of thin gauge corrosion-resistant alloy steel and a backing of comparatively yieldable sheet material adhesively secured to said facing which comprises scoring said product along a plurality of substantially parallel lines extending through said undulations and in a direction longitudinally of said product; the depth or extent of the deformations being insufficient to prevent the easy longitudinal rolling of said product.

3. The method of eliminating undulations in a rollable composite strip product comprising a facing of thin gauge corrosion-resistant alloy steel and a backing of comparatively yieldable sheet material adhesively secured to said facing which comprises scoring said product longitudinally and through the zones of the undulations therein; the depth of the scoring being insufficient to prevent the easy, longitudinal rolling of said product.

4. The method of eliminating undulations in the marginal zones of a rollable composite strip product comprising a facing of thin gauge corrosion-resistant alloy steel and a backing of comparatively yieldable sheet material adhesively secured to said facing which comprises scoring said product longitudinally along the marginal edges thereof; the depth of said scoring being insufficient to prevent said product from being readily rolled in a direction longitudinally thereof.

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